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Business Dynamics in the 21st Century

Edited by Chee-Heong Quah and Ong Lin Dar



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Contributors

Chee Heong Quah, Ademir Clemente, Geert J.M. Braam, Miguel Merino, Dangis Gudelis, Felipe Furtado, Gibeon Aquino, Silvio Meira, Hisham Hamid Hawass, Alain Lepage, Okan Veli Şafaklı, Mustafa Ertanin, Wellington Didibhuku Thwala, Godfrey Mofokeng, Jarmo Heinonen, Mika Raassina, Ewa J Kleczyk

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Meet the editors



Dr Chee-Heong Quah is a senior lecturer at the Faculty of Business and Accountancy, University of Malaya, who in 2011 completed his doctorate degree (PhD) in International Business at the aforementioned institution with his thesis of study entitled "Identification of optimal currency areas in East Asia: A clustering approach". His research interests encompass international econom-

ics, monetary integration, financial crisis, optimum currency areas, and Austrian economics. His works have been published in scientific journals such as Asia Pacific Business Review; International Finance; Journal of Business, Economics, and Management; Journal of the Asia Pacific Economy; Actual Economic Problems; African Journal of Business and Management; South Asian Journal of Management; and International Journal of Asia Pacific Studies, of which some are ranked by SSCI and/or Scopus.



Dr Ong Lin Dar, PhD is a Lecturer at the Faculty of Business and Accountancy, University of Malaya. She teaches Organisational Behaviour and Management in the Faculty's Bachelor of Business Administration and Bachelor of Accountancy programmes. Her research interests include interpersonal trust, teamwork, employee performance and work behaviour.

Contents

Preface XI

Section 1 Performance and Quality as the Competitive Edge 1

- Chapter 1 **Improving Organizational
Performance Through Reward Systems 3**
Felipe Furtado, Gibeon Aquino and Silvio Meira
- Chapter 2 **Capacity Assessments for Improving
Corporate Efficiency – Case of Limassol
Turkish Cooperative Bank in Northern Cyprus 29**
Mustafa Ertanin and Okan Veli Şafaklı
- Chapter 3 **Sustainability and Quality
of Life Modeling the
Complexity of Governance 45**
Alain Lepage
- Chapter 4 **Processes Management
Guaranteeing Life-Cycle Quality of
the Maintenance Service Agreement – A Study
Regarding Outsourced Maintenance Services 65**
Jarmo Heinonen, Mika Raassina and Nick Moss
- Chapter 5 **Balanced Scorecard's Interpretative
Variability and Organizational Change 99**
Geert J.M. Braam
- Chapter 6 **Uncovering the Pre-Dispositional
Roots of Job Satisfaction 113**
Hisham Hamid Hawass
- Chapter 7 **An Exploratory Study of Problems Facing
Small and Medium Sized Contractors in
the Free State Province of South Africa 143**
Wellington Didibhuku Thwala
and Godfrey Mofokeng

Section 2 Networks and Logistics as the Link to Success 155

Chapter 8 **Managing Networks in Business Organizations 157**
Dangis Gudelis

Chapter 9 **Supply Chain Management in
International Logistics – RFID Applications 169**
Miguel Merino and Perfecto Mariño

Section 3 Money and Finance in Global Markets 193

Chapter 10 **The Determinants of
Corporate Debt Maturity Structure 195**
Ewa J. Kleczyk

Chapter 11 **The Brazilian Stock Market –
Dimension, Structure, and Main Features 221**
Ademir Clemente, Marinês Taffarel and Robert A. Espejo

Chapter 12 **The Case for Monetary Union in
East Asia – From Theory to Empirics 237**
Chee-Heong Quah

Preface

In the aftermath of the 2008-09 global financial and economic crisis, businesses and firms today face a totally different landscape than their counterparts in the past decade or so. In addition to a global marketplace where competition is stiff, domestic and international businesses need to deal with the rise of China as the economic powerhouse, liberalizations of real and financial markets in the developing world including the transition economies, lingering fiscal problems amongst the high-income countries, the emergence of Brazil, Russia, India, and South Africa as global market players, and the surge in the virtual communications across the globe.

Amidst this epoch of opportunity and turbulence, business firms need to equip themselves with new competencies that were never thought of before. For this reason, this book is timely as it introduces new insights into new problems in the aspects of performance and quality improvement, networking and logistics in the interconnected world, as well as developments in monetary and financial environment surrounding private enterprises today.

Along the line of achieving greater performance, quality, and efficiency, the question of sustainability, quality of life, and satisfaction of employees is not neglected and will be addressed in the first few chapters. In addition, whilst discussions are generally targeted to firms of all sizes, a chapter is devoted to challenges faced by small and medium enterprises. Subsequently, we shall look at new business paradigms in networks and logistics management. Finally, the money and finance section will bring to readers the developments in corporate capital structure, the features of stock market in one of the fastest growing emerging economies, and the case for a regional monetary integration in the emerging East Asia.

Readers shall find that reading this book is an enlightening and pleasant experience, as the discussions are delivered in a clear, straightforward, and “no-frills” manner – suitable to academics and practitioners. If desired, the book can serve as an additional piece of reference for teaching and research in business and economics.

Chee-Heong Quah and Ong Lin Dar

Department of Business Strategy and Policy,
Faculty of Business and Accountancy Building, University of Malaya,
Malaysia

Section 1

Performance and Quality as the Competitive Edge

Improving Organizational Performance Through Reward Systems

Felipe Furtado, Gibeon Aquino and Silvio Meira
Informatic Center of Federal University of Pernambuco
Department of Informatics and Applied Mathematics of
Federal University of Rio Grande do Norte
C.E.S.A.R, Recife Center of Advanced Studies and Systems
Brazil

1. Introduction

In order to improve the results of projects, senior management of software development companies define programs to measure and improve productivity. This interest is related to the need to monitor whether the results of teams are aligned with organizational strategic goals and whether they are achieving the levels of productivity expected, such as, for example, the levels set for finance, customer satisfaction, product quality levels, and so forth (Austin, 1996).

There are several strategies for improving productivity that are researched in the area of software development. The large majority are related to some previously studied factors that affect the productivity of teams. For example:

- Quality of management: the low productivity of teams is directly related to poor project management (Scacchi, 1984);
- Size of teams: small teams tend to be more productive (Behrens, 1983);
- Length and size of the project: increasing the length of the project or its size tend to decrease productivity (Maxwell *et al.*, 1996);
- Use of tools: the impacts of the increase or decrease in productivity related to introducing and using tools in the software development process (Bruckhaus *et al.*, 1996);
- Reuse of software artifacts (Boehm, 1999);
- Instability of the requirements (Yu *et al.*, 1991) and of the software architecture (Cain & McCrindle, 2002).

However, besides the areas related to tools, methodologies, work environment, management and reuse, the area of personal incentives, raised in a study by Boehm (Boehm *et al.*, 1982), should be considered as one of the initiatives to be integrated into a program for improving productivity.

Aligned to Boehm's way of thinking, DeMarco (1999), in his research studies on the productivity of teams, reported that the main problems of our work are not only of a technological nature. Many are sociological in nature.

The theories of motivation argue that the people who contribute more to a company should receive more for doing so (Campbell, 1998). This expectation has a significant influence on the design of incentive systems, and payment by merit programs reflects this influence. However, they do not always achieve their objectives.

Clincy (2003) pointed out some areas that can increase productivity in software development: software development processes, testing tools, defining the architecture and reward systems.

Based on the above thoughts, the importance of this issue is related to the fact that the recommendations proposed may be useful for solving day-to-day problems and need to consider the nature of reward systems so as to obtain a gain in productivity.

Figure 1 illustrates the examples cited above by using a time line, between 1982 and 2003.

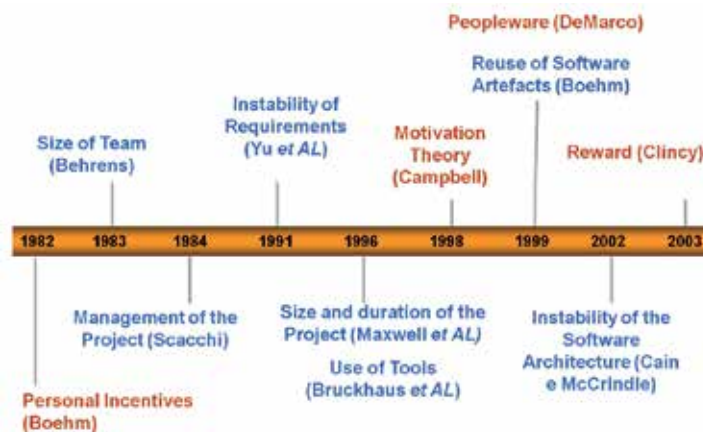


Fig. 1. Time-line related to some strategies for improving productivity.

In addition, this chapter will continue the discussion of a topic that is less emphasized in the software area compared with other strategies for improving productivity, since currently it is more related to technological aspects.

At the same time, this theme is widely discussed and implemented in the disciplines of Economics and Social Sciences (Holmstrom & Milgrom, 1991; Laffont & Martimort, 2002), where various aspects related to incentives have been applied and can be considered as lessons learned for software organizations software.

1.1 Context

There are several practices related to productivity in organizations that develop software, for example, productivity analysis (metrics of productivity and factors which affect productivity); techniques, processes, tools and environments for improving productivity; and estimating and measuring software.

Figure 2 presents an overview of how the problem of productivity can be mapped by using a framework that contains a set of solutions so that organizations may undertake an effective program of productivity. It consists of the following parts:

- *Infrastructure for productivity measurement programs*: resources (tools, roles and responsibilities, hardware, etc.) which gives support to implementing a program of productivity metrics;
- *Program of productivity metrics*: a metrics-based model that enables the assessment of productivity in different projects to be evaluated;
- *Productivity metrics*: metrics which may evaluate the productivity of software development projects;
- *Code quality and productivity*: the influence of the quality of software code on the productivity of the team, by means of an examination of the metrics of code that influence the quality of the code's architecture and metrics that influence productivity;
- *Productivity factors*: the main factors that influence productivity so as to serve as a guide for organizations which wish to start programs to improve productivity in software development projects;
- *Strategies to improve productivity*: a systemic view on the practices related to productivity in software development, thus the correlation between the solutions to be documented;
- *Model for improving productivity*: a model for continuously improving productivity following the standards used by CMMI (SEI, 2006) & MPS-BR (SOFTEX, 2006);
- Reward Systems.

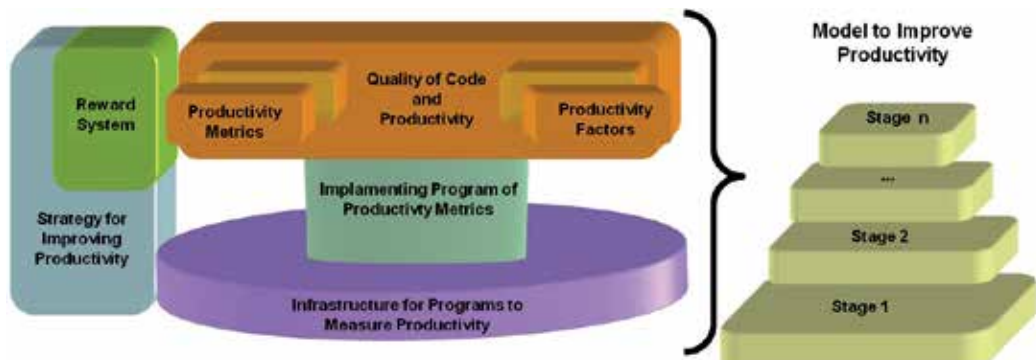


Fig. 2. Context of the proposal.

Based on this context, reward systems are the focus of this chapter, with the goal of being one of the strategies for improving productivity in software organizations.

Setting out from the correct definition and implementation of a reward system, also known as an incentive system, the organization seeks to measure some aspects related to team productivity. Based on these measures, teams are rewarded, for example, with financial recognition, promotions, awards and benefits. It is expected, therefore, to obtain a gain in productivity and, consequently, to improve quality and the indices of project performance (Austin, 1996).

This chapter seeks to answer the following question: In order to stimulate increased productivity, are reward systems effective as part of the organizational strategy to improve the productivity of a software company? And, moreover, what are the good practices that should be considered and the pitfalls that must be avoided when implementing a reward system?

To answer these questions, this chapter provides a set of recommendations in the form of guidelines that can guide managers to define and implement a reward program, in an organization, as part of the organizational strategy for increasing the productivity of teams engaged on software development projects. In addition, it addresses the negative impacts that these programs can cause to the productivity of teams, by generating the effect of the dysfunction of the measuring system, when the indicators are poorly defined or badly used.

2. Measurement systems

According to Deming (1986), a measurement system is a set of actions that should be performed with respect to the collection, validation and analysis of data used for decision making. It is the set of all definitions, methods and activities used to measure a process and its resulting products for the purposes of characterizing and understanding the process.

The search for metrics that represent certain dimensions of the software, such as size or cost, has been one of the greatest challenges in software development organizations. One way to implement practices to obtain indicators that represent the status of a project or organization is by using measurement systems. They aim to establish and sustain a culture of taking measurements and conducting quantitative analysis in organizations. Thus it may be seen that measurements help us to understand the world and to take decisions that are more correct (Pfleeger & Fenton, 1997). However, there are views that disagree with the influence of the practice of measurement on the activities performed by individuals within organizations.

In a recent paper, DeMarco (2009) is self-critical about his famous phrase "*You can't control what you can't measure*," published in his book *Controlling Software Projects* (DeMarco, 1982). Twenty-seven years later he says that implicit in this phrase is the idea that the control may, perhaps, be the most important aspect of a software project. But it is not. Many projects have been conducted almost without control, and produced wonderful products, like Google Earth or Wikipedia. And he adds:

"For the past 40 years, for example, we've tortured ourselves over our inability to finish a software project on time and on budget. ... , this never should have been the supreme goal. The more important goal is transformation, creating software that changes the world or that transforms a company or how it does business. ... Software development is and always will be somewhat experimental" (DeMarco, 2009). Earlier in the same article, DeMarco (2009) says he now believes *"...the more you focus on control, the more likely ... (your) project ... (will) deliver something of relatively minor value"* prior to which he wrote *"So, how do you manage a project without controlling it? Well, you manage the people and control the time and money"* and he says of his current views: *"...I'm advocating a management approach, one that might well steer the team toward agile methods, at least toward the incremental aspects of the agile school"*.

2.1 The real intentions of a measurement system

Insofar as software engineering matures, measurement begins to play an increasingly important role in the understanding and control of software development (Fenton, Kitchneham & Peeger, 1995). Organizations seek to measure characteristics of the software so as to check if the requirements are consistent and complete, if the project is of good quality or if the code is ready to be tested or delivered to the client. But what are the real intentions of a measurement system?

It is expected that organizations are seeking to understand and improve their development process, thus facilitating decisions that are taken by using information. To understand the real intentions of organizations, it should be realized that the measurement starts at the project level, where it is of great help to the manager. With the measurements, he/she can make decisions by making use of objective information on the following points (Jones *et al.*, 2001):

- Communicating more effectively;
- Monitoring specific project objectives. The measurements of the project can provide more precise information on the status of the project and the product which is being generated;
- Identifying and anticipating the correction of problems, which favors the manager taking a pro-active view;
- Making key decisions. All software projects are subject to restrictions. Cost, schedule, capacity of team and its technical quality, and performance have to be negotiated and prioritized in relation to the best cost benefit to ensure that the objectives of the project are achieved.

Austin (1996) explains the two categories of the real intentions of making use of a system of measurement: the motivational and information ones. He does not completely invalidate the benefit of the measures, but discusses extensively the question of whether the measure is to generate information or motivation. In the first case, there is the chance of success. In second, the system will tend to be circumvented, and so some additional care must be taken.

Measurement with motivational intent is explicitly targeted on affecting the people who are being measured so as to prompt a greater demand for efforts in relation to the organizational goals.

The purpose of measurement that targets information is to identify any situation that may occur in the project and can be divided into two forms: measurement to improve the process of project development and measurement of coordination, namely, to provide information that may permit some management on the progress of the project, for example, adding new people to a project that has fallen behind schedule. This measurement, in turn, is not intended to change people's behaviour.

While the intentions of the measurement systems are known and pursued, as are tools and methodologies, measurements alone cannot ensure the success of a project. However, they favour factual decisions, visibility and the pro-activity of the manager. Thus, projects, besides reaching their objectives, bring the organization closer to meeting its goal.

In this context, methodologies, models, standards or tools such as the Balanced Scorecard (BSC), the Goal-Question-Metric (GQM), Practical Software & Systems Measurement (PSM) and Capability Maturity Model Integration (CMMI) are widely used in the identifying, defining and refining business objectives, initiatives, metrics and indicators to be implemented.

2.2 Dysfunction in a measurement system

In organizations, despite the good intentions on creating effective systems of measurement, there is a phenomenon called dysfunction, which impairs the performance of companies.

While the managers of a measurement system believe they are giving visibility to the performance of the organization through its indicators, in fact they are actually diverting the attention and efforts of the teams to numbers that distort reality.

In the organizational context, dysfunction can be defined as the consequences of changing people's behavior that interfere with the intended results or lead in the opposite direction from the real intentions of the organizational objectives defined (Austin, 1996).

According to Austin (1996), measurement is something potentially dangerous. When any performance indicator is measured, the risk of making it worse is incurred. The simple fact of measuring sees to it that the person, more and more, focuses only on the dimension which is being measured. However, this does not mean that one should not define indicators for monitoring and improving projects and process, but some care needs to be taken when defining the real intentions of what is being measured.

Boehm (Boehm *et al.*, 1982) states that to obtain significant gains in productivity requires integrated efforts in several areas, for example: improving tools, methodology, work environment, education, management, personal incentives, software reuse, among several other factors. That is to say, that in order to measure productivity, i.e., how much value-added the projects produce per unit of value consumed, it is necessary to understand what the various dimensions are that need to be considered when analyzing organizational performance. However, very often, these dimensions are not easily identified and measured.

This can occur for various reasons, such as: lack of knowledge of what needs to be measured in relation to the strategic objectives; lack of knowledge or difficulty about how to collect a certain dimension; and cultural barriers; etc.

Very often, the indicators are created because they are easy to collect; for example, the number of lines of code produced per unit of time. From the moment at which a team is judged by this single dimension, the natural tendency is for people to focus their work on producing the lines of code, more and more quickly, thus leaving aside other aspects related to the quality attributes of the product generated, which are not being observed and are as or more important than the lines of code (Aquino *et al.*, 2009).

Therefore, the dysfunction occurs when the way the team works to achieve a target controlled by the organization leads to a decrease in actual performance, which is not reflected in the indicators measured, as illustrated in Figure 3. Dysfunction, thus, increases when any critical dimension increases which expends effort, is not measured.

Jackson (2002), Meyer (2002) & Bruijn (2002) have also addressed this phenomenon, in more recent studies. They call it the "perverse effect" or "gaming".

As seen previously, a measurement can be used to provide information and, thus, to improve the process used for or give support to taking management decisions based on facts, such as, for example, to decide to increase the human resources in a project. On the other hand, the measurement can also be used to generate motivation. In this case, the measurement system becomes vulnerable to human behavior, since it can cause reactions in those being measured; for example, the measurements used in reward programs.

Flamholtz (1979) says that, in the context of organizations, the role of measurement is not merely represented by the technical aspect; it has a social and psychological dimension.

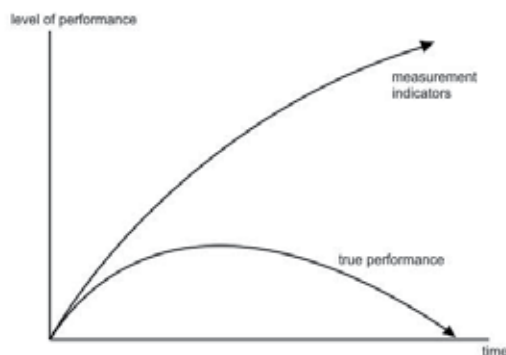


Fig. 3. The effect of dysfunction on measurement systems (extracted from Austin, 1996).

3. Reward systems

3.1 Reward

Rewards can be classified as tangible or intangible. In the first case, they are defined as being awards granted to employees on the basis of tasks performed, which meet or exceed the expectations initially established. In the second, they are defined as praise granted in public by virtue of achievements widely approved in the context of organizational culture (Stajkovic & Luthans, 1997).

Within this scope, it is worth stressing that reward systems are designed with the objective of increasing organizational productivity, and rewarding those who achieve an expected level of performance. The central question is how to define appropriate indicators to ensure the productivity of teams and to prompt motivation without causing dysfunction in the measurement system and action that has little effect (Austin, 1996).

According to Zanelli (2004), the reward system of an organization has repercussions on motivating work when workers are rewarded in a tangible way (cash bonuses, salary increases) or intangible (praise or public recognition) because they have demonstrated behaviors considered desirable for the organization.

The main challenge of an effective reward system is related to defining criteria on how the reward should be distributed among people. The use of standards of differentiation that people consider are fair and the consistency of these standards with the context of the organization are essential for there to be commitment to the company and the work to be performed.

3.2 Motivation and the Theory of Expectancy

There are various theoretical frameworks on motivation: Maslow, Herzberg, McClelland, Expectancy, Equity, Geertz, Bergamini (Vergara, 2000). But, it is worth declaring, based on field research, that no motivational theory on its own can fully explain human motivation.

In this chapter, expectancy theory, as proposed by Victor Vroom, will be addressed, since it is a more contemporary theory and possesses a direct relationship between performance and reward.

Expectancy theory was proposed by Vroom in the 60s. He states that an employee will be motivated to work hard when he/she believes their efforts will produce a performance which, when recognized, will lead them to having rewards that have value to them (Vroom & Kenneth, 1968).

This theory is targeted on the workplace. It is considered a theory of process, and not simply of content, because it identifies relationships between dynamic variables that explain the behavior of people at work (França *et al.*, 2002).

Vroom developed a multiplicative model between the three variables: *Valence*, *Instrumentality* and *Expectancy*. According to him, what motivates a person to make a decision is a product of these three variables: of how much a person desires a reward (*valence*); his/her estimate of the probability that effort will result in successful performance (*expectancy*); and his/her estimate that that performance will be a means to get the reward (*instrumentality*).

Thus, a person will reduce their efforts if he/she believes that they will not achieve the required performance, if they believe that it is impossible to achieve the rewards or if they believe that the reward is undesirable. According to Vroom, achieving rewards to which a large value is assigned leads a person to making more intensive efforts.

3.3 Reward systems – Overview

Economists began to consider the measuring motivation more deeply based on articles published by Ross (1973) & Holmstrom (1977). The Economic theory, known as *agent-principal*, is concerned with the fact that as an individual, the principal (the employer), can construct a compensation system (a contract), which motivates another individual, his/her agent (the employee) to act in the interest of the principal. The *agent-principal* problem occurs when it involves some effort that cannot be monitored and measured by the principal and, therefore, cannot be rewarded directly. The solution to this type of problem is to establish some kind of alignment of interests of both parties (principal and agent) (Holmstrom & Milgrom, 1991; Laffont & Martimort, 2002).

In 1990, a conference was held, organized by Harvard Business School, prompted by the unsatisfactory amount of knowledge about how organizations measure and evaluate their performance and how incentive systems were defined and implemented. Ten articles written by sixteen professors from universities in the United States and Europe were presented and discussed by sixty-six executives, consultants and academics (Bruns, 1992).

They reported that although economists and psychologists have written extensively about how organizations should define these systems, the literature was still very sparse on how to solve the problems inherent in the system.

As to incentive schemes, the authors found evidence, using field studies, that, in most organizations, the purpose of these systems was, in fact, was to relate motivation to performance, given that one of the main difficulties was to find ways to measure and evaluate their performance without, however, producing the effect of dysfunction. They further report that a variable that the then models did not consider was the cultural aspect of organizations. And that many incentive schemes have failed to consider it.

There is much empirical evidence that suggests that reward systems influence the behavior and performance of the members of organizations (Maltz & Kohli, 2002, Furtado *et al.*, 2009).

According to Humphrey (1987) a reward is appropriate when the employee contributes in an extraordinary way to the profits of the organization. To qualify for a reward, the goal must be clear, meaningful and consistent with other rewards for similar goals. For a reward system to be effective and to be able to encourage motivation it needs to satisfy some individual need of an employee, in particular, besides keeping track of the changes in their needs. Otherwise, it is unlikely to achieve the performance desired.

In more recent studies, Kaplan (Kaplan & Henderson, 2005) states the importance of formal or informal incentives in organizations and their being used, in some companies, as a way of stimulating an increase in the performance of employees. He points out, however, the following concern regarding the measurement systems on which they are based:

"Incentive systems are usually based on measures that are subject to interpretation. Although the economics literature says that these parameters, despite being subjective, are instantly understood by everyone in the company, our argument is that building a common understanding of what the relationship is between actions and results is not such an easy thing to obtain". (Kaplan & Henderson, 2005).

Bowles (2009) suggests a reflection on the fact of defining incentive systems only based on economic theories. He says that at the same time as the promise of a bonus prompts high performance, it can also cause the opposite effect, by restraining the very behavior that it should encourage. He exemplifies with a study that economists discovered that offering money to women to donate blood reduces, to almost half, the number who are willing to donate, and that to allow the payment be passed on to a philanthropic body reverses the effect.

The main problem for most reward systems in organizations is not related to the measurement of performance, but rather to the distortions introduced by those which are being measured (Austin, 1996).

Aligned to this way of thinking, Baker (Baker *et al.*, 1994) states that the reason for any dysfunction caused by changing behavior is not related to *pay-for-performance* systems in themselves itself, but by inappropriate measures of performance on which these systems are based. He assumes that objective measures of performance are imperfect. Therefore, reward contracts based solely on these measures create distorted systems. Finally, he adds that the effectiveness of these systems depends on various social, psychological and economic factors.

According to Baker (Baker *et al.*, 1990), one way to mitigate the distortions in an incentive system which are caused by imperfect objective measurements, is by combining these measurements with subjective components. He says that even if subjective measures are not perfect, they can complement or improve the objective measures available.

4. Recommendations for implementing a reward system in software organizations

The purpose of this section is to present some recommendations with the objective of supporting managers of software organizations to implement a reward system as a strategy for increasing productivity.

The form of description of the recommendations is by means of guidelines, the format of which follows the standard listed below, which was based on how Sommerville described them for the requirements engineering and process improvement (Sommerville & Sawyer, 1997) and was adapted based on a form of notation used to describe software standards (Braga, 2001):

- **Title:** short phrase that identifies the guideline;
- **Problem:** establishes the problem that the guideline is meant to solve;
- **Description:** brief description contextualizing the field of application of the guideline;
- **Benefits:** some directions of the gains hoped for by the organization by adopting the guideline;
- **Form of adoption:** guidance for adopting the guideline in an organization.

4.1 Understanding the motivational aspects of individuals

4.1.1 Problem

It is important to understand the needs that motivate people. Rewards or other results to motivate people need to be desired by them. Managers need to identify results of value and not simply suppose that they know exactly what their staff desire, or to attribute their own needs or desires to other people (Robbins, 1999).

4.1.2 Description

It is hoped that an appropriate distribution of rewards may positively influence both satisfaction and performance. Both should be considered as two separate but interrelated results.

Therefore, well-administered rewards are considered the keys to create both satisfaction and a high-performance for the work. While surveys may show that people who receive large rewards are more likely to report high job satisfaction, they also conclude that the rewards must be contingent with regard to performance so as influence it. This means that the type of reward varies according to the person's level of achievement (Schermerhorn *et al.*, 1999).

4.1.3 Benefits of the adoption

The rewards may result in better performance if workers have the skills to enhance it, in fact, to desire the rewards being offered and if there are few physical and psychological restrictions (Spector, 2002).

Expectancy theory says that an employee will be motivated to make a high level of effort when he/she believes that the effort will lead to a good performance evaluation; that a good evaluation of performance will lead to organizational rewards, such as a bonus, a salary increase or a promotion; and that the rewards will satisfy the employee's personal goals (Robbins, 1999).

4.1.4 Form of adoption

The first step towards adoption is not to think that everyone wants the same reward. Motivation varies from person to person and also for the same person, it may vary over time.

According to Maslow's theory, if we wish to stimulate someone's motivation, we need to understand at what level of the hierarchy that person is at the moment and focus our attention on meeting the needs of that level or the higher one.

4.2 Clear definition of the plan of variable remuneration

4.2.1 Problem

When a variable compensation plan is poorly applied, it can provoke demotivation and impair the performance of teams. This occurs, for example, when the criteria for compensation are not well defined when there is no transparency in the process, or, even, when the cultural aspect of the organization is not considered.

4.2.2 Description

One of the forms that organizations use to reward their employees is through a variable compensation program, usually coordinated by Human Resource Management. This program allows some goals to be set that are aligned with the strategic objectives of the organization. Based on these goals, a set of indicators is established and used to define the degree of reward.

In this context, if the organization chooses to define a variable compensation plan, it is essential that it be clearly defined and advertised to all those who will be influenced by it.

4.2.3 Benefits of the adoption

The reward can be seen as a competitive differential, as long as it is implemented adequately. Some of the benefits that can be achieved with a variable compensation program are: the alignment of the activities of those involved with the goals expected by the organization; the stimulus to continuous improvement, by means of the link between reward and performance; encouraging people to make an effort to ensure projects are successful (Hipólito, 2006).

4.2.4 Form of adoption

The visibility of the criteria and benefits of the plan is fundamental to its success. It is important that the performance data be broadcast and all forms of measuring be available to all involved.

For a reward system to be effective, three elements must be present (Spector, 2002):

- The worker should have the possibility to expand his/her capacity. If he/she is working at full capacity, the introduction of a reward system will not maximize his/her performance;
- The rewards should meet the worker's needs and expectations. Not every employee wishes to work solely in exchange for money, i.e., so that a reward system is effective, it should converge with what the worker really wants from his/her work;
- There should be no physical or psychological limitations on the worker's performance.

4.3 Definition of baselines of comparison for productivity metrics

4.3.1 Problem

The use of reward systems based on productivity goals of the software development team may not be appropriate when the measurement of productivity is distorted because not all the relevant factors that affect it have been considered.

4.3.2 Description

Some measurement systems use indicators of physical (LOC/h) or functional (FP/h; UCP/h) size in order to measure the productivity of software development team. Whatever the indicator chosen, there are several other factors that can affect the team's productivity: programming language, tools, the experience of the team, etc. To state that the goal of productivity has been achieved or to compare productivity between projects, it is necessary to define for the specific organization which factors will be the ones that can influence the performance of teams and to categorize projects based on several parameters: size, duration, technology, type of client, etc.

There are several studies that report on the factors that affect productivity, for example, Yu *et al.* (1991); Boehm *et al.* (1982); Boehm (1999); Maxwell & Forselius (2000).

4.3.3 Benefits of the adoption

The following benefits can be achieved by adopting this guideline:

- Defining a standard for the characteristics of projects that allows productivity goals to be stipulated, in accordance with the attributes of the specific project;
- Defining a standard for the characteristics of projects that allows the performance of different teams to be compared, only between projects with similar attributes.

This type of orientation enables a situation, like the one described below, to be avoided. Figure 4 illustrates an indicator that measures the productivity of a software development project team, in hours worked, divided by use case points, i.e., how many hours are

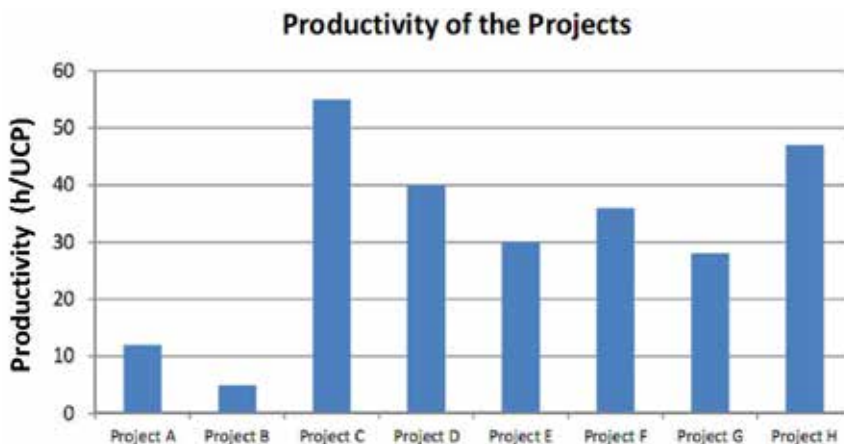


Fig. 4. Example of productivity indicator.

consumed to produce one use case point. The y-axis of this graph represents the productivity indicator (h/UCP) and the x-axis represents all the projects measured in a given period. Note that productivity varies from 5h/UCP to 55h/UCP, namely, a variation of 1,000% between the most productive project and the least productive project. However, not all projects have the same characteristics related to technology, business domain, maturity of the team, etc. This means that in a scenario like this, it is not possible to compare which project has obtained greater productivity in relation to the others and, consequently, to use this indicator as the basis for the reward program.

On applying this suggested guideline, the indicator would come to be analyzed by groups of projects with similar categories.

4.3.4 Form of adoption

The adoption of this guideline involves making an inventory of the existing projects in the organization and to classify them according to parameters that help to identify similar projects. For example: technology, contract type, team size, and so forth. Based on this survey, a precise infrastructure needs to be set up. This means using a tool to store the historical data of the projects and one that is available for consultation by similar projects.

Then the productivity indicators should be defined based on the characteristics of the projects previously raised. In addition, the goals to be achieved by the teams will be established from an initial baseline, collected from historical information¹.

4.4 Identification of the participants in the sale of the project

4.4.1 Problem

When estimates of effort, time or cost are established in the proposal for the sale of a project by the same people who will participate in carrying it out, proposals with that are over-estimated can be generated, if these people are later subjected to a reward system, e.g., a variable remuneration program for project managers based on complying with estimates.

4.4.2 Description

The people involved in the sale of a project, such as, for example, project managers, should not influence the estimates arising from a contract of results² into which they will be submitted while the project is being carried out.

From the moment that people who are involved in the sale of the project are not the same as those who will participate in its being carried, the risk is avoided of the estimate being over-sized. This type of behavior can occur, should the project manager be subjected to a contract of result that may control the variation of the budget or the end-date of the project. To avoid

¹ LOC: Lines of Code; FP: Function Points; UCP: Use Case Points.

² In this chapter, the term 'contract of result' is a set of goals periodically established between a person, or team, and the organization in which the service is being rendered or the product is being developed. Each goal is evaluated at the end of a period and a score is provided. It is common for the result of this agreement to be used by organizations as a form of reward, whether this is related to promotions, benefits, re-inclusions, etc., in accordance with the policy of reward and remuneration of each company.

a poor performance in its end result, estimates of the effort and cost may be increased by a percentage of risk that may increase the price of the project. This can make the company less competitive in the market and decrease the number of business deals contracted.

4.4.3 Benefits of the adoption

The main benefit of this guideline is the impartiality of those responsible for the schedule and estimates of cost, established in the proposal for the sale of the project. To the extent that these people are not rewarded for these dimensions, the tendency is that the proposals are not influenced by personal interests.

4.4.4 Form of adoption

The area responsible for allocating resources needs to understand the business domain and the technology into which the sale is placed in order to identify the possible professionals skilled at supporting the assembling of clients' needs and making estimates of effort and cost. Based on this list of people, the area responsible should select those who will have little likelihood of being assigned to be in charge of conducting the project, if the sale comes to fruition.

4.5 Definition of the success of the project

4.5.1 Problem

The criteria that define success or failure of a project are not always well aligned between the organization's top management and those responsible for implementing a project. And when these criteria are used as the basis for a reward system, the project results can be interpreted in different ways.

4.5.2 Description

The success of a project can be used as a criterion for evaluating the results of the contract manager or the team that conducted it. However, this definition of success may vary as a result of many factors. For example: the business model, the organization's strategic objectives, etc. Therefore, it is important that the concept of success is clear for each project before it starts to be carried out.

There are studies that confirm the success of a project is a multi-dimensional concept (Shenhar & Renier, 2002). Projects cannot always be evaluated based on the same dimensions. A project may provide an efficient solution for the client's needs, but still be considered a failure on account of the return that it brought the organization. Similarly, some projects are considered successful in the short term, but this may not be true in the long term, and vice versa. In some cases, some time must pass until the initial expectations are really met and the success evaluated.

4.5.3 Benefits of the adoption

Baccarini (1999) states that traditional metrics allow only a view with regard to the success of the process of project management, since they are focused on the design process, and in

particular, the successful achievement of the objectives of cost, time and quality. Willard (2006) suggests that additional metrics are identified to define the project's success. According to him, the metrics should be identified by taking into account how the implementation will benefit the main directives of the business of the organization.

Thus, the correct definition of how the success of a project will be measured will see to it that those involved in its being carried out are aware of the project's real goals and the criteria that will be evaluated in their results contracts.

4.5.4 Form of adoption

Defining the success of a project is an activity that will depend, mainly, on the alignment of this project with the organization's strategy and on the time at which the project was completed. In general, software organizations relate the success of a project to meeting its defined deadlines, budget and scope. This model makes sense in most projects. However, there are cases where the organization's strategy is geared towards obtaining a particular client or carrying out a strategic project of some other client, and there are others. In these situations, the project's success cannot be measured only by the three indicators mentioned above (deadline, budget and scope). The project could have succeeded even with the budget at variance, but the strategy with the client was met and this has come to have a greater weight for a specific context.

There are cases in which measuring the project in relation to meeting the deadline may impair the quality of the product which is being delivered. It is then necessary to define what the quality criteria are which should be measured so as to avoid the deadline being met, but the product not complying with the level of acceptance laid down for the project.

These criteria have a dependency with time, i.e. for a given project, the perception of success may change over time. This will depend on the time elapsed since its completion. For example, a project may have as its main focus to create future opportunities. Therefore, it is barely likely that it is seen as successful until these opportunities have effectively materialized.

Since the organization manages to have this real notion of what represents success within its portfolio of projects, the contracts of results will be better applied.

4.6 Definition of the model of team management

4.6.1 Problem

In general, reward systems use base indicators for decisions to encourage teams. If the definition of these indicators does not consider the model of team management, it is possible that some of them are not feasible for measuring and monitoring, thus making the targets set by the reward system unviable.

4.6.2 Description

The choice of the model for managing a software development team should be considered when trying to define how a contract of results will be applied results in a reward program. In general, we may consider three models of team management: no supervision, partial

supervision and total supervision. This categorization is in accordance with the model proposed by Austin (1996).

4.6.3 Benefits of the adoption

The correct understanding of what management model will be used to plan and monitor the activities of the teams is fundamental for defining which dimensions may be used in a contract of results. This will allow, early in the project, the expectations to be aligned with regard to the indicators that may be collected and which of these will be used to reward the team at the end of the project. Thus, it will be clear both to managers what the teams may be held responsible for, and to the teams, what will be considered at the time of their being rewarded.

4.6.4 Form of adoption

In the case of the model chosen being self-management, i.e. no supervision of the team will be carried out, it will not be possible to quantify clearly the goals associated with this team. Thus, the contract of results will not have objective data in order to reward people.

In the case of the model chosen being partial supervision, it will be necessary to identify which dimensions may be determined, collected and analyzed, and only then clearly define how the contract of results should be formulated. In this type of model, as the team is not fully managed, not all dimensions can be collected. For example: the project manager can only monitor if the deadlines are met, but cannot monitor if the effort made by the team is within a range planned. In a case like this, the contract of results of the team should consider only the goals related to the success obtained by delivering the products within the agreed deadlines, but it will not consider if it was necessary to work more or less hours in order to meet them.

Finally, if the management model chosen is that of total supervision, any dimension may be evaluated in the team's contract of results. For example: on-time delivery, meeting the estimates of size, effort and cost, the number of lines of code, the function points, the use case points, etc., produced per unit of time, density of defects, etc.

The definition of what management model will be used in a specific project should not only be a unilateral decision by the project manager. Other aspects should also be considered, for example: maturity and experience of the team, cost of managing the project and the strategic importance of the project to the organization.

Based on these characteristics, the organization should define which management model is most appropriate for the project. However, it will be for the organization to consider other characteristics to support this definition.

4.7 Definition of the performance indicators

4.7.1 Problem

The results contracts which are used to measure the performance of teams and reward them are not always adequately defined and aligned to the strategic objectives of the organization.

4.7.2 Description

The indicators used to measure the performance of the teams must be defined prior to the contract of results. These indicators may vary as a result of the organization's strategic objectives and should not follow a standard rule for all companies. For companies where the business model is related to a software factory, the indicators may be related, for example, to delivery on time and density of defects. On the other hand, for business models related to innovation, the indicators can be defined based on other dimensions. For example, the degree of impact of the product launched on the market or of learning a particular technology.

4.7.3 Benefits of the adoption

Defining indicators based on the correct dimensions arising from the company's business model sees to it that the objectives of the project being undertaken are aligned to the organization's strategy. Thus, the contract of result applied to the project team will be defined and measured so as to minimize personal interests interfering in the interests of the project.

According to Austin (1996), the main problem for most incentive systems in use by organizations is not the concern about performance measurements but rather with the distortions introduced intentionally by those who are being measured. This being so, making it clear to the project manager under what aspects he/she and his/her team will be evaluated throughout the project will help minimize the effect of the dysfunction in the collection and analysis of the indicators of customer satisfaction, since the manager will also be evaluated in terms of other internal aspects of the organization.

4.7.4 Form of adoption

Early in the project, senior managers of projects and the business manager should analyze with the manager responsible for conducting the project what the strategic objectives are that are to be achieved and how they are aligned to the objectives of the project. These goals should be part of accounting for the final performance indicator of the project.

The indicators used to measure the performance of a team must be defined using a system of measurement. There are several techniques and methodologies for this purpose. For example: the Balanced Scorecard, the Goal Question Metric and Practical Software and Systems Measurement. When implementing a measurement system, it is important that the indicators can be based on more than one dimension to avoid the effect of system dysfunction.

Since the indicators are defined, some criteria can be established to assign weights that ponder the importance of each indicator on a specific project. And, thus, can convey a greater sense of fairness to those who are being rewarded.

4.8 Setting up an independent committee to evaluate the results

4.8.1 Problem

It is common that even if quantitative measurements of the performance of the teams are set, the person being assessed or the assessor can manipulate the measurements, and therefore

they will not accurately reflect what they are predisposed to measure (Gibbs *et al.*, 2004). In addition, quantitative measures do not always manage to capture all the information needed so as to take decisions on reward systems.

4.8.2 Description

The process of implementing a rewards program is not completely objective and easy to follow. This will depend, among other factors, on the level of the criteria set by the organization to reward people and on the uncertainties that may exist in a measurement program that uses their as a form of incentive to the teams.

The use of subjectivity allows evaluators to explore any relevant information that arises during the period of measurement to benefit both the company and the employee. Moreover, it is known that even in the simplest environments, there will be factors that will be beyond the control of managers and therefore initially they will not form part of the measurement systems. For these factors, the use of subjectivity can facilitate the allocation of rewards (Gibbs *et al.*, 2004).

Several companies mitigate the effect caused by the distortion of objective performance measures by using subjective performance evaluations (Baker *et al.*, 1990).

It is suggested, therefore, that a committee be set up, which is able to analyze any distortions that may have arisen, and subjective data and has the autonomy to adjust indicators and targets, established previously.

4.8.3 Benefits of the adoption

The setting-up of an independent committee to evaluate the results may be able to correct any distortions that may have arisen and were detected during the process of collection and the analysis of indicators, as well as during the process of allocating rewards.

The evaluations of the results of a reward system may cause unfair outcomes because of the degree of subjectivity that some indicators may show, besides it being very difficult to predict all the criteria that will be used in the program. This is a process that takes time and requires the organization to be mature. When the committee has been set up, the opportunity will be created to "calibrate" the reward indicators and criteria.

4.8.4 Form of adoption

The form of adopting this guideline may vary depending on the size of the company and the way it is functionally organized. The organization should select a group of people who are impartial to the reward program. The ideal is for them not to be the line managers of the teams that will be evaluated.

This committee should meet periodically and needs to be formed by a team with representatives from different departments and to have decision-making powers in the organization. For example, executive oversight, human resources, senior managers, etc.

This multidisciplinary of the committee is also important so that certain aspects that were not originally defined can be taken into consideration. The context in which some projects

are conducted and their alignment with the organization's strategies are subject to change over time. Even if the reward program and the indicators have not been revised in time, it will be for the committee to review each case and to consider these changes to the decisions already taken.

4.9 Relationship between the guidelines

Figure 5 illustrates how the eight guidelines are related, according to the categories described below, and their respective scopes of action and phase of activity:

- **Relation of support:** when the use of a guideline supports the adoption of another guideline;
- **Relation of influence:** when the adoption of a guideline can influence the behavior of another guideline;
- **Relation of use:** When a guideline can make use of (benefit from) another guideline;
- **Relation of restriction:** when the use of a guideline may restrict the application of another guideline;
- **Relation of Reevaluation:** when the use of a guideline may reevaluate the use of another guideline, by changing its behavior.

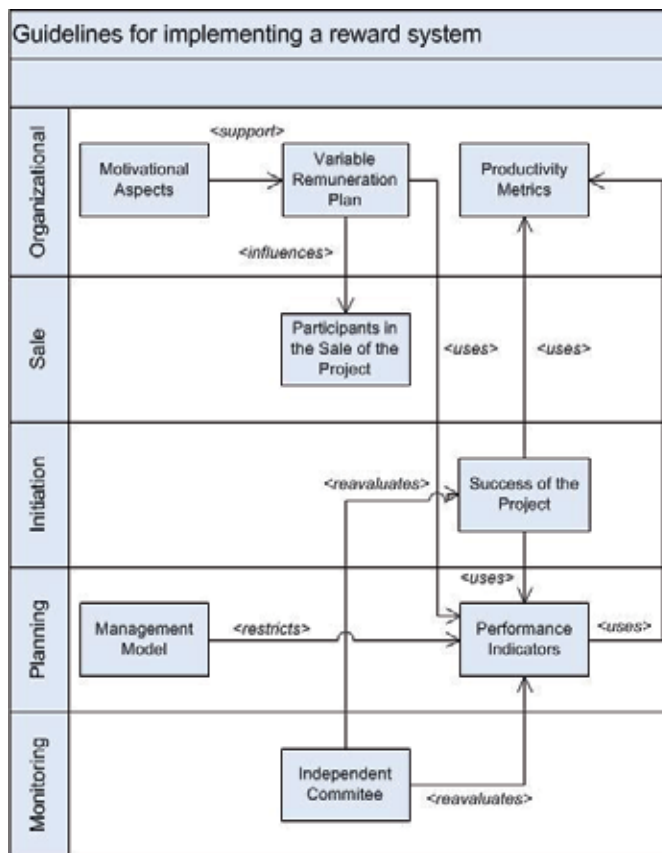


Fig. 5. Relationship between the guidelines.

5. Validation of the guidelines

The guidelines suggested in the previous section were validated by applying a questionnaire comprising the ten questions below:

- **Question 1:** What is the profile of the respondent (managerial or technical), the geographical region, time in the market and the number of people involved in management or software development?
- **Question 2:** Is it possible to set the same standard indicators for every type of project, with the aim of evaluating the productivity of a software development team?
- **Question 3:** Normally, is the success of a project evaluated using the traditional dimensions of 'cost, scope, length and quality'? Do you think it is possible to evaluate the success of the project based on different dimensions?
- **Question 4:** What is your response to the following statements? Each organization that develops software should define what the factors are that can influence the productivity of their teams and categorize projects based on several parameters: size, length of time, business domain, technology, customer type, and so forth. This categorization is important because it will enable the comparison of the productivity of different teams, only between projects with similar characteristics.
- **Question 5:** Are reward programs (e.g., variable remuneration, prizes/awards, public recognition, etc.) useful for improving the productivity of people working with software development projects?
- **Question 6:** Has a reward program (e.g., variable remuneration, prizes/awards, public recognition, etc.) been implemented in the company in which you work?
- **Question 7:** If there is a reward program in your company, do you think it was set up properly?
- **Question 8:** Is it important to have a list of recommendations/guidelines on how to guide managers to define and set up a reward program in software organizations?
- **Question 9:** If the people involved in the sale of a software development project are the same as those who will participate in carrying it out, will the estimates of length of time and time be influenced, should these people be put forward to a reward program (e.g.: the contract of results), while the project is being conducted?
- **Question 10:** Does the use of indicators in software development projects, as part of the process of evaluating individuals (e.g. contract results), change their behaviour such that these indicators are affected?

During 10 days in June 2009, 106 people answered the questionnaire. However, after analyzing the data, 15 responses were discarded because they were incomplete or because the company is not part of the target audience desired. Therefore, 91 responses were considered.

Based on this field research, we conclude that the predominant characteristics of the respondents are:

- Profile of respondents: management;
- Geographical region: the survey was conducted in several states of Brazil, but predominantly in the Northeast;
- Time in the market: 11 to 30 years;

- Number of people involved in software management or development: from 101 to 500 people.

All guidelines could be analyzed and there are strong indications that they are valid, considering the scope of the companies surveyed.

Figure 6 represents the responses on three scales group: 'I agree' and 'I fully agree'; 'I neither agree nor disagree'; 'I disagree' and 'I completely disagree'.

To validate the guidelines, it was expected that positive replies would be concentrated in Questions 3, 4, 5, 8, 9 and 10, and negative ones in Questions 2 and 7. In the chart below, it is these groupings that can be seen.

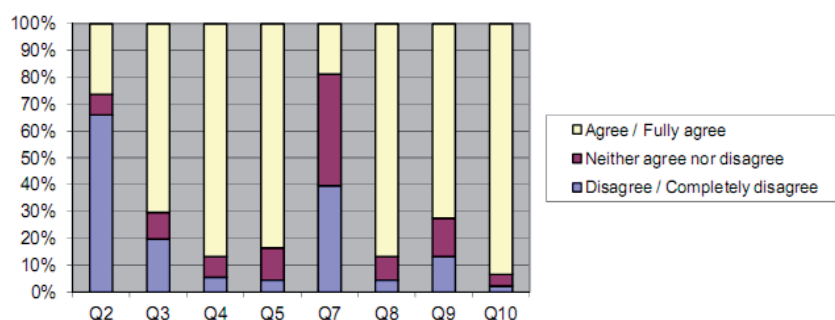


Fig. 6. Consolidation at three levels of the eight questions of the field survey which have the same scale and options as answers.

Given the results presented, it can be stated that there are indications that adopting the eight guidelines may be effective so that a software development organization may achieve higher levels of productivity.

Finally, it is important to point out that this chapter did not consider the application of the guidelines in conjunction with other strategies for improving productivity. This means that adopting it alone may not be sufficient, it being necessary to apply other known strategies, for example, using tools to automate the process of software development, reuse artifacts, improve the quality of the management of teams, and so on.

6. Conclusion

The process of measuring performance has received great attention due to the concern of organizations with increasing the productivity of teams. Several methodologies, models and tools are used to create measurement systems: the Balanced Scorecard, Goal-Question-Metric, Practical Software & Systems Measurement, Capability Maturity Model Integration, and so forth.

In this context, several strategies can be defined to increase productivity. One is through the use of the indicators in a measurement program as a way to define a reward system that may prompt the motivation of the teams through rewarding them.

Reward mechanisms aim to strengthen behaviors that should be repeated. That is, the achievement of goals of productivity and quality may be rewarded with a bonus or some

kind of extra premium for the purposes of showing the individual, and other participants, what the goals and hoped for behavior are.

In general, these systems are intended to attract, retain and motivate people. But for a person to be motivated, he/she needs to give value to the result, needs to believe that additional effort will lead to better performance and that the better performance, subsequently, will result in some form of recompense or better results.

Financial recompense is an important component of the reward system, but there are other factors that prompt employees to be motivated and influence their performance. In fact, several studies have reported that financial forms are not always the ones to be most recommended.

To ensure an effective reward system that leads to the desired behavior, it is essential to consider carefully the advantages and strategies used and to ensure that the rewards are based on performance. Encouraging and rewarding performance should be a constant management activity, and not just an annual ritual of remuneration.

Reward systems, when properly set up, have proven to be an important tool for achieving organizational goals. It is essential to keep the plans simple in terms of following, measuring, understanding and managing them so as to increase the performance desired.

However, these programs are not always effectively defined and implemented. One important point emphasized in measurement systems is the psychological and social aspects. When the intention of the measure targeted on motivating people, they tend to change their behavior based on what is being observed and measured. This seems to it that the efforts of teams are directed only to the dimensions measured by the organization. And when these dimensions are not correctly identified, this leads to the problem of dysfunction.

In addition, the cost of measurement needs to be considered. The activities of identification, collection, analysis and dissemination of indicators can represent a high cost to the organization so that relevant indicators are, in fact, considered in the measurement system. There is a great challenge in analyzing the trade-off between: the relevance of the indicator collected, the cost associated with the entire cycle of measurement, the benefits it will bring to the process of organizational decision making and the increase in the performance of teams.

In order to further explore this strategy to improve organizational performance, this chapter provided a set of recommendations in the form of guidelines that can guide managers to define and implement a reward program in a software development organization. It also addressed the negative impacts that these programs can have on the productivity of teams when the programs are badly applied.

The definition of guidelines considered aspects related to the individual, such as, for example, issues related to motivational theories. Some recommendations were also put forward on how to minimize the impact of measurement for the purposes of motivation, i.e., that used to reward people and in relation to the changes in behavior of those involved throughout the measurement process. In addition, the recommendations encompassed factors associated with the correct definition of the teams' contracts of results, the care to be taken when comparing indicators between projects of different natures, the meaning of the

success of the project and the impact of the form of managing teams so as to identify and monitor relevant indicators. In parallel, on top of all these recommendations, the need was seen to set up an independent committee that may act when the reward program is being reevaluated by calibrating various parts of the reward program, since, sometimes, subjective analysis may be necessary, provided that certain precautions are observed.

The adoption of guidelines may be undertaken as whole or in parts. This decision can be taken, for example, in terms of the scope of the organization which it sets out to achieve (organizational process, sales processes, or processes relating to the conduct of a project). The relationships between the guidelines can be used to support this kind of decision.

Finally, like any set of guidelines, if the recommendations presented are adopted only in isolation, this does not guarantee an increase in the productivity of organizations, but the field analysis undertaken provides evidence that this is possible. Nevertheless, it is necessary that other strategies be considered for increasing productivity and that they be combined with this proposal. Moreover, it is essential that these guidelines are adapted to the culture of the organization and that it is possible to receive the support of senior management both when adopting them and to ensure they are used effectively.

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Capacity Assessments for Improving Corporate Efficiency – Case of Limassol Turkish Cooperative Bank in Northern Cyprus

Mustafa Ertanin and Okan Veli Şafaklı
*European University of Lefke, Faculty of Business and
Economics Department of Business Administration, Lefke
North Cyprus*

1. Introduction

Ever increasing challenges in real and financial sectors, the more so often global and territorial crises, the concentration and adjustments in banking regulations, the increased competition level in banking (due to deregulations and cross-border banking competitions) and the social factors such as banking ethics, customers' maturing perception of bank services, consumer satisfaction add pressure to any bank's Board of Directors (BOD) for paving new paths in overall management directions. Sustainability concerns and social responsibilities create a new and more complicated mix in which the bank employees at all levels continue to be a major factor reasoning the success and profitability levels of the organization.

Periodical staff and management performance evaluations are now more than a trendy tradition in corporations. Outcomes of performance evaluation affect the staff structure in both management and operations. Performance evaluations use criteria to evaluate the overall ability of staff in fulfilling the duties and tasks assigned to them. The results also indicate the employees' corporate values and social responsibility values. Employees subject to any performance evaluation are expected to be staff with appropriate education, training, experience, and ability to manage the tasks and duties that, their job requires.

This study evaluates the necessity of Capacity Assessment to employees prior to exercising performance evaluation to them. By implying Capacity Assessment, staff is initially evaluated if they are equipped with knowledge enough to handle the tasks. Capacity Assessment will also scale the corporate attitude of the employee. Team-workers, leaders, innovators, communicators, and silent abilities are filtered, whereas each one's strengths and underdeveloped skills are projected in the outcome.

Methodology of the study and the challenges to ensure participation of the Board (Saskatoon, 2004) are as follows:

- Briefing and motivating the employees for professional participation
- Criteria selection with the participation of management and staff

- Drawing the Capacity Assessment Questionnaire¹
- Completing the Questionnaire as Balanced Scorecard with section for Top and Middle management (Kaplan and Norton ,1992)
- Employing the Personnel Department² to schedule the interview process.

Capacity Assessments as in the case studied below will necessitate additional individual and corporate trainings, relocation of personnel, restructuring the departments and even reviewing the company major policies as the case may be.

Limasol Türk Kooperatif Bankası (LTK Bank) is a cooperative firm³ subject to the local company law and is operating as a commercial bank under supervision of local central bank and finance ministry. LTK Bank had a Central Branch and 11 branches and employed 170 including 15 top-level managers when the Capacity Assessment program was initiated in April 2010.

The program was implemented by experienced and qualified Corporate Educators, Mustafa Ertanın,⁴ and Huda Hudaverdi⁵. The Capacity Assessment interviews for the employees were also done by M. Ertanın and H. Hudaverdi.

BOD of LTK Bank and General Manager (GM) participated in some decision-making procedures.

The main structure of this study unique to LTK Bank consists of the Concept of Capacity Assessment and Capacity Development, corporate assessment process and conclusion respectively. This chapter is organized as follows: The first introductory part presents aim, scope, and methodology of the study. The second part explains the Concept of Capacity Assessment and Capacity Development. Third part is devoted to corporate assessment process. Corporate assessment process contents Drafting the project with BOD of LTK Bank; Ensuring the participation of BOD and GM; Briefing the staff and motivating them for professional participation and contribution; Drawing the questioner with key participants and forming the Balanced Scorecard; Interviews for Individual Capacity Assessments; Physical and Management Assessment of Branches and Departments; Evaluating the Data and Reporting to BOD; Capacity Assessment and suggestions to LTK Bank's BOD; and Summary of trainings as an outcome of the capacity assessment program correspondingly. The final part gives conclusive remarks about the study and informs the readers about the limitations of the study and the need of future research.

2. The concept of capacity assessment and capacity development

Capacity is defined as the ability of individuals and organisations or organizational units to perform functions effectively, efficiently and sustainably. Alternatively, capacity can be defined as "The ability of individuals, institutions and societies to perform functions, solve problems and set and achieve objectives in a sustainable manner (UNDP, 2007)", "the ability

¹ Key Performance Indicators as developed by Advanced Performance Institute and others

² No HR dept was yet established.

³ Popular public company type with large number of members owning shares

⁴ Co-author of this chapter, Dr, Economics , Lecturer in European University of Lefke and with 30 years of experience in Corporate and Education Issues.

⁵ Dr., Senior Lecturer in Girne American University, ex member of various Bank BODs

of people, organizations and society as a whole to manage their affairs successfully (OECD-DAC Network on Governance, 2006), and “ability of an organization to function as a resilient, strategic and autonomous entity (Kaplan, 2007)”. These definitions imply that capacity is not a passive state but part of a continuing process and that human resources are central to capacity development. The overall context within which organisations undertake their functions are also key considerations in capacity development. Therefore, capacity is the power of something (a system, an organisation, a person) to perform or to produce (UNDP, 1998; UNDP, 2006).

The following five central characteristics or aspects of capacity can begin to give the theory and practice some substantive and operational shape (Morgan, 2006).

- Capacity is about empowerment and identity, properties that allow an organization or system to survive, to grow, diversify, and become more complex. To evolve in such a way, systems need power, control, and space. Capacity has to do with people acting together to take control over their own lives in some fashion.
- Capacity has to do with collective ability, i.e. that combination of attributes that enables a system to perform, deliver value, establish relationships and to renew itself. Or put another way, the abilities that allow systems - individuals, groups, organizations, groups of organizations - to be able to do something with some sort of intention and with some sort of effectiveness and at some sort of scale over time.
- Capacity as a state or condition is inherently a systems phenomenon. Capacity is an emergent property or an interaction effect. It comes out of the dynamics involving a complex combination of attitudes, resources, strategies, and skills, both tangible and intangible. It emerges from the positioning of a system within a particular context. In addition, it usually deals with complex human activities, which cannot be addressed from an exclusively technical perspective.
- Capacity is a potential state. It is elusive and transient. It is about latent as opposed to kinetic energy. Performance, in contrast, is about execution and implementation or the result of the application/use of capacity. Given this latent quality, capacity is dependent to a large degree on intangibles. It is thus hard to induce, manage, and measure. As a state or condition, it can disappear quickly particularly in smaller, more vulnerable structures. This potential state may require the use of different approaches to its development, management, assessment and monitoring.
- Capacity is about the creation of public value. All countries, regardless of their level of development, have many examples of effective capacity that subverts the public interest. The most obvious would be organized corruption, the behaviour of gangs and organized conspiracies, and the capture of public institutions. In most countries, different kinds of capacities compete for power, control, and resources.

Capacity Development ⁶ is a concept that is broader than organizational development since it includes an emphasis on the overall system, environment, or context within which

⁶ This is not much different than the OECD Development Assistance Committee (DAC) definition of Capacity Development, adapted by various donors, as “... the process by which individuals, groups, organizations, institutions and societies increase their abilities to: (1) perform core functions, solve problems, define and achieve objectives; and (2) understand and deal with their development needs in a broad context and in a sustainable manner.” This definition goes on to define **core capacities** of an organization, or community,

individuals, organisations, and societies operate and interact (and not simply a single organisation). In the case of development programmes, it includes a consideration of all factors, which affect upon its ability to be developed, implemented and the results to be sustained. Of special concern to development planners and to situations where there are limited resources is the need to build on what exists—to utilize and strengthen existing capacities, rather than to start from scratch. A Capacity Assessment is an analysis of desired capacities against existing capacities; this generates an understanding of capacity assets and needs, which informs the formulation of a capacity development response (UNDP, 2008). According to OECD, Capacity Assessment is structured and analytical process whereby the various dimensions of capacity are assessed within a broader context of systems, as well as evaluated for specific entities and individuals within these systems (OECD, 2006).

In addition to above, the more commonly used definitions of capacity development can be outlined as follows (Lusthaus et al., 1999):

- Capacity Development is a concept which is broader the organizational development since it includes an emphasis on the overall system, environment or context within which individuals, organizations and societies operate and interact (and not simply a single organization) (UNDP, 1998).
- Capacity Development is "... any system, effort or process... which includes among its major objectives strengthening the capability of elected chief executive officers, chief administrative officers, department and agency heads and program managers in general purpose government to plan, implement, manage or evaluate policies, strategies or programs designed to impact on social conditions in the community." (Cohen, 1993)
- Capacity Development: "The process by which individuals groups, organizations, institutions and societies increase their abilities: to perform functions solve problems and achieve objectives; to understand and deal with their development need in a broader context and in a sustainable manner" (UNDP, 1997)
- Capacity strengthening is an ongoing process by which people and systems, operating within dynamic contexts, enhance their abilities to develop and implement strategies in pursuit of their objectives for increased performance in a sustainable way" (Lusthaus et al. for IDRC, 1999).

3. The capacity assessment process

Addressing the questions '**capacity for whom?**' and '**capacity for what?**' helps determine the design of a capacity assessment. Key steps in this process are: Defining the scale and scope of the capacity assessment by selecting point of entry, core issue(s) and capacity(is); Defining desired capacity; Determining the data collection and analysis approach; and Reviewing existing data sources and knowledge (UNDP, 2008). As a result, of the UNDP's experience with capacity assessments to date. It is organized along the different steps of the capacity assessment process: 1) mobilize and design; 2) conduct the capacity assessment;

or sector, (or system) as consisting of : defining, analyzing the environment or overall system, identifying needs and/or key issues, formulating strategies to respond to or meet needs, devising or implementing actions; assembling and using resources effectively and sustainably, monitoring performance, ensuring feedback, and adjusting courses of action to meet objectives, and acquiring new knowledge and skills to meet evolving challenges

and 3) summarize and interpret results. During the second step of the capacity assessment process, the plan designed during the first step is carried out.

The capacity assessment team determines the level of desired capacities and assesses the level of existing capacities. This can be done through, for example, focus group discussions, self-assessment questionnaires, or one-on-one interviews (UNDP, 2009).

The Capacity Assessment program specially tailored for LTK Bank will follow the sequence of Drafting the project with BOD of LTK Bank; Ensuring the participation of BOD and GM; Briefing the staff and motivating them for professional participation and contribution; Drawing the questioner with key participants and forming the Balanced Scorecard; Interviews for Individual Capacity Assessments; Physical and Management Assessment of Branches and Departments; Evaluating the Data and Reporting to BOD; and Capacity Assessment and suggestions to LTK Bank's BOD.

Board of Directors, reporting to the Annual General Assembly composed of shareholder cooperative members initially was searching ways to improve the competitiveness of the Bank by either improving the individual performance of each employee or by replacing them with more equipped staff. The ruling vision was to motivate the employees to upgrade their knowledge in customer relations, more specifically in sales.

Time management was also an issue that BOD believed that needs attention. The management of the Bank faced dilemma; the traditional in house trained and experienced versus University educated bankers when selecting staff to be promoted and or assigned to new departments and divisions.

3.1 Drafting the project with BOD of LTK Bank

The journey of the bank to Capacity Assessment started with the search for external trainers to provide above up skilling to the staff and to evaluate the performance of the employees. This would justify the BOD's decisions in all staff matters like employment, wages, promotions etc. BOD thus intended to keep up with the increasing competition in the sector by both new local banks and foreign bank branches.

The Capacity Assessment program was suggested by the external evaluators as a method to analyse in more detail the staff and their knowledge and skills in relation with the duties they are assigned. BOD was briefed that they first need to know what the organisation is made of.

3.2 Ensuring the participation of BOD and GM

Data collected and processed during Capacity Assessment will clearly help to restructure the organisation to a better efficiency by upgrading the knowledge in needed areas and by reshuffling the employees to better matching positions. During the meetings with BOD, also a silent or indirect Capacity Assessment was implemented to the members by bringing to their attention how and what tools capacity assessors use in general. Spidergram⁷ helped to

⁷ a drawing that shows a summary of facts or ideas, with the main subject in a central circle and the most important facts on lines drawn out from it, used in various spheres of assessment, evaluation and planning

clear the confusion amongst the members of board for participating and contributing to the Capacity Assessment program. The board members agreed to build up the relations with the organisation by first strengthening the nucleus of the organisation (BOD and GM in the case) and continuously working the way to middle (middle management; Department Heads, Branch Managers) and outer (first level employees) spheres of the net.

Demonstration with a healthy onion and a semi rotten onion also projected more than the necessary clues to define that only around strong core structure healthy layers can be built where a decaying core will only add other decayed layers creating an overall unhealthy product. Apple's marketing, at its "core", is more like an onion. Separate, individual layers that all come together to create the whole picture. At every stage of a product's development or marketing, there is input, evaluation, and ideas. Don't think of Apple as having a single "marketing department" that controls all its advertising and design, rather, the whole company, and its customers, are the marketing department.⁸

3.3 Briefing the staff and motivating them for professional participation and contribution

Up to the date when the employees were introduced to a complex program of Capacity Assessment, only some of them had attended to mostly single day conferences and trainings. Introductions were done in three groups of average 50 people and special attention was paid that each group consists of employees from all levels. Reluctant to attend top management were given the task to organise and lead the meetings to ensure their participation. Capacity Assessment specialists supervised the meetings and to overcome the major concern and confusion of the participants in "how the result of the program will affect them individually", the employees were encouraged to work on the individual and corporate benefits and challenges that might arise from the implementation of Capacity Assessment. Some definitions of capacity cited above were shared with and the staff.

3.4 Drawing the questioner with key participants and forming the Balanced Scorecard

A questioner was produced with extensive contribution of 35 employees from different hierarchies including representation from BOD, GM, and various departments and branches. BOD was presented the questioner to ensure everyone's involvement and approval on the questions selected. BOD approved and confirmed the use of the questioner as it was drafted.

The Balanced Scorecard (BSC) is a strategic performance management framework that allows organizations to manage and measure the delivery of their strategy. The concept was initially introduced by Robert Kaplan and David Norton in a Harvard Business Review Article in 1992 and has since then been voted one of the most influential business ideas of the past 75 years (Kaplan and Norton, 1992).

About half of major companies in the US, Europe and Asia are using Balanced Scorecard Approaches. The exact figures vary slightly but the Gartner Group suggests that over 50% of large US firms had adopted the BSC by the end of 2000. A study by Bain & Co finds that about 44% of organizations in North America use the Balanced Scorecard and a study in

⁸ Sherice Jacob <http://blog.kissmetrics.com/how-apple-changed-the-world/>

Germany, Switzerland, and Austria finds that 26% of firms use Balanced Scorecards. The widest use of the Balanced Scorecard approach can be found in the US, the UK, Northern Europe, and Japan⁹.

A process with no real management commitment will be compromised from the start. As important as senior management's commitment is, it is important to have the full support of the individuals in middle management or front line supervision whose support, or lack thereof, can make or break the process, hence, prior to the assessment, a steering team (from both sides) comes together to agree the plan, clarify objectives and commit their organization, team or group to support the assessment process. The senior decision-makers of relevant organization then need to foster support and leverage resources within their own organization or team, e.g. dedicated time and availability from specific people (Shamugia, 2008).

Even though this process looked like a preparatory stage, the training was already on and the preparations for Capacity Assessment were triggering the employees to improve their knowledge and various skills like effective communication and teamwork. The questioner as shown in Table 1 contained a total of 42 capabilities reflecting corporate value, work attitude, communication, leadership, team spirit, customer relations, marketing, and crises handling etc. The questioner provided possibility to cross check statements of employees by forwarding to all, questions like “who are the usual early birds?”, “who are the social event fans?”, “who do you work with greatest pleasure?”, “who is strictly affiliated to the corporate uniform?”...

The questioner also included criteria to evaluate the overall emotional situation of the employee, matters like household issues affecting them, distance of residence and travel means and times. The questioner additionally provided section for “**Destination Statement**”¹⁰ to encourage the employees to express their comments on their current position and future expectations.

At this stage, the participants were briefed for Capacity Assessment methodologies and the use of Balanced Scorecard. Participants evaluated three generations of Balanced Scorecard practise and for initial Capacity Assessment agreed on a general format respecting the basics (The 4 box system in grading) and current achievements in using Balanced Scorecard.

A grading system 1-4 was built in the Balanced Scorecard where, Capacity graded as 1 needs urgent improvement, Capacity graded 2 is improvable, Capacity graded 3 is improving to satisfaction, and Capacity graded 4 is efficiently improved.

The Balanced Scorecard included a third generation feature; section for the assessed to define their own targets in improvement with times for such stated. Definition Statement concept was thus introduced to the assessed to contribute also to their evolvement for Self Assessment in future Performance Evaluation programs.

During the 10 years since the advent of Balanced Scorecard, many changes have been made to the physical design, utility and the design processes used to create the tool within organisations. This evolution of Balanced Scorecard, at least in terms of these three parameters, can be largely attributed to empirical evidence driven primarily by observed weaknesses in the design process

⁹ [http://www.ap-institute.com/Balanced %20Scorecard %20How %20many %20companies %20use %20this %20tool.html](http://www.ap-institute.com/Balanced%20Scorecard%20How%20many%20companies%20use%20this%20tool.html)

¹⁰ Destination Statement is an improvement used in 3rd generation balanced scorecards

NAME				
SURNAME				
BRANCH				
TITLE				
POSITION				
WORK START DATE				
EDUCATION STATUS				
PARTICIPATIONS IN TRAINING PROGRAMS				
CAPABILITIES	1	2	3	4
1) The knowledge about the Bank products (credit types etc.)				
2) Observation and ability to understand customer need				
3) Understanding the Customer needs and matching them with bank policies.				
4) The ability to offer innovative recommendations				
5) The ability to offer new products to existing and new customer (up selling skills)				
6) Communications skills				
7) The quality of service provided				
8) Average processing times for primary operations				
9) Communications with colleagues				
10) Ability to communicate with customers with exaggerated expectations				
11) Trainings attended for dealing with problematic customers				
12) Trainings attended for solving customer problems				
13) Pre-detection capability for ,risk, complications				
14) The ability to deal with and resolve the problem/risk/complication				
15) Reporting skills for unresolved problems authority				
16) Corporate Dress attire				
17) Punctuality and regularity				
18) The frequency of sick leave and other excuses				
19) Participations in development programmes				
20) Flexibility and adaptability to development skills				
21) Learning skills				
22) Skills, abilities and activities except the job				
23) Knowledge in the bank's policies and practices				
24) Ability to comply with the Bank's and practices for compliances				

25)Compliance with the teamwork skills				
26)The ability to motivate his teammates				
27)Leadership and management skills				
28)Presentation capabilities				
29)Relations with subordinates				
30)The number of staff working under the control of				
31)Main concerns about the performance of his subordinates when he is absent				
32)Overall concerns when absent				
33)Strains in the absence of his staff				
34)Ability to solve staff matters on his own				
35)Reporting frequency of staff matters to the management				
36)Reporting to				
37)Last branch or department meeting attended				
38)Solve his own individual problems				
39) Referring the individual problems to the administrator				
40)How does he analyze the problems in the absence of the branch manager				
41)Foreign languages spoken				
42)The level of foreign languages spoken				
External factors effecting the emotional condition of the employee and Destination Statement				
1) Number of employed family members living together				
2) Number of dependant family members living together				
3) Distance of the residence				
4) Transport means to and from the work				
5) Social weekly activities				
6) Weekly or periodical sports activities				
Suggestions of the employee				
Destination Statement of the employee				

Name of the Assessor:_____ Date of Assessment:_____

Table 1. Capacity Assessment Scorecard

rather than in the architecture of the original idea. The need to have a design process that made measure selection more relevant and part of the collective view of the management team drove the major changes that can be seen in two subsequent generations of Balanced Scorecard from the original concept. However, while empirical developments were the mainstay of the evolution of Balanced Scorecard certain aspects of the evolution rationale can be paralleled to pre-existing academic philosophies relating to organisational management and strategic thinking. The

alignment between developments in Balanced Scorecard principles and the theoretical aspects of control and management process are a positive indication that the more modern ideas about Balanced Scorecard design processes and structure are indeed 'better' than the original concept described by Kaplan and Norton, in so far as they are more likely to have a beneficial consequence for the organisation adopting the tool. However, while more recent Balanced Scorecard designs are substantial improvements on original ideas; there is still room for improvement.¹¹

3.5 Interviews for individual capacity assessments

Interviews to assess the personal capacity were conducted at the branch or department of the employee. Appointments were set in advance and the employees were well informed about the date and time of their assessment interview. Participants' workload and engagements were considered when appointments were set. Holiday and sick leave and other excused were respected and the interviews were arranged to accommodate these.

At the beginning, the two interviewers executed the interviews together. Bank branch with 1 branch manager, 2 assistant managers, and 12 employees of different positions were interviewed. By working together, the two interviewers ensured to use similar scale indicators when grading the employees, who were evaluated by the interviewers, later working each on his own with the interviewed.

Interviews took place in private and no ordinates or subordinates were present at any employee's interview. The interviewers paid attention to the comfort of the employees and tried to gain the trust of employees in the process by implementing the principal that all comments stay confidential except for the final grade and outcomes like suggestions for additional skill trainings and relocating of departments and or branches (See table 1 for a sample).

Duration of interviews depended on various criteria like the range of responsibilities of the employee, willingness of the employee to comment and offer ideas and suggestions for improvement. Most interviews completed in 30-45 minutes. As the interviews progressed, the initial strain and stress signs of the employees decreased significantly. The team spirit evolved and more suggestions and critics increased the data collection.

3.6 Physical and management capacity assessment of branches and departments

Work environment has always been a decisive factor on performance of the employees. The Capacity Assessment Team evaluated every Branch and Department during the assessment visits. The physical capacity of the premise was evaluated by observation to define multiple criteria like; Building and work area's ergonomic and corporate design, Efficiency in traffic in the work and customer service areas, Display of information, Existence of employee service and recreational areas, Hospitality desk or area for Customer, Equipment standards and appropriate use, and Parking spaces for staff and customers. We will observe later in this chapter a sample report evaluating the physical and operational capacities of a branch (See Iskele Branch as a sample).

¹¹ Ian Cobbold and Gavin Lawrie The Development of BSC as a Strategic Management tool, 2GC Limited, 2001, 2003.

3.7 Evaluating the data and reporting to BOD

3.7.1 Capacity evaluation for each staff

Capacity Assessment for each employee was evaluated based on the Balanced Scorecard graded and composed during the interviews

- i. **Numerical Evaluation.** The sum of grades (marked 1-4) for each capability, divided to the number of capabilities assessed on the scorecard produces the overall Average Capacity grade of each employee. Scorecard Average (SCA) is thus derived
- ii. **Comments of Capacity Assessor.** Indicates the leadership, communication, sales and other capacities observed, suggests additional training in appropriate disciplines and eventual new job position. Comments about the motivation level and points to psychological needs if any.
- iii. **Own comments of the assessed.** Commitments and Destination Statement of the assessed for building further capabilities.

3.7.2 Sample of report for Employees' Capacity Evaluation grouped in the branch or department where they work

As a result, a table was produced for each branch and or department listing every employee and evaluations derived from the collected data. The Table 2 is just a short part of the full table, which was composed for the employees of The Nicosia Main Branch, in Nicosia with total 24 employees. The sample table displays only 5 randomly selected employees. The table clearly exposes the numerical (Scorecard Average) and comments of Capacity Assessor.

Branch	Employee Name ¹²	Capacity Assessors' Comments for further improvement areas	SCA	Capacity Level	Position
Main Branch	A.A	Leadership, Management Skills courses advised	2.5	Improving to Satisfaction	Assistant to Branch Manager
Main Branch	ED	Will be more efficient if relocated to accountancy dept	2.2	Improving to Satisfaction	Starter level clerk
Main Branch	AU	Possesses teaching skills to be trained as in-house trainer. Leadership and advanced communication skills courses advised.	3.3	Efficiently improved.	Intermediate level clerk
Main Branch	ÇH	Effective Communication and Accounting courses advised	1.8	improvable,	Starter level clerk
Main Branch	SA	Leadership, Marketing courses advised	3.6	Efficiently improved.	Branch Vice Manager

Table 2. Report for Employees' Capacity Evaluation (Main Branch)

SCA as Scorecard Average can be calculated as “between 0.0 and 1.0 (needs urgent improvement)”, “between 1.1 and 2.0 (improvable)”, “between 2.1 and 3.0 (improving to satisfaction)” and “between 3.1 and 4.0 (efficiently improved)”.

¹² Full names not reproduced for ethical reasons and privacy respect

3.7.3 Physical and operational capacities

The Capacity Assessors also observed each branch and department visited for Physical and Operational Capacities. The Data collected for these capacities of each branch, was analysed and reported to BOD.

A Physical and Operational Capacities report based on the real report for one branch (Iskele Branch) is partially sampled below. Only the capacities, which need improvement, are summarised and included in this sample.

Iskele Branch is in a relatively distant town (fishing, tourism, agriculture) from the main office. The Branch has 14 employees including the Manager and 2 Shift Leaders. **Average Score of the Iskele Branch is calculated as 2.63.** The Average Score of the Branch is the figure derived from dividing the sum of all employees' Scorecard Average to the number of employees.

Physical Capacities of Iskele Branch, which need improvement, are stated below:

- Perfectly located Branch needs architectural reconstruction to reflect the corporate style indoor and outdoor.
- Security of the Branch and the employees is compromised in the current work environment. This elevates the necessity of attention to the reconstruction issue.
- Equipment needs upgrading.
- New architectural solution must allow space for customer hospitality desk to protect the existing friendly work relations with locals
- The character of the rural area demands increased mobility for the branch. Additional vehicle must be provided.

Operational Capacities Iskele Branch, which need improvement are as follows:

- Strong local relations must be capitalised for further growth
- Branch manager to be supported continuously with specific additional trainings to improve to satisfaction his organisational and leadership skills.
- Products related with the rural character of the area must be included to the product range

3.8 Reporting and suggestions to LTK Bank's BOD

The Capacity Assessment Team provided to the BOD with the following reports and presentations:

- Capacity Assessment of employees grouped in the department or branch they are positioned (sampled above in table 2).
- Physical and Operational Capacity of each branch or department (Sampled above in Iskele Branch case; 3.7.3).
- General Report covering all the capacities of the LTK Bank aspects stating both the capacities needing priority for improvement and the capacities improved to satisfaction.

Following is an extract from the General Report presented to BOD of LTK Bank. The main findings of report are categorised as advanced capacities of LTK band and Capacities of the bank needing urgent attention for improvements.

3.8.1 Advanced capacities

- Bank employees possess highest level of institutional loyalty
- Work departure / arrival times are in general satisfactory. (Solution to this issue; use exit entry card system!)
- The employees (especially employees with more than 10 years in the bank) demonstrate high level of communication skills, attention, and are active and diligent in introducing the bank's products.
- Significantly high employment continuity helps to keep and improve customer loyalty and encourages applicant and new employees.
- The easy accessibility of senior management even though occasionally disturbs the hierarchical scheme; employees often enjoy the practice and develop higher level of self-confidence.
- A satisfactory number of employees in each branch and department are well acquainted with the customers and possess skills to satisfy individual needs of the customers.
- Solidarity and support among the staff is present at a high and admirable level. This positively affects the performance of the bank and the team work of the employees.
- Board of Directors' job, responsibility, and authority sharing strategy is a major advantage for the bank. This innovative way of management in North Cyprus banks is increasing each BOD member's specialization and effective and efficient management.

3.8.2 capacities needing urgent attention for improvements

- Periodic meetings are not regular. The meetings, the agenda and the minutes / reports of branches and departments are not present.
- Bank's regulations are neither well distributed nor well recognised by the employees. Regulations are unknown, except by a minor group.
- Complete restructuring of Human Resources unit is needed.
- Level of staff motivation needs to be increased. In particular, branch managers need to improve their supportive attitude to the employees.
- Individual achievements should not be in front of corporate success. Especially 'We' instead of 'I' should be preferred.
- Hierarchical structure within the bank must be respected.
- Access and facilities for disabled must be present and or improved.
- Branches must project the corporate design and identity.
- Marketing is the capacity, which needs immediate improvement.
- Marketing Department needs to be restructured as quickly as possible, with well-trained and energetic staff.
- Unique to each region-specific marketing campaign. Credit expansion of the region's needs to be identified and developed.
- Closed circuit TV screens (LCD), in each branch can be used to promote the products and services offered.
- Customer preparatory desk (pens, forms, calculators, product brochures, and even an internet connection) should be designed for all branches.
- Customer profile is aging. Aim for a young customer profile. Note that young people are future customers. Especially important in this sense are marketing points at the university campuses.
- Develop relationships with State and local government agencies and institutions in regions.

- Improve communication with Main Office by using online IT software to find earlier solutions to special customer demands such as insurances, special credits etc.
- Marketing Department at the Main Office must consider regional marketing needs and provide solutions and support.
- Internet banking and customer service must be introduced with no delay.
- Hospitality Desk (The concept of hospitality) as a pilot study in a small branch must also be tested in a larger branch.
- Risk management is a very urgent need and priority should be the establishment of a new department as soon as possible. At the present, the individuals assigned to this task lack the knowledge and experience. Expert service must be outsourced to save time and avoid legal strains.
- Contemporary banking technologies need to be available in all branches and not only in the new ones.
- Compliance with existing regulations of dress is generally observed. However, the colours used are incompatible with the vision of the bank. Black represents the colour of authority and seriousness.
- The senior management is selectively far too easily accessible and this creates hierarchic disorders of communication between administrative staff.
- Personal Banking must be introduced to create an upper hand in competition with other banks.
- Branches need to have meeting rooms to provide service that is more efficient to the customers. The current practice of inviting the customers behind the service bench is outdated and projects selective servicing of some customers while carries risk for confidential data to be exposed
- Marketing products offered by the bank should not be competing with each other.
- In some branches, the bank asks for customer's password when providing service related with Debit cards. These practices have to be abandoned immediately since it may lead to security and legal drawbacks.
- Cleaning and maintenance done by bank staff is not at the expected highest level. Outsourcing these services will bring more efficiency.

3.9 Summary of trainings as an outcome of the capacity assessment program

Education and Trainings; Communication Skills verbal and written, Presentation skills, Ethics and Banking Ethics, Leadership, Crises Management, Advanced English Language, Report Writing skills of staff were improved by providing education and training programs to the employees in harmony with the outcome of Capacity Assessment.

A group of 30 employees were trained on Performance Evaluation and Methods, Objective Evaluations, Interview skills, this group drafted the Performance Evaluation Balanced Scorecard majorly applying the 360-Degree Methodology¹³. 8 of this group were appointed as in-house Performance Evaluators and after practising, they conducted Performance

¹³ The performance feedback method known as 360-degree feedback has gained wide popularity in the corporate world to the point of being nearly universal among Fortune 500 companies. A 360-degree feedback program enables organizational members to receive feedback on their performance, usually anonymously, from all the major constituencies they serve. (Jai Ghorpade Managing Five Paradoxes of 360-Degree Feedback. Academy of Management Feb., 2000)

Evaluation under loose supervision of The Capacity Assessment Team. The results were supporting the necessity of trainings and programs provided and justifying the suggestions made to BOD in the General Report of the Capacity Assessment Team¹⁴.

4. Conclusion

In this study, capacity assessment program was applied to Limassol Turkish Cooperative Bank in Northern Cyprus. Expectedly, positive contributions of this program started to be observed just after the implementation of the program.

LTK Bank in less than a year gained a well-dressed corporate identity. Departments were restructured to more efficiency. Total restructure was in Human Resource Department now performing much more than being a pay-roll office. Information Technology Department rise to the level to meet both customer and Bank's needs. A proactive Marketing Department harmonised the existing products and constantly is researching and designing new general and specific to the area products. Young customers are targeted with products offering them solutions for financing their education and or new profession. A small number of staff (6) was relocated to alternative departments. Limited numbers of staff (2) were contributed to improve their emotional well being by professional attention and paid recreational holiday. Two top-level managers and one member of the board enrolled to 8 weeks Executive Bank Management Training. 16 new jobs were created in the bank at specialised and starter levels. LTK Bank became more visible with additional social responsibility programs.

As in any other Capacity Development program, the method used during this study lacked the capability of bringing to surface some of the significant human factors in any operation. There were no tested tools to understand if the mature staff who occupy executive positions are more interested in their retirement plans or the strategic improvement of the of the organisation in next 10 years. Likewise, we could not verify how devoted is the junior employees to the Bank. The program provided too little information for the assessors to trace or to link the psychological discomforts (if any) with the management styles of the bank or the leading methods of the nearest administrator.

Without a comprehensive Capacity Assessment, LTK Bank could still be wondering how to meet the new challenges. The implemented Capacity Assessment gave the opportunity to the Bank to learn *'what their staffs are made from'*. This knowledge was much easier to obtain and more economic than costly new management and new staff contracts. It also improved the positive image amongst stakeholders as an institute who cares and contributes to existing employees rather than terminating their contracts. It also provides a fair and transparent quality to the recruitment policies of the LTK Bank.

The program will lay strong foundations to the organisation's further Capacity Development. Education and Training provided must be tested for outcome. Biannual Performance Evaluations performed by trained corporate in-house assessors must be crosschecked with external expert assessors until the derivations in the results are diminishingly narrow. Researches among close stakeholders (Cooperative member

¹⁴ Another study of the authors' will detail the improvement program and training and conducting Performance Evaluation

shareholders, customers, targeted sectors, related institutions such as Central Bank and Finance Ministry) and general stakeholders need to be carried out for both verifying and extending the level of capabilities and newly acquired capacities of the Bank.

5. Acknowledgment

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- The authors acknowledge the significance of the decisions of BOD of LTK Bank and express their gratitude to The Chair, to the Education Member of the Board, and to all executives enabling this study and thank to all employees of the Bank.

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Sustainability and Quality of Life Modeling the Complexity of Governance

Alain Lepage

*University of Technology of Compiègne (U.T.C.), COSTECH Laboratory,
Centre Pierre Guillaumat, BP 60319, 60203 Compiègne Cedex
France*

1. Introduction

The Quality of Life index is a well known measurement schedule able to compare the citizen's life facilities across countries of the world. It is based on rational and factual parameters such as Gross National Product, per citizen health spend and gender equity. The criteria has to be reinforced by psychological approaches like those used in customer satisfaction and Total Quality Management. My studies validate the theoretical role of QoL as attribute of sustainability. I have represented this concept with Makovian reverse processes in political systems.

I studied the different attributes of the Quality of Life in a first approach from the research literature, elaborating a structure of these elements. In a second approach, I made interviews of citizens about their Quality of Life perception, with the "voice of the customer" method (Kano [1] , Griffin – Hauser [2]). A validation came also from companies with studies of customer needs and expectations, particularly in the health field.

The presentation of these previous works concludes showing confusions between Quality of Life, well being, health, happiness, liberty. Then come the effects analysis in the sustainability and the policy definitions with the place of sustainability and safety in political systems, allowing us to use a Markov model description [3].

The impact of Quality of Life's variability perception in the instability of political systems drive politicians to better understand sustainability and safety processes functioning. Its useful for politicians to improve the political system and avoid to provide short term answers to citizen's unsatisfactions with a lack of mastery. So I understood that the analogy was relevant in management applications in firm's governance, driving this research to focus on the enterprise analysis in the second half of the document. Observing technology and industry history conducts us to describe the effects of growing complexity in these organizations. My presentation will observe the limitations of the ancient linear models and proposes the analysis and the opportunity of cross reverse differential ones such as Markov. These works conduct towards a partial study of interfaces with human beings and suggest producing simplifications by aggregation method and Markov model describing Quality of Life's place in sustainability and complexity of governance.

The question arises of the Quality of Life (QoL) definition which is a usual standard well known and used in governments' publications. It is also frequently used in the daily discussions of customers and citizens about their personal needs, expectations and requirements. But the concept is very difficult to understand due to the lacking sense which should come from its quality definition and lacking available measurement which should come from a factual quality control process.

I propose to begin with a theoretical approach about the QoL theme and a survey designing the map of common parts, discriminations and links between QoL, well-being, health, safety, pleasure, and sustainability. Making studies for many years in a lot of companies on management and on quality services, the members of our laboratory can observe quality products, change management, organisational development and polls, doing situation maps and structuring the data to nurture the research. In companies and state offices I had a practice of the "voice of the customer" method (Griffin, Hauser [2]), (Shiba, Malsh, Lepage, [4]). Our laboratory stocks a large data base about QoL's perception, which has been used in this research. A particular survey is used in this research to validate our assumptions. It comes from customer's needs and expectations from a pill-maker which offers to our laboratory to study governance, products and services. We can take this opportunity of internal observation of the companies to know if the same attributes of Quality of Life and sustainability appear to build the governance style perception. The central assumption for this research can be proposed here: is it relevant to consider that the QoL concept has the same sense in both the entrepreneurial area and the public political area? If I could prove that the attributes are similar to those from political system, it would be interesting to test the same calculation mode between the attributes and the governance concept using the same Markov model.

2. Markov model application for the Quality of Life concept and the global research approach

This part can be deeply studied regarding Markov system experts (Mauldin, Urbanski, [3]), (Heylighen, [5]), but offers also some improvements of our analyses which has been made in our laboratory from ten years. For the study described in this paper, I describe hereafter the research approach which has been deployed at each time with the same global research design:

- Exploration phase, with One on One interviews made by myself accompanied with a PHD student preparing his thesis under my responsibility , or (most of the time) with a project managers who were employed by the companies in which I have been implied with a contract from my laboratory to do research studies;
- The One on One Interview method is applied with an interviewer and a second person taking notes to catch the voice of 24 customers. It consists in factual explicit expressions with observations of the environment, context and client mind representations to be able to elaborate the implicit and the latent needs or ideas or opinions of the interviewed person (see Hauser [2], and Shiba [4]);
- The elaboration of a Kano questionnaire (see Kano method [1]) from the structuration of the interviews data in affinity diagrams;
- The validation with the returns of questionnaires sent to 80 customers (different from the first one interviewed) to verify the reliability of the information caught in the first phase;

- The elaboration of the outcomes of the survey (charts, tables,... to represent the opinion of the people interviewed or questioned);
- In each case described in all the parts of this paper the person implied in the research were the project managers in the companies (or sometimes the PhD student when we had to interview citizens on the streets) with me on all phases of the research approach. In all these cases I made the interviews with a panel of company's board members, who were members of the project inside the company (new product or service elaboration, improvement of the organisation, change management...). The typical panel is made of experts in Marketing, Quality, finance, Production, Procurement and sales, Maintenance and Information System. At each time I trained these members on interview and Kano questionnaire practice.

This global design of the research approach has been elaborated by Von Hippel, Griffin, Hauser [2] with a 90% reliability level. It is based on the Beta - Gauss model, which we have tested on 22 product and design applications in companies with our laboratory, with the same reliability result.

All the applications presented in this paper used exactly this research frame. But in each case I propose in the further parts of the text the details of the number of people participating to the surveys, the 2 people involved in driving the interviews and Kano validation, and the profiles of the organizations observed in the samples. We can see these details in parts 1.3 (Markov base model), 3.0 (QoL / management and politics), 3.1 (correlation between management and politics), 3.2 (application in health field). These research design details are done in these parts as "research context" denomination .

2.1 Previous research in un-linear models with our Markov application on customer satisfaction

This theoretical approach has been made with an application I made on a leisure park. This approach was used to take immediate quality feedback after each observation of drift in the satisfaction of the customers (Qualisat, deposited method, INPI, A. Lepage [6]). I can confirm, as said by Kano that concerning all products/services, only 20% of them, classified "explicit expectations" follow a linear answer (Kano [1]), (see also Edvardson, Gustafsson, Enquist, [7] about correlation between satisfaction and memory of personal life events). In 1998, at the "Assises Nationales de la Recherche en Qualité" seminary, Versailles, France, I explained that the service quality measurement is reliable in relative comparative results between some tiny similar events, or same events measured in same conditions many time on small detailed topics, but never in absolute or large value. This gave the idea to apply Markov models on satisfaction because it allows usually to calculate the global availability of a equipment from the detailed failure ratio and repair ratio. In this application, it allows me to calculate the global satisfaction of the whole participants to the site's exhibitions from the local variations of satisfaction in small teams of participants.

The Markov models (Mauldin, Urbanski) were also choosen to describethe complex global satisfaction phenomena with their ability to synthesise cross reverse dynamic processes. It is based on the calculation of the probable position in a real situation between two extreme, ideal, theoretical situations relative to the number of basic team repairer-originators (elementary team members, carrying out routineby re-designing or repairing). It should be remarked that the definition also means: "zero dissatisfaction of the customer, between the

moment 0 and the moment T of analysis", which supposes a measuring instrument available from time 0 to time T. The problem which I had to solve was also the implicit assumption of the observers about a previously-established linearity (without any validation) to model the satisfaction.

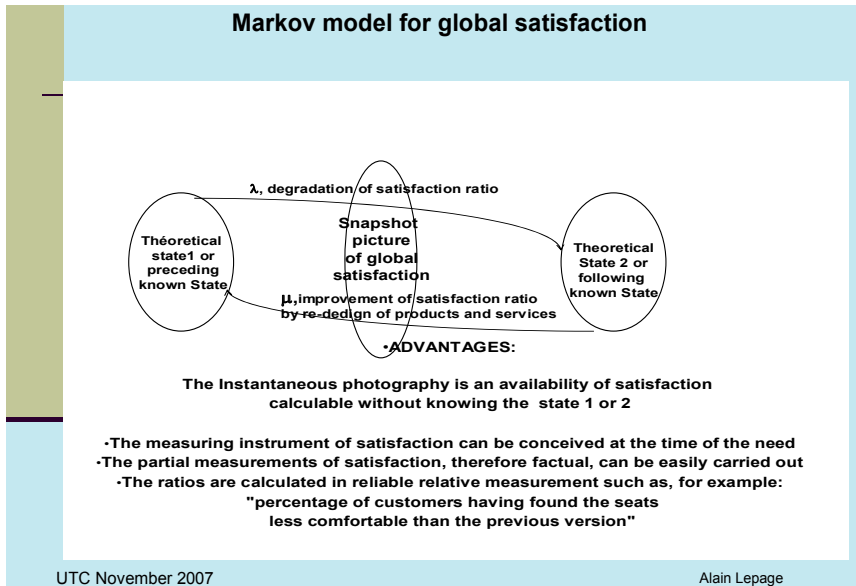


Fig. 1. Markov model for global satisfaction (A. Lepage)

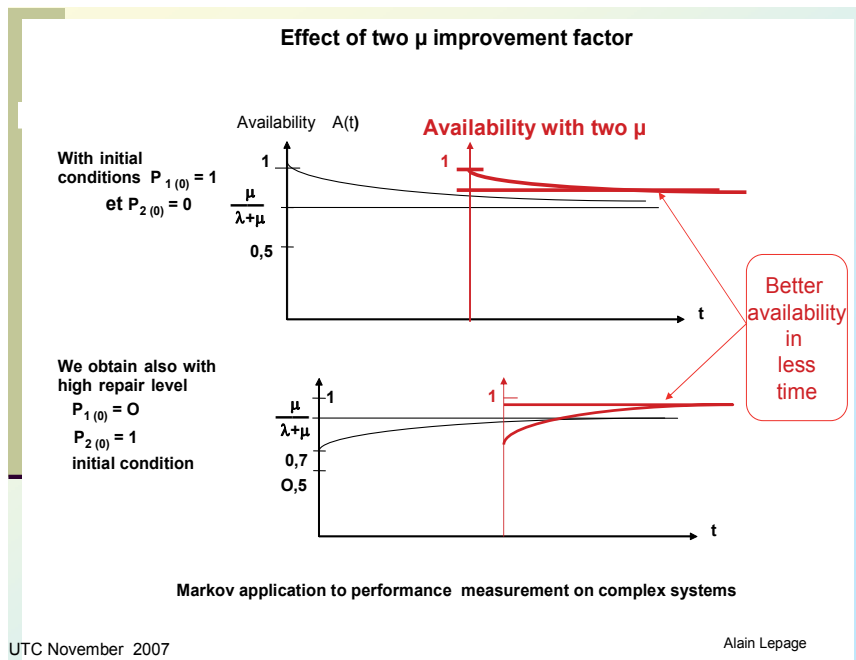


Fig. 2. Re-design level of reparation to satisfaction result (A. Lepage)

The research context in which this application has been made is done as under:

- Interviews and Kano validation made on 280 person all clients of companies which offered a research contract to our laboratory; these clients were final customers (so, citizens, 70%) and enterprises (30%) ;
- The survey has been deployed on 12 companies (the first for Markov model elaboration was a leisure park, and all the others for Markov model validation are shared between car constructors, equipment makers and bank or insurance servicing);
- I drew myself the survey as co-project manager beside the internal project manager of the company, and made a training phase to the members of the companies until they were able to practice interviews.

2.2 The first application of the Markov model on the political system evaluation

Here the quality perception is relative to the image seen by citizens when they understand the quality system presented by politicians in their political program. This is a description of a future proposed to listeners modelled in 2 reverse processes (see figures 3 and 4, and Lepage, [8] TAR journals, 2006). The first process moves concerning sustainability. It is made up of many resources, supports and actions which offer citizens a better quality of life. What is defined as sustainability is the measurement of the quality of the political system, as mentioned in the report on the United Nations Conference on Environment and Development (Landolt, and all, [9]). A more detailed definition is postulated by Afgan and Carvalho, ([10]): "the measure of the quality of our society is its ability to secure, and not compromise, the right of future generations to have a quality of life, at least equal to that of its own generation". Sustainability is seen here as people's self - organisation driven by the desire to obtain the best quality of life, under constraints of financial feasibility and individual and collective safety. However, some authors view sustainability as a measure of quality (Gianpiero, Mayuari, Postar, ([11])) and others underline the high level of complexity in the measurement of sustainability (Heylighen, [5]). The second process, of safety, concerns the natural effect of self - degradation (Levenson), particularly in the case of complex systems, with a worldwide measurement tool, the "World Disaster Report". The two processes can be evaluated with the same approach than this used in the measurement of quality. It can be considered that they hold a similar place in the conception of life.

The results of my research on Markov model applied to political system has been presented on several research conferences from which I can propose an extraction here after with 2 figures.

2.3 Markov model for QoL as sustainability attribute in political program

The model has been validated with our global research approach applied on citizens and public and private employees whose were interviewed at random, as they came to our environment:

- Interviews and Kano validation made on 120 citizens and 95 employees of companies in which a research contract has been signed with our laboratory;
- The survey has been deployed on all the counties of France;
- I drew myself the survey as co-project manager beside the internal project manager of the companies, and the citizen's interviews with a PHD student.

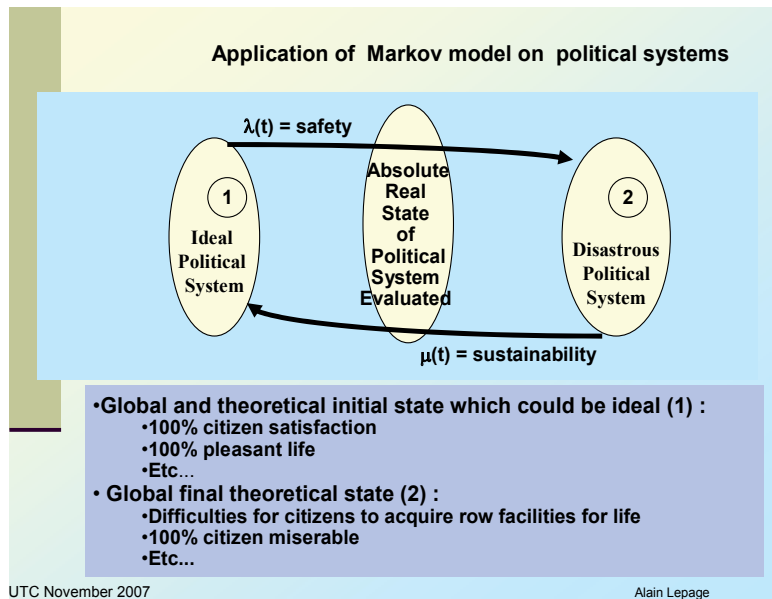


Fig. 3. Markov model for political system evaluation (A. Lepage)

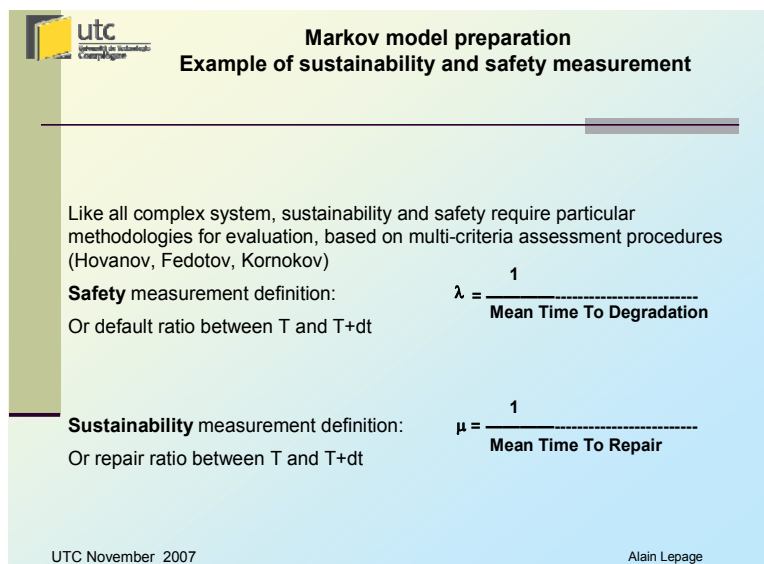


Fig. 4. Sustainability and safety position in political system evaluate

The complex process' evaluation requires a particular methodology based on multi-criteria procedures. This method is well-known as "The multi-criteria evaluation and assessment of complex systems". An example can be found in economics (Hovanov, Fedotov, Kornikov, [12]). My purpose was not to classify all the relevant criteria for the measurement of sustainability and safety in this previous research. My interest lies in the use of some of the criteria-elaboration methods which are available in the economic, organisational and systemic areas regarding the way they will be included in the Markov calculation.

The second interesting outcome is that sustainability offers some tools for its own measurement which can be apply in the current research on health in QoL. Afgan and Carvalho [10] made a synthesis of this sustainability with its four components, resource quality, environmental quality, technological quality and social quality.

So, I can promote this theoretical structuration of the links between the principal attributes in the roots and causes giving the mapping representation of the sustainability. One of them, QoL, will be particularly observed in this aggregation roots representation.

3. The concepts relative to Quality of Life

This concept has been studied for a long time beginning with old standards of measurement. Now, new approaches come just to confirm our description of QoL as a global satisfaction seen by citizens (ISQUOLS measurement, Cummins, [13]). In a large correlation between some experts' announcements and the common sense, everybody think that happiness can be synonymous of quality of life. If the perception is not completely the QoL we can observe that it is at least the principal attribute of the concept, having links with health, environment. Some authors confirm this observation like Rogerson ([14]) in his study based on QoL in Britain and some European countries.

3.1 The attributes of Quality of Life

The paper comes to present the different research roots which our laboratory had to examine regarding the Quality of Life. I can firstly summarize the principle attributes of the QoL which has been available and observed in the customer and citizen interviews. I propose secondly to analyse the importance of the psychological aspects in the QoL studies and consequently the lack of indicators and measurement, whereas would be the research results available in the cybernetics area.

3.1.1 The Gross National Happiness with its measurements

The Gross National Happiness (GNH) is often presented in holistic approaches as quality of life. I can have a kind regard to Jigme Shingye Wangchuck [15] who get Buthan's King power-shift in 1972, building an economy that would serve Buddhist spiritual values. Today he is walking across his country to convince his citizens to go to polls and gave their vote to another person than this lastly designed king (himself). The four pillars of GNH are the promotion of equitable and sustainable socio-economic development, the preservation and promotion of cultural values, the conservation of the natural environment, and the establishment of good governance. International centres like Genuine Progress Index Atlantic promoted GNH measurement (Rethinking Development) (see also and the Centre for Bhutan Studies). Classical liberal economists attempt to quantify happiness through measurements in consumption and profits (Hayek [16], Javorski, Friedmann, [17]) and sometimes as parameter of sustainable development (Ezechieli, [18]). The happiness is a well - known and self - obvious parameter easy to measure. From the research point of view I can ask what is their place sitting in a complete structuration of the quality of life's (QoL) description, and which is the part of Health and Human Development in the global QoL calculation. How much does it weigh?

3.1.2 Health and its perception as Quality of Life

Measurement of quality of life is used in health with Quality Adjusted Life Years (QALYS), and Disability Adjusted Life Years (DALYs). It is based on links between health, medicine and QoL (Pena, in The Economist Intelligence Unit). The cost of a treatment is usually measured by the cost per QALY, or per DALY (Bergner) with links on QoL (Landolt, [9]). All the authors relate the permanent confusion with well-being in patient perceptions of health included in QoL. They think usually that the health quality of life comprises: happiness, freedom, standard of living. Pena studied and explained the linearity between the physical state of the body and the perception of QoL (Netz, Wu, [19]).

3.1.3 Human development as attribute of Quality of Life

Most of the customers and citizens perceive the two concepts as similar, but many authors who have been studying QoL and HD present the distinction between human development and QoL, like Dossa [20] since 1989. That basic qualitative part of human aspect of QoL is the physical one, presented by Morris [21] since 1970 as: percentage of the population that is literate + infant mortality rate + life expectancy. Today many interesting discussions share a new knowledge about these measurements. They fill an ancient lack in the description of the psychological and cultural attributes of the citizen's expression of their human perception of QoL, which I can call qualitative elements (Hout M., [22] from Russel Foundation, takes qualitative approaches as the most important part of living conditions). This experience of many people's perception of life surveys confirms these evolutions, adding that both customers and citizens decide clearly to make a volunteer mix between QoL, well-being, human being, happiness and family social uses which we experimented as attributes of global QoL.

3.1.4 Aggregation method for Quality of Life's measurement

We can find a schedule of Quality of Life description and measurement in the Quality-of-Life index (The Economist Intelligence Unit) elaborated in The Economist Intelligence Unit, and calculated on a unique methodology that links the results of subjective life-satisfaction surveys to the objective determinants of Quality of Life across countries. The index has been calculated for 111 countries for 2005. We have also a multicriteria model of QoL measurement proposed by Massam [23]. Life satisfaction is seen as a judgment that depends on social and culturally specific frames of reference. Often it is question of gross domestic product (GDP) per person, at purchasing power parity (PPP) in \$ (Economist Intelligence Unit) beside other well-being indicators (Kahneman and Schwarz, [24]). Based on the QoL index, researchers validate some QoL factor's indicators:

- Material well-being (our laboratory keeps complete studies about global happiness (see Diener E., [25]) and happiness attributes in material well-being (see Frey [26], Stutz [27]), with an economical approach. There also this is the concept of GDP per person, at PPP;
- Health (life expectancy at birth, years. Source: U.S. Census Bureau);
- Political stability and security (source: Economist Intelligence Unit);
- Family life (divorce's rate per 1,000 population, converted into index of 1 (lowest divorce rates) to 5 (highest) (U.S. Euromonitor (see Disabled Family));

- Community life (Vias and Carruthers, [28] worked on country geographical and regional factors of development versus QoL). We can also use the Dummy variable taking value 1 if country has either high rate of church attendance or trade-union membership; zero otherwise (I.L.O.World Values Survey);
- Climate and geography (latitude, to distinguish between warmer and colder climates (C.I.A. World Factbook).
- Job security (unemployment rate, %)(Economist Intelligence Unit; I.L.O);
- Political freedom (average of indices of political and civil liberties. Scale of 1 (completely free) to 7 (un free)) (Freedom House);
- Gender equality (ratio of average male and female earnings).

3.2 The impact of human resource management from entrepreneurial and political areas

Many authors in psychology sociology quality (Cummins [29]) and philosophy have done some research works concerning the major importance of human aspects in political and organisational systems. It would be too long here if we expected to present a synthesis of their results, and it could be irrelevant to offer useful answers to our problematic. So I propose to observe a part of this knowledge really and actually opportune to understand the Quality of Life's expectations in the context of professional working in companies. It seems to me that an opportune research area could be the cybernetic one which presents new elements mixing internal working social and psychological processes in the firms and organizations with knowledge management and cybernetic models of the system.

3.2.1 Cybernetics and knowledge management at psychosocial aspects of QoL in enterprises

As I presented our works at Orlando in 2008 (Lepage, CCCT, [30]) I offered the elements coming from the Heylighen [5] presentation. It concerns the second - order cybernetics, comprising the effect of the observer in the system's description. The definition of second - order here is done by the fact that it is not only the factual analysis of a stable and motionless system that is important, but the representation of the perception of the dynamic system. This representation made by all the members of a working team at the same time in the process on which they work in the system makes them become the observers of the system. Passing from the analysis of the system alone to the global human workers and observers in and out the system consist in classify the system from first order to second order cybernetics. I proposed as under, a comparative presentation of the first order and the second order cybernetics:

The second-order consists in the system itself described by the observer. The second order consists in the system, and at least his individual observation, and all the human interactions, particularly with the environment. The second-order cybernetics is not reserved to machine intelligence application, as we could have supposed at the beginning of cybernetics studies, but first to human activities, particularly in organisations (see Pangaro [31]). I can describe hereafter the particular inputs and effects concerning the second - order cybernetics of our Markov system, and precise the attributes of the second order cybernetics in our case.

Author	First Order Cybernetics	Second Order Cybernetics
Von Foerster	The cybernetics of observed systems	The cybernetics of observing systems
Pask	The purpose of a model	The purpose of a modeler
Varela	Controlled systems	Autonomous systems
Umpleby	Interaction among the variables in a system	Interaction between observer and observed
Umpleby	Theories of social systems	Theories of the interaction between ideas and society
Definitions of First and Second Order Cybernetics		

Fig. 5. Source A. Umpleby, G. Washington University

Self-organisation in the firms

The importance of multidisciplinary collaborative team – members in organizations input a cybernetics configuration such those that have been studied by Ashby and Heylighen [5]. He explained that an organizational system comprises many subsystems which are under constraint created by self-organization becoming mutually dependant and adapted. So it is a freedom loss, like in the analogy of magnetic spins in a first time coming free, and became stable after being put closed to other ones.

It is also interesting to study Von Foerster [32] which added that self – organization can be enhanced by perturbations coming at random. It can make state and drive the system, called “order of noise” principle.

Knowledge management and en-action concept

The human participation in the team working inside companies had been studied on the knowledge aspects with the famous separate tacit and explicit parts of professional competencies (see Takeuchi and Nonaka, [33]). They describe the additional complexity in the organizational systems due to knowledge and behaviour sharing in the teams. This is a new parameters linked to cultural aspects. This takes part of the complexity particularly on the reverse impact of expatriate and spousal cross-cultural adjustment (see Takeuchi, Yun and Tesluk [34]). The organization depends on these crossover effects of contingency cultural impacts. I can also take in consideration the cross – reverse and cause – effect play of the rational and the emotional parts of the human being and human thinking in the organization system. This is at the centre of the cognitive approaches and particularly the en – action principle. In many cases, it’s not clear that reason precedes always action. This is one of the effects of en – action that allows many researchers to consider this concept at the centre of organizational complex systems.

Individual emotions

Individual emotions and individual perceptions of citizens and customers are also at the centre of QoL, sustainability and political system. This effect has been studied by Hollenbeck [35] in cybernetics. We can particularly present the effect of emotions in the

external –internal situations of the organisation with observation of personal –team fitting to the system. I can consider that emotional stability is an important parameter of the organizational complexity and stability which can be seen as a contingency approach.

3.2.2 The lack of psychological aspects in QoL management

It is admitted that the human factors take an important place inside the system to improve the complexity. So, as a first evaluation I have explained that the human presence genders a second order cybernetics due to the knowledge, cultural and en-action principles functioning inside the team working. But conversely I have also explained that the human presence can reduce the dynamic movements. By this second point of view, by the effect of cultural, emotional and organizational aspects, it is confirmed that in the second-order cybernetics theory the important impact of the human presence drives a similar cross reverse process that the one I described with our Markov model.

4. The QoL concept applied to managerial and political areas

My previous research allowed me to propose some results as outcomes extracted from the validations in several companies. I can show, for example, some data analyses issued from two surveys. The first one analyses the QoL with a “voice of the customer” method (Griffin, Shiba, Lepage) applied in 2007 on French people questioned on their perception of actual life and their future desired. The second one is in concern with QoL measurement on a panel of medicine clients. As co-project manager beside the product manager (company’s employee) we were together in charge of catching customer needs and design pills and health services as good answer.

The research context of this application is done as under:

- Interviews and Kano validation made on 150 person all members of companies which offered a research contract to our laboratory;
- The survey has been deployed on 22 companies (equipment designer for enterprises, car constructors, sub – contractors for car and aircraft construction, banks, public administration, professional chambers, internet services, etc);
- I drew myself the survey as co-project manager of internal projects in the companies with help from one internal volunteer employee.

For these applications we collected data from the employees inside the companies and also from the users of the services and products in the public environment outside. At each time employees and users told us what they had to say in answer to our question, without being forced to position themselves in their employee situation or personal and public situation. So our difficulty consists in getting some detailed explanations to correctly classify the answers in families (enterprise or individual/citizen). The complexity of some answers made this analyse more difficult, because the interviewed person does not separate professional from personal aspects in their answers, being unable to observe their own personal cognitive process.

4.1 QoL analogies and strong correlation between managerial and political areas

As we proceeded with the product manager to interview people inside companies (employees), or outside (citizens,) we collected a mixed and half shared data concerning

both professional classification (enterprise) and personal one (political system). It has been a huge work for our laboratory to separate the enterprise and the political aspects of the answers due to the sense of the sentences which have been noted with a factual constraint. But we have taken the opportunity of realizing a study with these mixed data about the relations between the QoL and its attributes and the professional or the personal area of these people. It has been easy for us to do an extraction of the vocabulary which they used to describe the QoL concept or its attributes. We can summarize here after the results with the correlations measurement.

The table shows in the last column, the correlation between political vocabulary and entrepreneurial vocabulary which is at a frequent strong level. We do not notice the least low level in the lines, which is a good similarity configuration regarding all the lines which are in the same concern in such entrepreneurial and political system language.

QoL / Attributes	Political Vocabulary	Correlation	Entrepreneurial Vocabulary	Correlation	Similarity
Quality of Life			High stress working conditions	-0,8	
	Personal human consideration	0,75	Personal human consideration	0,9	0,68
	Global wages and options	0,8	Global wages and options	0,95	0,85
			Job satisfaction	0,8	
	Social standing satisfaction	0,7			
			Good relations withn colleagues	0,8	
	Smart design for working/housing	0,7	Smart design for working area	0,7	0,99
Health and quality of life	Soft human ambiancy				
	Soft urban design for living	0,8			
	High stress causes of disably	-0,9	Low stress working conditions	0,8	
			Tax for medical care	-0,6	
	Cost per day in	0,7	Good insurance recover	0,6	0,85
	Well -Being patient	0,7			
	Physical state of body	0,9	Missing days for medical care	0,7	0,75
Gross national happiness	Disably Life years	0,7			
	Easy access to medical care	0,9			
	Good basic public education	0,8	Good basic public education	0,8	0,99
	Smart individual life and behaviour	0,75	Smart professional life and behaviour	0,8	0,85
			Good prof continuous education	0,6	
Human development	Consumption and services facilities	0,9			
	Sustainable socioeconomic devt	0,75	Sustainable socioeconomic devt	0,8	0,85
	Good literate public education	0,8	Good literate public education	0,8	0,99
	Ratio of skilled citizens	0,7	Top professional skills	0,8	0,8
			Top interpersonal management skills	0,9	
	Climate and environment	0,9			
			Good evaluation of competencies	0,8	
	Per citizen cultural spend	0,8			
	Available cultural facilities	0,9			
	world class research/education	0,8			

Table 1. Similarities of QoL between political system and entrepreneurial system

I can confirm that these results validate our qualitative observations in the field of societies and inside the towns, small cities and countries. Indeed we had difficulties to separate data from the customer/citizen voices because they always told us their personal stories which were commonly presented to us with mixed pictures from personal professional and public life. For example, when they spoke of their global wages and incomes, they always present

their salary as a unique and fundamental resource to pay at the same time and in the same way all their costs of life in the firm in the town and in their home. Driving the same approach further in this research, we propose to continue without segregation between the political system and the entrepreneurial system. The Quality of life can be analysed with the same principles among the studies with Markov systems, regarding the only difference which appears on the theoretical extreme states and cross reverse processes of the Markov system vocabulary concerning the management styles in the firm. I propose a scheme here after:

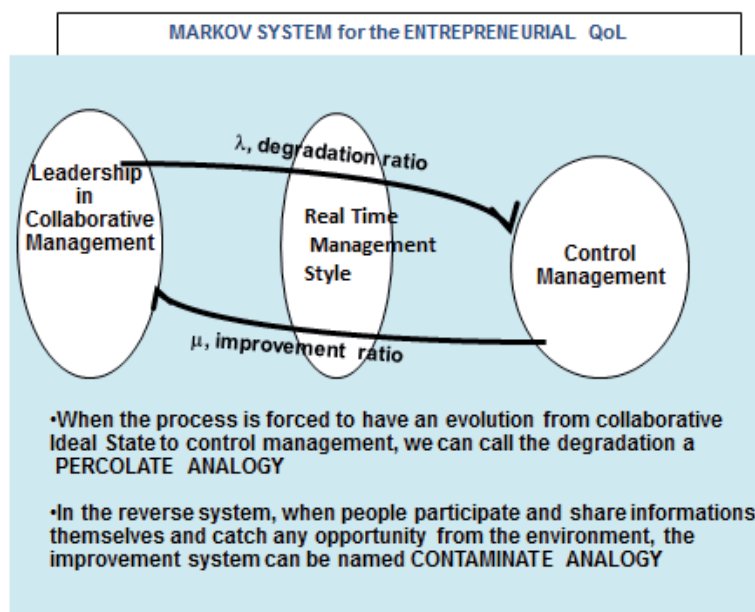


Fig. 6. The vocabulary proposed for the Markov system in the entrepreneurial case

This study allows me to validate a strong analogy between the entrepreneurial area and the political area regarding both the whole concept of Quality of Life and all the attributes of QoL. This validation confirms the assumption which was announced at the beginning of our research works: it is relevant to consider that the QoL concept has the same sense in both the entrepreneurial area and the public political area. This result conducts the study to do analysis without regarding any difference between these two areas, so I present the further parts of the text examining QoL concerning both the entrepreneurial or political systems or mixed together.

I can propose the major results of the citizen's survey structured with the Kano (Kano) method from the same data panel which was used in the part just before. So the semi-direct interviews which we have made with the employees of the company were secondly used to establish the best questions seen by the people whose we interviewed. These data were structured and proposed in the Kano questionnaire.

In this application the research context and general proceeding conditions were the same than those of the 3.0 chapter previously described.

The results, from questionnaire's returns, are presented here after in per cent part of a panel of more than 600 client answers at each question. They have been already presented in a journal but with a unique focus on the political aspects. As the data have common parts with our data coming from the enterprises which part is taken with confidential constraints, we can offer here after the same tables that we published concerning the only political part. As we presented before in this text, the validation is not false because the QoL concept and its attributes are similar in the political and entrepreneurial contexts, and the data came from the same panel of interviewed people.

	A	P	O	I	C	D
Q1			44,4	11,2		44,4
Q2	77,8					22,2
Q3	44,4			11,2	11,2	33,3

A=attractive, P=proportional, O=Must Be, I=indifferent, C=Reverse, D=questionable.

Table 2. Kano answers classes to three questions

Q1 is a question about environment protection respected by State and companies. It comes with under – questions on air and water pollution, environment standards respect, and innovations for cleaning the production process. We can see that Q1 is a Must Be concept of QoL.

Q2 is a question about better individual incomes allowed by CEO and politicians. It comes with under – questions on salaries in companies, retirement cost and health cost, and better life at work with a lower stress level. We can see that Q2 is clearly an attractive concept of QoL.

Q3 is a question about individual liberty and good education. It comes with under – questions on autonomy with thinking and speaking liberty, better education programs in schools and universities, and better relation between education programs and professional capacities needed in companies. Q3 is also attractive. On the figure after, we can see the Kano answers to positive and negative under questions (A to C):

Customer Needs → ↓		Unfunctioning				
		1. I Like	2. It is Normal	3. No Opinion	4. I can live with	5. I do not Like
Functioning	1. I Like	D A2-A3-A4- A6-B4-B5 C3-C4	A C7	A B6-B87	A B1-B2-B3 B7-B9	P C1-C2-C5
	2. It is Normal	C	I C8	I	I+ C97	O A8
	3. No Opinion	C A7	I	I	I	O A1-A5-A9
	4. I can live with	C	I	I	I	O
	5. I do not Like	C	C	C	C	O C6

Table 3. Corrélation table between positive and negative answers to Kano questions

On the table upper we can see how the answers are positioned. This is an example of partial calculation from nine citizens - customers (A1...A9) of the same service provided by one society. This extraction of the Kano returns shows confusion between the concepts, and during the "One - On - One" interviews of the "voice of the customer" method we were allowed to observe exactly the same confusion phenomena which I detailed in the theoretical approach, between QoL, well - being, happiness, health, and political future.

4.2 QoL concept's validation in the health field

Here after we can offer the particular results in the case of the customer's, citizen's and health expert's perception of Quality of Life. Such information stays in our data base from the study ordered by the company specialised in the production of pills and health services. As there is a confidential constraint, I offer the public part of the results which are closed to our observations from the company's clients, but I precise the research context and design after the table:

	Coefficient	Standard error	Statistic Value
GDP per person	0.00003	0.00001	3.5247
Life Expectancy	0.0448	0.0106	4.2299
Political Freedom	-0.1052	0.0561	-1.8749
Job Security	-0.0217	0.0099	-2.2062
Family Life	-0.1878	0.0640	-2.9349
Climate and Geography	-1.3534	0.4691	-2.8852
Political Stabilit	0.1519	0.0520	2.9247
Gender Equality	0.7423	0.5428	1.3676
Community Life	0.3865	0.1237	3.1255
Constant Statistic Value	2.7959	0.7890	3.5435

Multiple R: 0.919

Adjusted R square: 0.823

Standard error: 0.482

Nb observations: 74

Table 4. Global importance of QoL attributes (The Economist Intelligence Unit)

The research context is closed to the previous one, but I give more details as under:

- Interviews and Kano validation made on some 40 professional (all clients of pills makers) and 90 citizens;
- The survey on professionals has been deployed on 25 veterinaries and 15 infirmaries and hospitals;
- I drew myself the survey as co-project manager beside the internal product/service manager of the pill makers, and made a training phase to the members of the companies until they were able to practice interviews and Kano validation.

Composant's weight in QoL	Eco Survey	QoL Index
Material wellbeing	11.5	18.8
Health	15.0	19.0
Family relations	14.3	11.3
Job security	11.9	7.7
Social and community activities	10.9	12.2
Political freedom and security	25.3	26.2
Gender equality	11.1	4.7
	100.0	100.0

Table 5. Weight of different components of QoL (The Economist Intelligence Unit)

I can present here after an extraction of the world wide survey made by governments up on the QoL of the 111 countries concerned:

	QoL	Rank	GDP/person	Rank	Rank gap
Ireland	8.333	1	36.79	4	3
Switzerland	8.068	2	33.58	7	5
Norway	8.051	3	39.59	3	0
United States	7.615	13	41.529	2	-11
Canada	7.599	14	34.15	5	-9
France	7.084	25	30.64	18	-7
Germany	7.048	26	28.25	21	-5
Slovenia	6.986	27	21.892	28	1
United Kingdom	6.917	29	31.15	13	-16
China	6.083	60	6.27	74	14
Nigeria	4.505	108	960	110	2
Tanzania	4.495	109	672	111	2
Haiti	4.090	110	1.47	107	-3
Zimbabwe	3.892	111	1.5	106	-5

Table 6. Worldwide quality of life index, U.N.

Reading these data and this presentation of the results a question came. Indeed, knowing that the person participating to the customer's/citizen's survey are also customer and citizen, the questioning and Kano return checking probably are concerning the people classes at random. So I can think that they have a great probability to be in the same being and behaviour. I can ask why they so much are concerning with reasonable, stable and poor

factors like GNP, material well-being, security. I can deplore the lack of positive and dynamical aspects such as risky personal projects, brightness in daily life.

5. Conclusion

In a theoretical first part I described the usual confusion made by customers and citizens on Quality of Life. I observed the misperception with its components like health, well – being, happiness and physical aspects of life. These mix-up definitions are confirmed with the customer and citizen surveys which we made with the company's employees on the global QoL perception. The validation has been made on health approach in enterprise seen by final users of medicines, with interesting links to the similar confusion in the management area in the society. The first part analyses the efficiency of the Markov model twined with the aggregation method to calculate and measure the Quality of Life. The second part analyses the opportunity and the effectiveness of the analogy in the enterprise's governance context. The same confusion between Quality of life, well – Being, happiness is validated with sustainability and governance, allowing the Markov model to present and value the dual reverse dynamic process between these concepts.

The validation made from the application which we can observe shows that the citizen's perception of QoL, and customer perception of QoL in the enterprise and public fields, offers some information:

- Confusion between the concepts (QoL, happiness, well – being, health) in the same way which explained in the theoretical part;
- Difficulty and inaccuracy of the direct measurement of global QoL in the case of a good research approach with a good reliability;
- the same ambiguity and inaccuracy about each attribute of the QoL, as positioned under QoL in their roots representation together, with a very good reliability and with sense;
- It is useful to firstly calculate the intermediary process of sustainability, and in a same calculation the safety one, from the detailed attribute's measurements, with the aggregation method;
- This is finally necessary to calculate global Quality of Life from the sustainability and the safety processes with a Markov calculation model.

I had the opportunity to make a study of the multitude of attributes elaborating the Quality of Life and interfaces between each of them in the governance area, particularly on the management activities in some enterprises. This allows me to make a complete analogy between the political system and the governance concept, with the same observation of the necessity to get better measurement of global QoL. It was useful to determine the exhaustive list of concepts included inside the sustainability spirit, like health or Quality of Life. Such emergence allows me to validate the analogy between the political system and the governance concept, conducting also further research works about the complete evaluation of Quality of Life and the better calculation of the global sustainability with the Markov model. As I validated the calculation model from the attributes of sustainability to the global governance system to be similar than in the political system case, I can have an interesting result of the Markov model in the governance context: the calculation of the percentage of real position of the existing governance system between two extreme opposite situations.

This Markov structuration for the management, studied as a particular focus in the enterprise of the governance Markov model for the political system, is interesting for further research works. Particularly the basic description of the management system which was made on this study comes to describe the large diversity of management systems between two extreme and marginal cases which are the bad one (total control with percolated entrepreneurial values towards employees) and the good one (democratic participative collaboration with contamination by the pollen of the individual values) could be studied with much more reliability. It would be relevant to examine the correlation between the structure of the organisation in a company, the management style of the board, and the Quality of professional Life of the employees. Our laboratory can offer some complementary data on this study coming from the organizations which we observed, but it would be interesting to do special surveys of several hundred of societies in different economic areas to perform a reliable study.

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Processes Management Guaranteeing Life-Cycle Quality of the Maintenance Service Agreement – A Study Regarding Outsourced Maintenance Services

Jarmo Heinonen, Mika Raassina and Nick Moss
ABB Full Service® Business Unit
Finland

1. Introduction

1.1 The challenges when ensuring operational excellence in service business

There are many concerns when organizations strive to ensure quality and operational excellence in their operations and the challenge as organizations grow bigger more global is sustainable operations.

When we come to service organizations the challenge will have new dimensions. For a long time researchers have stated that service is intangible by nature and it is difficult to set consistent and accurate measures for quality assurance. External auditors often find difficulties when trying to assess the quality management system: whether the organization audited has a consistent and communicated quality plan; or that there is a traceable system in place to prove that key quality characteristics have been planned and further more they have also been followed and documented; or what the organizations own process is to ensure operational excellence.

The challenge above is due to certain characteristics that separate service from physical products. When new service development is concerned; the literature relates largely to traditional service products such as financial and hospitality services, not to a great extent to industrial services. Five key characteristics that distinguish service products from physical products have generally been identified as intangibility, perishability, non-ownership, inseparability of production and consumption, and variability (Kundu et al., 2007)

1. **Intangibility:** Services are predominantly performances of actions rather than objects that can be perceived using any of the physical senses.
2. **Perishability:** Services must be consumed as they are provided. In general, they cannot be saved, stored, returned or carried forward for later use or sale.
3. **Non-ownership:** Largely as a result of their intangibility and perishability, customers do not obtain ownership of services; rather, they experience the delivery of the service.
4. **Inseparability** of production and consumption: Service products are typically produced and consumed at the same time - consumption cannot be separated from the means of production.

5. **Variability:** Service product quality is subject to variability because services are delivered by people to people.

Two dimensions of variability have been identified (Zeithaml & Bitner, 2003)

- the extent to which delivery standards vary from a norm, and
- the extent to which a service can be deliberately varied to meet the specific needs of individual customers.

Productizing (or productification) of services is the key word that has been used in service management. It is a key approach that has given organizations the opportunity to standardize offerings, service delivery and also many related development activities. It has also enabled increased accuracy in service cost determination, as well as enabled improvements in competence management and thus reduced dependency on some key service specialists which is a typical concern especially in the maintenance services field. Well defined and managed service productizing has given international service companies a remarkable differentiator – global, standardized implementation of service management model. One key thing in productizing also is that it has given the marketers the opportunity to create sales collateral to create image and brand for the service organization. We can say that thanks to productizing we can now see well defined and well marketed service products available for both business and consumer customers. And information technology has enabled that even bigger part of the services are delivered by the customers of the organizations themselves. The public sector is following fluently the private one; just think how clarification of the state taxes in some countries has evolved during the last few years, making tax announcement handling easy both for the customer, the tax payer and the supplier, the taxman.

But when we take steps beyond the service products we will face large variance. We find two big challenges concerning the service delivery.

1. How the organizations ensure operational excellence of the whole service set-up over the lifetime of the entire product portfolio they have the obligation to serve?
2. How the organization ensures constant high quality and meeting the customer requirements when its business is about delivering the services at the customers' premises during a long-term e.g. 5 to 10 years agreement?

Both of the research questions above have become vitally more important as the service models have been evolving from transactional contracts to KPI based service level agreements and further to long term performance based agreement where company is e.g. outsourcing its entire maintenance function to an external service provider.

1.2 The aim of the chapter

In this chapter the authors aim to provide an illustrative dialogue of the challenges that ensuring operational excellence includes and how a comprehensive processes management system can tackle the challenge over the life-cycle of the number of the agreements that the service provider has. The methodology is based on case presentation linked to background from literature and on the experience of the authors. The chapter gives input to further research as well as having a solid educational purpose.

1.3 Defining the business environment studied

The Authors have long experience in developing services and improving quality in a global industrial service business environment. Our recent work experience is with ABB, the leading, truly global and multinational power and automation Technology Company. Out of 135.000 people working at ABB more than 20.000 are working directly in service businesses, a fact that is not so well known in the market. Recently ABB has developed the ABB Group Service Strategy, aiming to triple the volume of the service business by the year 2015.

ABB classifies its services into three very different main categories:

1. Life-cycle services for ABB's own installed base
2. Consulting services for reliability, safety, and energy efficiency
3. ABB Full Service® for outsourced, performance-based maintenance of the entire production plant

As the business is a global one, productizing is essential in the ABB approach for standardizing and packaging service offerings. Service products are developed for the different phases of a product life cycle. The target is to offer customers service already before the introduction of the product up to the phase when product itself is obsolete but service is still required to lengthen the life cycle of the product or even to ensure the best result is achieved at the end of life and when a product is replaced/upgraded. The service development phase is very important when securing the successful launch and quality of ongoing activities. Thus the new service development is done in accordance with a specific service development process, the Stage-Gate Model. Service productizing itself does not guarantee the quality, thus the organization has developed a set of design, sell and deliver processes. The challenge is to agree and maintain a consistent approach across more than two dozen globally managed Business Units and in more than one hundred countries where local country service organizations are delivering the service.

ABB's maintenance outsourcing business differs strongly in nature from the product life cycle business. For the maintenance outsourcing business ABB has developed ABB Full Service® with the following definition:

"Globally supported long-term, performance-based agreements in which ABB commits to maintain and improve the production and equipment performance, energy efficiency and reliability for an entire facility with agreed cost base."

The definition above includes the following special characteristics when compared with life cycle service businesses or typical man-power related services:

1. The service is performance based, the performance clause is linked directly to the customers production process outcome and customers financial results than just with the service providers own performance.
2. The service agreement is long-term, typically a greater than five year evergreen agreement. Thus the quality must be defined for a long period into the future, the strategy, requirements and KPIs will probably change in the course of the time.
3. The value proposition includes production performance improvement, energy cost saving and total maintenance cost optimization or saving, thus opening a very interesting but also a complex benefits definition.

4. The provider will have a contractual commitment to some main customer KPIs. That commitment forces the provider to assume total management responsibility of the whole maintenance function, and the scope of the services is thus wide, typically covering maintenance management, development, engineering and execution. The typical pricing model is a fixed price covering labor, materials and sub-contracting.
5. In outsourcing service the customer's related personnel is typically transferred to the provider, who in turn takes the responsibility for the safety, competence development, motivation and supervision of the people to be transferred. The service includes an enormous change management activity and potential as well.
6. Also management of the maintenance materials and subcontracting are typically part of the agreement. The suppliers also need to be empowered, common targets created, and synergies plus economy of scale obtained. Suppliers will be used both for specialist services when suppliers are the technology owners and at the lower end when they are expected to provide competitive man-power.

2. Service models evolving towards performance partnerships

Nearly all industrial companies see production as a core competence, meaning that development of any production and product feature will directly connect the company into a position of competitive advantage. Production strategy is one of the core strategies of the company. To maintain the competitive position companies have started to ensure they are keeping focus in core competence by outsourcing non-core activities. In western countries support functions such as IT, payroll, cleaning, canteen, health care, security and facility management have been outsourced to external companies, rates usually being connected to the volume of labor consumed. These outsourcing projects are usually easy to do and argue – the function is outsourced to a provider who can give the most attractive, often man-hour based offering with low risk. These functions are not life important to the customers which is often demonstrated to the service provider as one inconvenient fact – very seldom does the facility management company get the chance to present and review the business case to a customer's CEO or COO.

In above cases the quality can be defined relatively easily. There exists a requirement for the service quality; service is usually seen in a transactional way where a key feature is to do the required amount of service correctly the first time. The customer controls the key service characteristic, (cost) by controlling the unit price and amount of the work done based on a clear contract and a bill of quantity based service contract. As we are in service, however the most relevant measure in transactional service is customer satisfaction, as the service outputs review will be basing on reporting certain jobs done.

Figure 1 illustrates how the transactional service is evolving to being KPI based and then further to performance based agreements. We can see that as the business model develops also the strategic nature of the agreement increases.

We would want to add a quality angle in the figure as well. In a transactional relationship the service product is a commodity and the quality measurement is tied solely with the supplier's delivery. When we reach the "Performance Partnership" stage the service product is based on strategy and risk sharing and the quality measurement is clearly linked with the customer's outcomes, outcomes that will be obtained together, under a partnership

Characteristic / OPEX topic	Business type		
	Product Supply	Product Based Services	Performance Based Services
Product Development	At Supplier	Mainly at Supplier	Close to customer Mainly with customer
Production	At Supplier	Visiting customer	Permanently at customer
Follow-up, KPI	On-time delivery	Response time	Customer output KPI
Reporting Analysis	Internal	Mainly internal	Mainly to customer
Review	At Supplier	Mainly at Supplier	Mainly at customer

Table 1. Comparison of different business types regarding quality planning

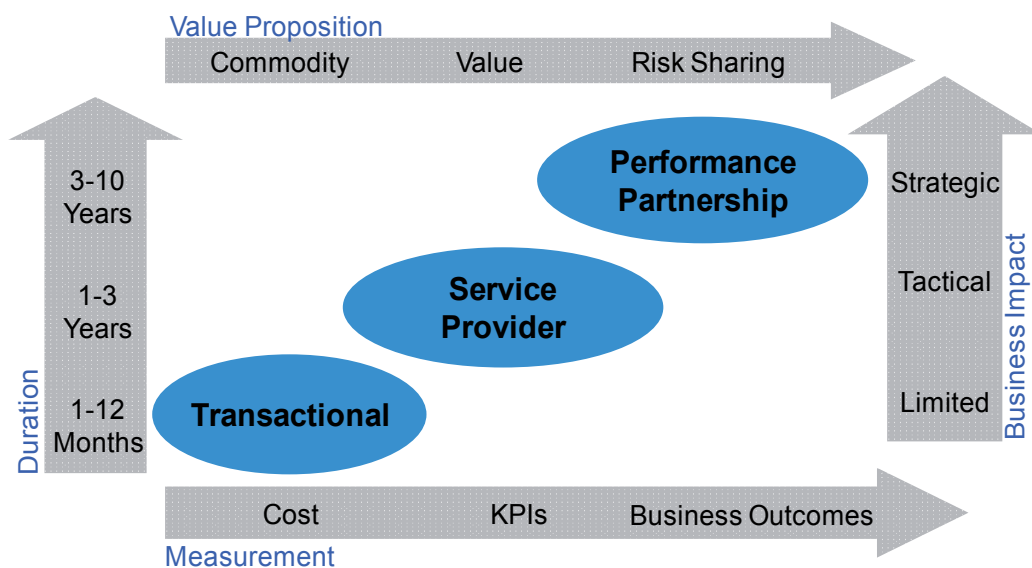


Fig. 1. Evolution of service models (ABB, 2006).

relationship. We have here many angles and very seldom companies have clearly been able to specify the quality responsibility being of either partner's sole responsibility. Quality measurement and operational excellence become both more important and difficult.

When comparing characteristics of product based businesses, transactional based service businesses and performance based service businesses, the following characteristics can be found.

3. Customer's pains regarding maintenance and the strategic outsourcing decision

3.1 Asset performance management constraints

During the downturn many companies have significantly reduced maintenance costs, either by themselves or by reducing external services to a minimum and without proper

management and a systematic approach. This approach has introduced significant risks for the future by generating remarkable levels of maintenance debt. Too often important reliability programs have been stopped and even banned, CMMS usage is often reduced and, too often, there is a clear drop in investments for asset health, maintenance management and competence development. Many maintenance managers are now struggling to convince higher management of the need to increase the maintenance to more sustainable levels.

The key element in industrial maintenance service is still cost. However when industries are expecting the market to recover, the focus on costs becomes focus on the costs of each produced unit and into increased manufacturing flexibility. Certainly, availability and total output (e.g. measured in terms of Overall Equipment Effectiveness, OEE) will be of greater importance as we are beginning to see a new born market for the increased output requirement. The key factor in requirements is the commodity price development. It has been favorable for most raw materials within the last year. But the expectation has been shaken more and more often with every new crisis somewhere in the world. Locally it can be the problems of a single industrial company, and also globally it is affected by, for example, the sudden political unrest in a number of Middle East countries in 2011.

Operations and maintenance are the key contributors to the operational profit of a company. The main pressures are in reducing costs and increasing efficiency. This includes efficiency in the use of raw materials e.g. Energy.

This is of particular relevance since maintenance has at least as high an impact on energy consumption as on plant availability itself. A good maintenance operator does not only contribute strongly in shutdowns, ramp-ups, and ramp-downs but also is key to considering how much energy is wasted during any phase of instability in production. We see a clear trend that a traditional maintenance outsourcing company will soon become a maintenance and energy stability company.

But there are also other challenges. Operational constraints need to be managed while improving sustainability. Asset Management has to be kept in balance over the long term. The main responsibility of operations is the maximum utilization of the assets and the main responsibility of maintenance is asset availability while managing the critical issues and operational constraints of the plant, especially in the areas of EHS. This means excellent co-operation between operations and maintenance while both need to be specialists in their own areas.

Figure 2 illustrates the challenges production and maintenance have. Without a good business plan, clear agreement between the two players and a consistent well defined process organization cannot take the best out of the two contributors. There must be a process management system in place and good comprehensive KPI's, i.e. we need Operational Excellence.

As the challenge is cost and the need for increased technological, automation and software know-how at the same time when the real specialists and performers are ageing, companies use more and more external services to solve bottlenecks and to balance consumption peaks, it is a strong trend and seldom is there a way back. Six clear arguments for maintenance outsourcing are listed below.

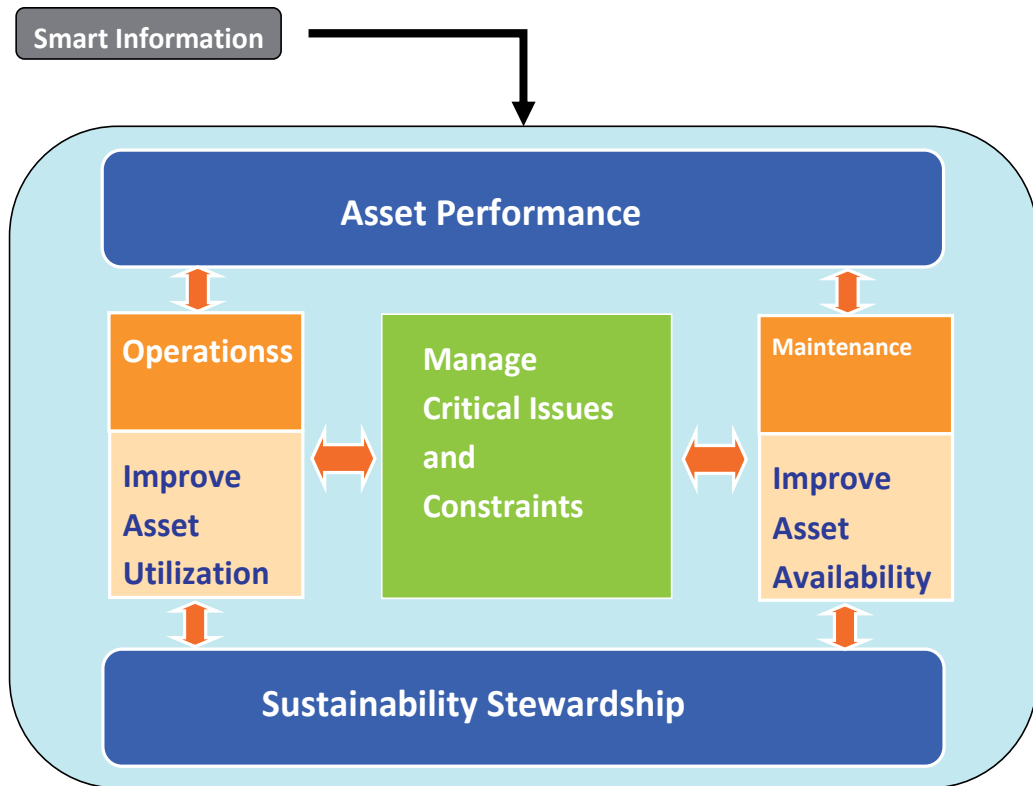


Fig. 2. Asset performance management for process industries (ARC Strategies, 2010)

1. Outsourcing companies are continuously developing their own core business, operational personnel and key management employees
2. Allows company to concentrate its attention, efforts, and investments on core business and reallocate key resources and focus to strategically important issues
3. Makes company lighter, more agile and able to react to the market with increased flexibility
4. Improves access to knowledge not available internally to help address key problems
5. Brings in world class resources, processes & best practices to;
 - a. Reduce operating and ownership costs
 - b. Make budgeting simpler and obtain predictable cash flow
 - c. Speed up changes and improvements
 - d. Reduce the dependency on individuals' skills
 - e. Improve the utilization of resources
6. Outsourced scope is clearly defined and measured to introduce disciplined execution and better management of risks

However there are also large concerns related with the outsourcing business case, labor issues, confidentiality, high dependency, staff moral, the binding nature of service agreements etc. Loss of control is also a concern, and for some individuals the concern is also around the perceived loss of power. In many instances the solution is to use strong purchasing tactics and to outsource to several service providers. The effect of this tactic is to

keep the power status clear, however in everyday life there will be constraints when trying to enhance seamless co-operation, innovation and responsibility to solving the main production constraints (Figure 2).

Maintenance outsourcing to one single provider is a successful model when searching for better asset performance and short & long term nurture of the equipment. With good agreements the focus can be turned from constant control to collaboratively solving the production challenges and constraints and hence there is a solid opportunity for a win-win-win performance based approach and set of KPIs. But a lot is required when targeting to reach a performance based partnership (Figure 1). There needs to be a clear strategy and decision, the partners' cultures, business ethics and principles need to match at a company and also at a personal level, and a good business case must be on table before the customers' management, usually the board will make the decision.

The challenge for the service provider is to prove that a) total outsourcing is the solution and b) they are the right choice. Thus maintenance outsourcing companies need to show a good business case, solid references and evidence of solid approach, i.e. Operational Excellence in their own operations is a must. Both CAPEX and OPEX expenditure needs to be addressed in the business case, the decision maker must also look at both.

3.2 Service providers' challenge to respond

The adoption of strategic, performance based outsourcing has not been extremely fast. That is primarily due to the fact that at the end of the day proving the benefits of the agreement have not always been easy. In this area the following topics must be addressed:

1. The benefits and targets must be agreed and communicated. Even if there is a study and a business case as a basis of the agreement the parties may not have made the contract review as defined e.g. in ISO 9000. The parties responsible for the delivery of the agreement are not always aware of the targets and KPIs. That can be the case on at the customer's side, on the provider's side or also on both sides.
2. There must be a governance model and sponsors in place. As the key nature of performance based outsourcing is strategic, there needs to be top management support and understanding that the targets will be reached only by working together. That fundamental cannot be maintained in an everyday operational business environment without having champions that can review and solve any issues with objectivity and a view that is from external to the plant.
3. Partners need to understand that moving to performance based partnership is a process of change. The change is deeply touching the existing maintenance team at a personal and identity level but it is also a remarkable opportunity to shake up the customer's organization. Colleagues become business partners and operators become real customers. That change is a remarkable resource which must also be understood. The service provider must have delicacy, experience and skills to run a professional change program and the customer must commit to be part of that program, standing as partner not as a master.
4. The economical changes and multiple financial crises' one after another have changed the business case dramatically, huge flexibility has been required and the fundamentals of the clear, compelling business case have sometimes been crushed permanently. The

performance based business case may have changed purely into a series of cost cutting requirements. Whatever investment that would have needed to guarantee successful and renewing implementation has often been taken away.

5. The service provider must be extremely capable, must manage maintenance as a process and must be able to implement generic, industry and customer specific leading practices. That calls for a strong methodology, implementation skills generally and in the country or business in question, as well as a well prepared, experienced and motivated team. The site team must get coordinated support from service organizations, country organizations but importantly from the international specialists. We see too often cases where the service provider is not mature enough and has failed on the topics above, company has seen this as field service and the site team has been parachuted into the “jungle” without support, tools and processes.

We can conclude from above that successful performance based outsourcing requires a long-term view, a long and dedicated business development as well as execution process; agreement development skills and good sensitivity in identifying the motives of different levels of the organizations. Several workshops are needed to reach a good mental connection. The risks have to be identified and a mitigation plan must be developed. We must stress that to be successful, the mitigation plan is to be common, not just the providers’ one.

4. Multiple customers and multiple industries – Why a process is needed

The disciplined approach to respond to challenges that we analyzed in chapter two requires the service provider to have a clear strategy and a strong business model. Those need to be deployed efficiently across customer types and regions. Good way to deploy is to have a process management in place. Customers do want to see that the service provider can implement maintenance solution that supports customer’s ever more changing strategy, is transparent and after all turns previous reactive maintenance strategy into more preventive and predictive mode, they key words in modern maintenance. In other words industrial customers want to see a process approach instead of fire fighting.

As most providers offering industrial maintenance are specialized not just one but various industries we have to discuss the nature of process model; is it general, do we need a specific process for each industry or shall the maintenance process model be customer specific? We analyze the topic here starting by understanding first what industrial maintenance is.

4.1 What is an industrial maintenance service?

Industrial maintenance usually refers to the repair and upkeep of the different types of equipment and machines used in an industrial setting. The basics of industrial maintenance know-how can be broken down into the following five categories:

- General knowledge,
- Mechanical knowledge,
- Electrical knowledge,
- Welding knowledge, and
- Preventative maintenance (Sasser).

According to this wide variety of areas of expertise, industrial maintenance technicians are usually multi-skilled individuals who are proficient in many tasks.

Industrial maintenance also involves a great degree of problem-solving skill. Identifying the problem along with the best and safest means of resolving the difficulty are typically integral parts of the industrial maintenance process. The general knowledge usually required in industrial maintenance is an understanding of tools, blueprint reading, and safety. The correct tools and the comprehension of how to use them can be crucial for fixing potential machinery problems. Blueprint reading enables the industrial maintenance technician to understand how a particular machine works. Safety is also a pivotal aspect of maintenance, as most industrial machines can be considered dangerous. Usually it is important for the technician to maintain his or her own safety, as well as that of other workers using the machinery.

The Industrial Services market may be defined by the level of added value provided by the services offering. The outsourcing task can be divided on the basis of value or coverage of the service into following four categories (AlixPartners):

1. Outsourcing with low added value (Cleaning / Catering / Trade Fair Service / Security Service)
2. Outsourcing with medium added value (Facility Management / Maintenance / Scaffolding / Installation)
3. Outsourcing with high added value and/or project business (Planning of Facilities / High Value Services (IT, ...) / Maintenance of complex facilities)
4. Industrial / Chemical park service (Utilities / Technical Service / Waste Management / Safety & Administration / Security)

4.2 Business models for industrial service

The maintenance provider's most critical task is to select the business model that enables sustainable business and satisfies the industry customer's present and anticipated needs. The strategy of an industrial maintenance provider needs to balance two main aspects:

1. **Customers' maintenance strategy.** What will be customers' present and future decisions towards the needs of the external services; what do customers see as core competence; will the solutions be centralized/decentralized; which part of the maintenance management value chain will customers manage and provide themselves and which will they outsource; which kind of agreement models are preferable; what are customers' attitudes towards networking and partnership models; where will the pain points be; where are the competence and technology requirements; which are the internal factors that affect decision making; and, interestingly, how does time and new generations affect choices.
2. **Maintenance provider's own strategy.** Where in the customers' value chain do we want to operate; where is the basis of our own competence and competitiveness; how do we differentiate; are we operating centralized/decentralized, locally/globally; what are our resources to develop competencies, maintenance solutions and technologies; how much can we add value; what is our readiness and capability to take risks and go for benefit sharing models; do we offer performance based models, know-how,

resources; are we working in networks and for partnership; and do we see how time and selected industries to be served will affect our strategy.

As a result, the selected business model affects the market the industrial service provider is operating in. It is not just in which category but it is also which kind of service the provider offers. A maintenance provider with lower technology and industrial know-how usually focuses on offering workforce, managing capacity peaks, shorter term service or service level agreements, short response time, limited responsibility and risk taking. The maintenance provider that has industrial background and is a provider of some key equipment usually provides more technological services, spare parts, upgrades, training, etc. The maintenance provider who has experience in both maintenance management and has an industrial/equipment background can split the offering according to which customer strategy and needs as well as according to which markets are selected. For example, our company, ABB, has several categories in the service tree which can all be developed and differentiated in the industrial maintenance marketplace, see section 1.3.

Each business model has its own value proposition, commitment level, and agreement structure. Each business model's characteristics differ from the other models so that the business management structure and core processes to provide value to customers are also different to a certain extent.

4.3 What is general and what is industry specific?

However, 70–80% of maintenance can be claimed to be general, and the rest is industry- and customer-specific. We do not consider fire fighting and issue solving heroes as general maintenance but systematic maintenance core processes, including the management of partnership, designing for reliability and life-cycle, planning and scheduling, the management of the supplier network, re-engineering maintenance work-flows and integrating safety practices with work instructions and work orders, systematic root cause analysis, etc.

What can be seen as industry-specific are the specific safety procedures, equipment condition upgrades, process specific know-how, automation solutions, OEE measurement definitions, process optimization activities, and, naturally, industry-specific technologies.

Taking the Pulp and Paper Industry as an example, the following are considered as industry-specific issues within maintenance (Weissenfelt, 2011):

- Pulp and paper producing equipment knowledge. Knowledge of all the equipment needed from the wood yard to the end of the last conveyor before the forklift takes the paper roll or the pulp bale to the ship.
- Safety at work
- Troubleshooting
- Knowledge about chemicals used in the process and proper equipment materials to be used with special conditions
- Roll Service
- Quality Control System Service
- Drives Service and Optimization
- Profiling management
- Web Inspection System Service

- Quality requirements for the final product for customers
- Hydraulics
- Condition monitoring
- Lubrication

As the professional maintenance provider must focus on industry and understand industry requirements, a very specific advantage is the ability to learn from others. Maintenance related methodologies have been developing in different ways and been implemented at different levels in industries. As maintenance specialists we know a variety of good approaches but struggle with implementation. That is often because each industry has its own tradition and there are walls between the outside world and the plant; the “outside world” here means other industries. Learning from another industry is an extremely valuable source of continuous improvement when it comes to performance-based maintenance practices.

From the discussion above we can conclude the rationale that in an industrial maintenance outsourcing business environment the following process management characteristics are a good basis for a successful process management model:

1. The maintenance management processes, core functional processes to deliver the maintenance and the required support processes are generic by nature. Greater value is created if the service provider has a learning environment where the leading practices as well as past mistakes are identified, reviewed and utilized in continuous improvement of the process than tailoring this level processes to specific industry or customer.
2. The industry specific processes will become very valid when we are looking at maintenance at a task level. Job instructions, preventative maintenance plans, special tools and skills must be looked at with regard to industry competence level – as defined e.g. for the Pulp and Paper industry as addressed above. For example the root cause analysis methodology is standardized but the cause and solution is often industry specific.
3. Customer customization will be seen in a very specific, exceptional equipment level where the technical solution is really tailored for that customer only. Key customer specific nominator is the customer’s production and maintenance strategy. That does not specify the maintenance process itself but feeds the essential criticality and focus into the process. Well understood strategy will lead to update of plant, line or equipment level (technical) maintenance strategy, criticality classification, scheduling of maintenance tasks and to addressing relevant KPI’s and reporting guidelines. As such it does not change the process.

5. The service delivery process – From single activity to delivering multi-year agreements

Here we present ABB Full Service® approach to develop a processes management system. We will introduce the ABB model; determine the specific elements and the link between the approach and the results. We also give a general process description and a more detailed definition of each process.

After analysis conducted in ABB we have decided that the process management model is a good approach for managing operational excellence in a long-term outsourced maintenance

business. The model needs to cover the whole business to ensure consistency, discipline and learning. Thus a good process management model needs to cover:

1. **The whole life-cycle of the maintenance outsourcing agreement.** There shall be a process for service design and development, sales and business development, delivery of the multidimensional service tasks and finally the review and assessment cycle.
2. **The different types of processes.** We can use general definitions of different process types, e.g. EFQM (European Foundation for Quality Management) categorizes processes into management processes, support processes and core processes.
3. **Processes for the life-cycle of a customers' plant.** There is a slightly different need for existing plant (Brownfield), newly built plant (Green field) and also for demobilizing of the plant.
4. **The industry applications.** As mentioned above each industry needs adaptation of the process to cover specific technically detailed areas.

5.1 Tools to define a process

To define a good process is a piece of art itself. Key attributes of a process are that the process is crossing several organizational boundaries, it is directed to meet the external or internal customer requirement, it can and will be repeated again and again and it needs to be measured and monitored. A good process is robust; it is designed to be in use for long periods, even if continuously reviewed for improvements. We say that organizational structures come and go, processes will remain.

A very important feature of the process is that it needs to be understandable and logical. People should understand why we do this, what is the purpose of the process and what is going on in the chain of activities, how information is shared. Processes cannot just be huge, room-size flow-charts or to be hidden into fancy process management IT system. Process must be **visual**.

The cross-boundary nature of the process gives a challenge for leadership and management. Executives need to show the commitment to the process, participate in process definition and meaningful process KPI set-up, they need to empower teams to work across the process, define clear ownership with mandate, and they need to demonstrate the process and results- finally presenting the process rather than the organizational chart. Process KPIs should be the key KPIs and process champions making the process successful shall be recognized. Companies should also be proud of their processes, present to customers and make sure that customers and suppliers are part of the process also giving valuable input for the improvement.

There are plenty of excellent tools to define and manage a process, as process management is definitely one of the key approaches in any Quality Management program or Six Sigma approach. We address here some central approaches ABB has used in maintenance outsourcing services.

5.1.1 SIPOC

As learned from above, good process definition is the key. There is not such a thing as "the right process", we can only talk about process in terms of excellence – more or less excellent.

That is why there must be a cross-function and or cross-border team to define the process together, involvement means commitment. The purpose of the process is necessarily not at all clear when the definition works starts, each participant views the purpose, inputs and out puts from his/her own point of view. The SIPOC tool is particularly useful when it is not clear (Simon, 2011):

- Who supplies Inputs to the process?
- What specifications are placed on the Inputs?
- Who are the true Customers of the process?
- What are the Requirements of the customers?

The SIPOC comes from the key words of process principle definition: **Suppliers**, **Input**, **Purpose**, **Outcomes**, and **Customers**. We have learned that any process has more than one customers, or stakeholders. So there will be a variety of other factors as well. SIPOC can be used for defining the purpose of one single process as well as the whole business system. Figure 3 gives a visual template used in process definition.

Process Definition – SIPOC

Use SIPOC analysis to define optimal process...

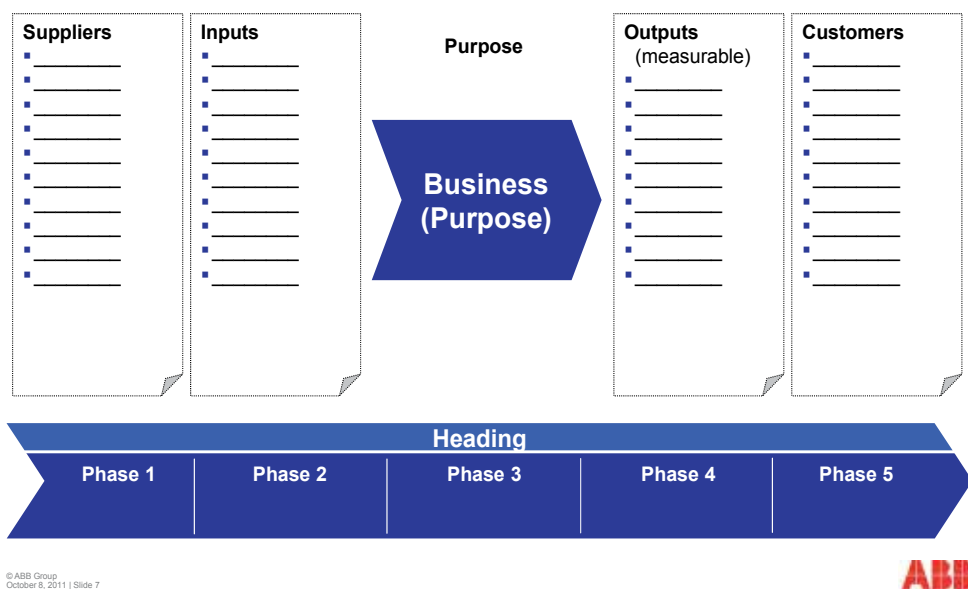


Fig. 3. SIPOC template used as business and process purpose definition

5.1.2 RACI

Another key issue on top of purpose is the ownership of the process. As process nature is most often cross organizational clear roles and information principles are needed. If these are not in place the process gets stuck, becomes meaningless or causes more problems than brings benefits. When talking about responsibility we find that that different kind of

roles are needed to make a process successful. The approach widely adapted is RACI-matrix.

The RACI model is a straightforward tool used for identifying roles and responsibilities and avoiding confusion over those roles and responsibilities during a project. The acronym RACI stands for (Haughey, 2011):

- **Responsible:** The person who does the work to achieve the task. They have responsibility for getting the work done or decision made. As a rule this is one person; examples might be a business analyst, application developer or technical architect.
- **Accountable:** The person who is accountable for the correct and thorough completion of the task. This must be one person and is often the project executive or project sponsor. This is the role that responsible is accountable to and approves their work.
- **Consulted:** The people who provide information for the project and with whom there is two-way communication. This is usually several people, often subject matter experts.
- **Informed:** The people who are kept informed about progress and with whom there is one-way communication. These are people that are affected by the outcome of the tasks so need to be kept up-to-date.

Without clearly defined roles and responsibilities it is easy for projects to run into trouble. When people know exactly what is expected of them, it is easier for them to complete their work on time, within budget and to the right level of quality.

A RACI matrix supports the model and is used to discuss, agree and communicate roles and responsibilities.

5.1.3 Process visualization

There are several ways to visualize how the process flows on. Selection of the visualization depends on the purpose and on the amount of information that is intended to show. Typically organizations want to show task, responsibilities and time in the process description. Then the model is **flow-chart**. Flow-chart is the most popular process definition format as it brings in time well. Strength is that each unit or department can easily see and understand in which tasks own and other's responsibilities are. There are also many IS solutions for process mapping that support flow-chart appearance, so the visualization can be linked with some real data.

A flowchart is a diagrammatic representation that illustrates the sequence of operations to be performed to get the solution of a problem. Flowcharts are generally drawn in the early stages of formulating computer solutions. Flowcharts facilitate communication between programmers and business people. These flowcharts play a vital role in the programming of a problem and are quite helpful in understanding the logic of complicated and lengthy problems. Once the flowchart is drawn, it becomes easy to write the program in any high level language. Often we see how flowcharts are helpful in explaining the program to others. Hence, it is correct to say that a flowchart is a must for the better documentation of a complex program (WebZip News, 2011).

The negative side of flow-chart is that it easily gets very extensive and complicated, and the purpose may remain unclear. The font in the print is either too small to see or the print

becomes so big that printing is troublesome and expensive. On computer screen flow-chart is seldom visible at one glance.

Process arrow is very practical when organization wants to address the purpose and overall understanding. The important phases and activities can easily be listed and agreed, and the print and screenshot can be visual and even attractive. Process arrow can be broken down into sub-arrows when a good structure from high level to detail can be built, organization is forced to build structured model which e.g. is typical way of thinking in maintenance people who are used to build equipment hierarchies and criticality and root cause analysis.

Downside in process arrow is that phases and tasks are by assumption sequential by time and that is not the case in all cases. Also detailed responsibilities cannot be shown easily in the arrows. Well managed process arrow needs either flow-chart or instruction to be more specific.

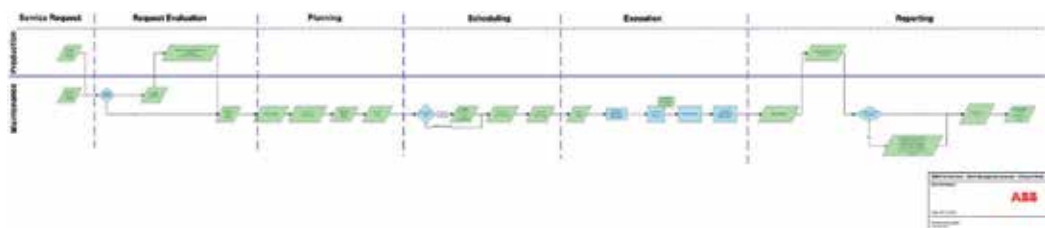


Fig. 4. Example of a simplified flow-chart, Maintenance work-order flow

ABB Full Service® Process with 5 Phases...

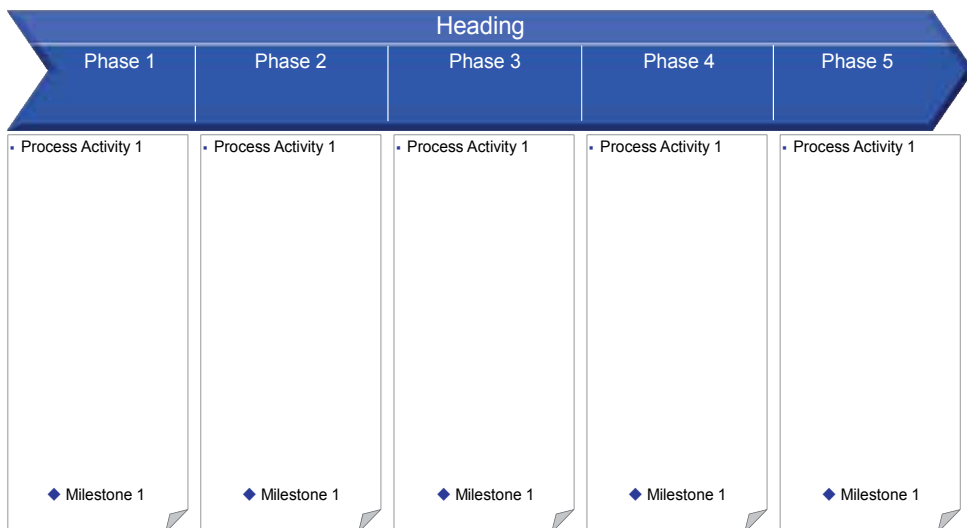


Fig. 5. Process arrow, ABB process arrow template, 5 phases

Closed loop is typical way of process visualization when there is the need to show loops. Annual planning and reporting cycles are typical closed circle visualizations, in these is easy to show moving to next quarter or next phase. However circle can include limited amount of information and making good visualization is bigger job and needs specialist support for tools to be used.

In ABB Full Service® Concept they key process definition approaches are to create first an overall process model, the big picture where all the management, support and core processes needed to bring the results are visualized, including the results area. Then the main process description level is process arrow, as it is highly visual, all the different processes can be shown with standardized format, and needed tools can be “hung” on the process. For many design and sales related processes the arrow model is sufficient and much more detail is not needed. When we speak about very operational processes like doing preventative maintenance task or managing a shutdown the applied model is flow-chart. In many instances the flow-chart supports the process arrow, and is also furnished with IT solution such as CMMS system work flow.

5.2 Case: The ABB Full Service® process model

The ABB Full Service® business excellence model is the comprehensive management model of the outsourced maintenance business, presented in figure 6. The model is designed to cover the overall life cycle of the maintenance outsourcing business.

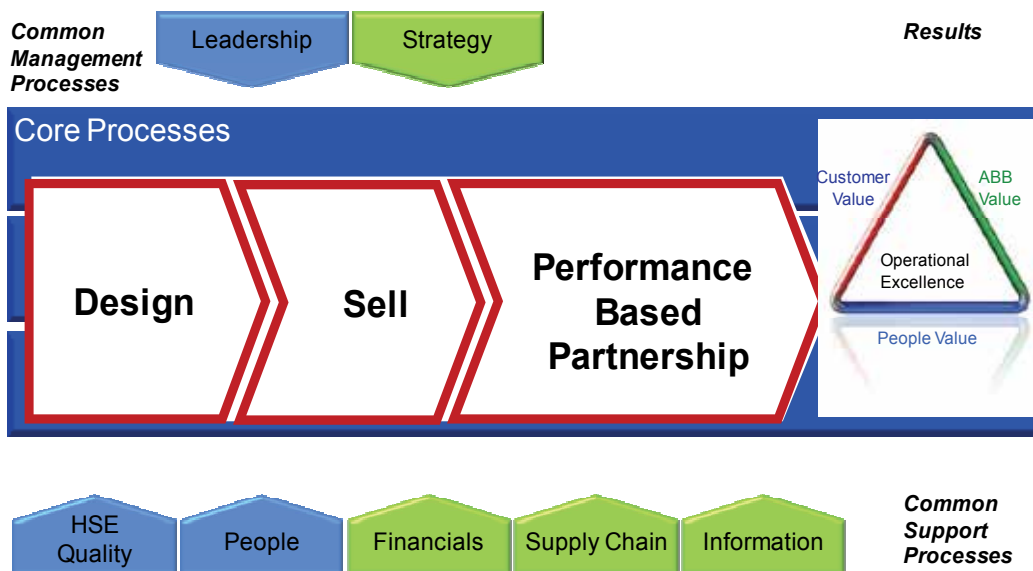


Fig. 6. ABB Full Service® Business Excellence model

The main process types are common management processes, core processes and common support processes. The core processes main focus is to deliver the results for the maintenance outsourcing agreement. Common management processes give the framework for the important management processes Leadership and Strategy. The common support processes are vital to support core processes in the creation of value. This model is based on

the experience of managing a 1 BUSD global maintenance outsourcing business and in the structure we have adapted the global business excellence models, i.e. EFQM Excellence Model (EFQM, 2011).

When considering the definition of the processes the level and phase of the operation must be considered. In the business management model we need to identify how the service product and business model is designed, how the business development or sales is conducted and how the service itself is delivered. In the chain of core processes we have identified processes designing and delivering client value as core processes. Others then are considered as management or support processes. We have to remember also that these definitions can be considered as an agreement within the organization. The definition of what is core is dependent on the strategy and interpretation of customer needs, and the result is an agreement and most often a consensus.

In the ABB Full Service® model the first core process is "Design". That process covers the sub processes that help to identify the market evolution, select the service product strategy with related business models, the development process of those models and finally the exposure, all related marketing activities. That process is globally led and coordinated, to ensure that we have a unified service product and offering in each target market. The Design process can be seen as global process even if the delicacy or specialization comes from the regional and local distribution of the responsibilities.

The second core process is "Sell". In the performance partner model maintenance outsourcing business a more descriptive name could be "Business Development". Each pursuit goes through a long sequence before the business case and value proposition is possible to be developed, identified and presented to the customer. The Sell process can be globally or locally executed but we see that the sales management is best to be global to ensure correct customer selection and focus, professionalism in pursuit development, value proposition creation and agreement development. Most often the maintenance outsourcing pursuits are also big and developing the value proposition requires special skills and know-how, i.e. teaming cross borders and industries. The sales is performed by a capture team and the phases from "Screening" all the way to executing the "Performance Based Partnership" is visualized in Figure 7.

The third core processes model is "Performance based Partnership". Here the globally developed maintenance alliance agreement will be executed under a long term agreement. Differently from the former processes which have been clearly globally managed this set of processes needs to be managed at site level. Site level capability to manage the core processes in value adding way always requires utilization of external support and tools. A consistent process model is necessary to enable efficient external support for site operations; it is also the key to operational excellence as the performance partnership model calls for implementing world-class approaches.

The core execution processes in ABB Full Service® concept are based on the strategic targets of the value proposition.

Partnership Fulfillment is the customer relationship focused process that is vital to ensure that the agreement targets will be turned into strategy based operational targets, customers are listened too at any moment as well as value is created and benefits validated.

ABB Full Service® Global Process for Implementation



- ✓ Identify business fit
 - ✓ Build Value Proposition
 - ✓ Develop trust, maintenance master plan and agreement
 - ✓ Ensure successful start-up
 - ✓ Provide and validate benefits

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Fig. 7. ABB Full Service® business development process from screening to execution

Reliability Maintenance is the backbone process of the model, ensuring that customer's asset value is maintained properly, reliability is improved based on critical issues from the customer's production strategy, and the life-cycle of assets is managed with systematic approach.

Maintenance Operations is a process to ensure that the work-flow for different maintenance technical strategies is optimized, the customer's short and long term requirements are fulfilled at shop floor level; and that systematic planning leads to reducing total maintenance hours used at the same time than reliability is improved. A very essential component is the smart and disciplined utilization of the CMMS.

Energy Efficiency Improvement is the process where professional maintenance can deliver a large amount of value. It is about everyday awareness and focus to manage maintenance, shut-downs, ramp-ups and ramp-downs in a smart, energy efficient way. It is also monitoring energy waste, planning, implementing and financing investments that are proposed based on monitoring and identifying waste.

Plant Performance Improvement is the process that has the most impact on the performance based maintenance agreement. Here the service provider has the strong motive to capture plant performance and other relevant KPI's, drive with passion the root cause analysis and continuous improvement activities, provide technological and soft solutions to improve the production and maintenance processes and to bring in global resources to support the customer to gain a competitive edge in terms of plant performance and operations.

As the site can and must focus on agreement fulfillment it needs a guideline and support from a combination of management and support processes. **Leadership** is to be seen mostly at a site level process where the leader demonstrates target orientation, partnership. **Strategy** sets up the strategy process, ensures that maintenance outsourcing agreement brings benefits to all stakeholders, customer, ABB and employees. **The support processes** take care of the essential support activities around HSE, people management, financial management, supply chain and welding business supporting IS systems of the partners together.

Results is the area that proves that the outsourcing agreement has been the right choice. In ABB Full Service® this essential part of the business model is visualized by a balanced score card model. The model is visually stronger and more attractive by using a triangle to addresses the key essential values, client, ABB and people.

The process models described above are the standard “Boilerplate” model, however variations need to be considered depending on the scope of the agreement, whether the customer’s business type is an existing plant (Brownfield) or where we would work with a cradle to grave approach (Greenfield) Also considered but of less importance is the variations between customer industries where a more specific or detailed process is required.

6. Example of a specific process – Reliability maintenance

In this chapter we dive deeper into the detail of the most essential service process in maintenance; Reliability Maintenance, which is ABB’s approach for implementing world-class reliability engineering. Introduced in this section will be how ABB’s reliability maintenance process contributes to operational excellence.

What then is reliability? The US military standard defines it as follows: “Reliability is the probability that an item will perform its intended function for a specific interval under stated conditions”(DOD, 1981). Reliability is a broad term that focuses on the ability of a product to perform its intended function. Mathematically speaking, assuming that an item is performing its intended function at time equals zero, reliability can be defined as the probability that an item will continue to perform its intended function without failure for a specified period of time under stated conditions. Please note that the product defined here could be an electric, electronic, mechanical hardware product, a software product, a manufacturing process or even a service.

When looking back to not so long ago, we find that the designers of new production equipment were also the builders, operators and maintainers of their equipment. They had a close relationship in all aspects with their hardware and they, for a fact did “know” their equipment; what worked, how well, and for how long, what broke, how to fix it, and how to take reasonable (but not too expensive) preventive actions to avoid future failures (Smith 2003). In this environment there also developed exceptionally good senses based condition monitoring routines and experience was the major source to define preventive maintenance programs.

As later there emerged a requirement for higher production capacity and increased efficiency, technology developed to be more and more sophisticated and more complicated,

leading companies to specialize solely in manufacturing production equipment or operating those equipment to manufacture end products for their clients. This was a necessary development to enable economical growth throughout the world, but it came also with down sides, one was the increasing challenge to design effective preventive maintenance plans since experience over total life cycle of equipment was scattered between several companies making feedback from operators and maintainers to the designers difficult.

Presently when end users take over their operations they have limited knowledge about the reliability of the equipment, in parallel, the manufacturers try to design the most reliable products and systems but have limited information about the actual operating conditions. It is clear that the combined experience of both these parties will lead to the improvement in overall availability and reliability of the production equipment. Another factor greatly affecting equipment reliability is how limited resources, both financial and physical are utilized to maintain or improve reliability. Today too often we can see that preventive and predictive maintenance plans are inadequately designed or if those are well designed the execution of tasks are neglected. On the other hand there is constantly increasing demand for improved equipment reliability, demand coming from our society to conserve natural resources and energy, protect our environment and to improve safety.

One of the ABB Full Service® core processes is Reliability Maintenance, which is presented in figure 8 under. In that picture it is also shown how the reliability maintenance process is embedded into the whole operational excellence model. In the next section ABB's reliability process will be discussed in more detail.

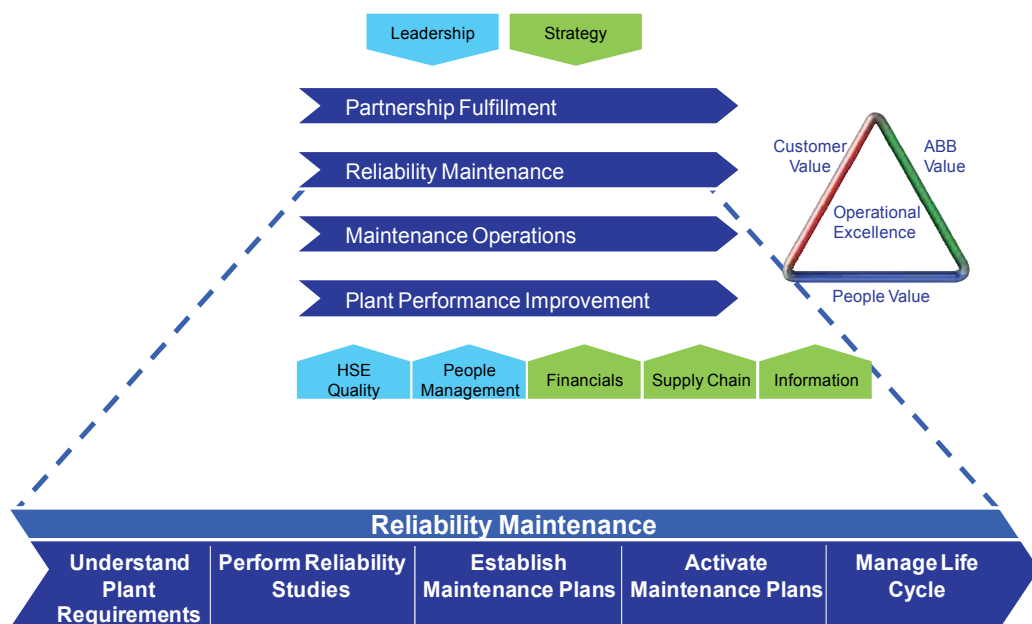


Fig. 8. ABB Full Service® Reliability Maintenance process

The Reliability Maintenance process aims to maximize the life of equipment and minimize consequence of failures. It sets a consistent standard for processes and tools for all activities

across the plant to assist the organization with the maintenance plan reviews and the asset life cycle management. In the next sections each phase of the process is discussed in more detail.

6.1 Understanding plant requirements

In this first phase of the Reliability Maintenance Process implementation, the main idea is to obtain a snap shot of the production facility and equipment with respect to reliability issues. There are several methods to assess the current state of reliability at the production plant. ABB has developed its own tool for this assessment, the Reliability Audit. Engineers at site assess four important aspects within reliability engineering, those are:

- Reliability Planning
- Maintenance plans
- Root Cause Analysis (RCA)
- Precision Maintenance

In each area there are predefined multiple choice questions. This enables ABB to compare, notify gaps and set targets for the reliability implementation (Vicente, 2011). Figure 9 displays an example of the reliability audit tool.


Reliability Audit

Customer: _____

OIS/OS site: _____

Respondent: _____

Fernando Vicente: _____



Date: _____

Results: UMLDU
Item

Asked examples list

Language	0	1	2	3
ENG	Not Done	Good Practice partially implemented	Good practice across site, or best practice partially implemented	Best practice across Site
1 Reliability Planning (1)				
1 Is a Reliability Champion identified?	<input type="radio"/> No one identified	<input checked="" type="radio"/> Position identified as default	<input type="radio"/> Single person identified but not advertised well	<input type="radio"/> Single person identified, everyone aware
2 Is there a documented Reliability Management plan, describing what needs to be done to implement or improve reliability on site? <i>Including: Maintenance plans, Preservation plans, lubrication, precision maintenance, increase of MTBF, decrease in MTTR etc</i>	<input type="radio"/> No plan	<input type="radio"/> Some tasks identified, not detailed	<input checked="" type="radio"/> Brief detailed plan, including most listed items	<input type="radio"/> Detailed project plan including all listed items
3 Does the plan have dates and responsibilities?	<input type="radio"/> No	<input checked="" type="radio"/> Only some, or vague	<input type="radio"/> only on high level	<input type="radio"/> Dates and responsibilities for all actions
4 Do the planned tasks have implementation plans? <i>A plan detailing how that task is going to be executed Including: Who, when, how, all people involved, equipment needed, priorities clarified, meeting plan, reporting plan etc</i>	<input type="radio"/> No	<input checked="" type="radio"/> Only the major ones	<input type="radio"/> Most have plans	<input type="radio"/> All have plans

Fig. 9. Example of Reliability Audit tool

6.2 Perform reliability studies

Once key reliability challenges have been identified, a complete equipment classification analysis will be completed to give an equipment maintenance prioritization. The purpose of

equipment classification is to give each piece of equipment or in some cases subcomponent a single classification, A, B or C, considering all factors related to the impact of failure to the manufacturing process. The classification project highlights which equipment needs to be addressed first to ensure reliability; this type of analysis is performed together by engineering, maintenance and operational (production) personnel. An example of classification factors and equipment criticality are described in Figure 10 below. Before starting a new equipment classification project the description of classification levels will be thoroughly checked and agreed in advance between maintenance and production personnel. For example a paper mill will defined Frequency Factor totally differently to the electronics manufacturing plant. in

EVALUATION FACTOR	LEVEL 1	LEVEL 2	LEVEL 3
Safety Risks for people	Equipment failure affects seriously people	Equipment failure causes risks to people	No consequence
Environment Risks for the environment	Equipment failure affects seriously environment	Equipment failure causes risks to the environment	No consequence
Quality Effect of failure on product quality	Failure affects quality, generating out-of-specification products or affecting seriously the revenue	Equipment failure makes product quality variable and affects revenue	No effect on the product or revenue
Working Shift Working shift of the equipment	Equipment is required 24 hours per day	Equipment is used more than half of a day	Occasional use
Production Effect of equipment failure on production	Equipment failure causes total interruption of production	Failure causes interruption of an important system or unit, or reduces production	There is spare equipment or it is cheaper to repair the equipment after failure
Frequency Number of failures in determined period	Many shutdowns due to failures (more than once per 6 months)	Occasional shutdowns (once per 6 months)	Not frequent (less than once a year)
Cost Amount of money involved in the failure	Repairing time and costs are very high	Repairing time and costs are high	Repairing time and costs are not significant

Fig. 10. Criticality classification table

A logical selection tree is prepared to assist personnel in coming to a conclusion of the classification of each equipment; an example of the logic selection tree is presented in Figure 11. All details of how class (A, B, C) has been assigned to equipment are documented. If modifications or investments are subsequently made to these equipment, it is easy to check from a well documented criticality analysis if the classification needs to be changed. The ABB logic tree is also translated into algorithms so that when equipment data is downloaded from the Computerized Maintenance Management System (CMMS) there are ready made dropdown lists and formulas creating ease of use, documented traceability and efficient time utilization in the criticality analysis meetings.

Another important task inside this phase is to understand the operational context and failure behaviour based on equipment history and experience that can sometimes be very different to those failure modes considered by the OEM during the design phase.

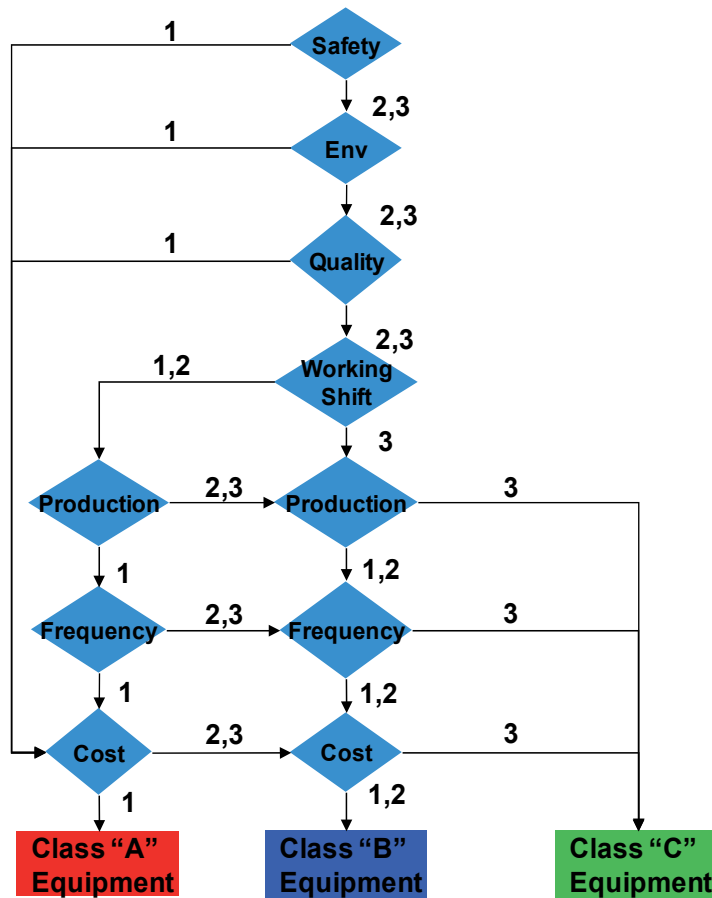


Fig. 11. Decision logic diagram

As an end result of this phase there will be a criticality analysis completed and a classification assigned to each piece of equipment.

6.3 Establish maintenance plans

After equipment classification, failure and operational context are studied, reliability analysis developed and then preventative maintenance plans (PM's) will be uploaded or updated in the CMMS. For A-class (the most critical) equipment, common RCM principles like FMEA can be used to identify functional failures and then logical thinking used to define how each functional failure can be avoided. There is often temptation to utilize only existing experience to define preventive maintenance plans in this phase, without any documentation as to why those PM's were chosen. Again thorough documentation would support more effective future development.

There are numerous pieces of commercial software available for reliability analysis. It has to be noted that software itself does not create preventive maintenance plans, although in skilled hands they are powerful tools to assist in analysis, decision support and documenting arguments for preventive maintenance plans. Not having dedicated software

is no reason to avoid running the reliability maintenance process; all phases of the process can be completed successfully without reliability software.

In figure XX there is one simple template presented to support documented failure prevention planning. This template is utilizing commonly available RCM methodology. After identifying functional failures the significance of each functional failure will be defined in the upper left part, questions 1 to 4 in Figure 12 under. For each question a yes or no answer is given and some documentation as to why each answer was given. When the significance of the failure is defined there will be questions (from A to F) to assist on formulating the functional failure preventive actions. The principle should be that actions to define equipment condition while it is left running are preferred to obtain an early indication of possible maintenance needs without disrupting the manufacturing process.

As a result of this phase there will be actions to prevent functional failures defined for the most critical equipment.

6.4 Activate maintenance plans

When the required preventive actions are defined, those actions must be planned and scheduled which means that each task will have resources assigned, possible materials to be identified and then the execution interval is to be defined.

In operational excellence it is important to recognize that it is not enough to define correct failure prevention actions, but those actions must be uploaded into the CMMS and most importantly for the execution of those important actions is the proper training and instruction for technicians. Getting feedback from the technicians to improve the preventive maintenance plans further is closing the loop of continuous reliability improvement on site.

Results of this phase of the process are detailed maintenance plans which are executed on time by trained and well instructed personnel.

6.5 Manage life cycle

After preventive maintenance routines have shown their value by reducing failure rates, there is then organisational capacity freed up for longer term planning of equipment strategies. Long term life cycle plans will be prepared for the critical or expensive equipment to determine when major repairs or replacement investments are most favourable to be undertaken. For this phase ABB reliability engineers also selectively connect equipment OEM's. From the OEM's there is often information of their equipment life cycle available, under (figure 13) is example from ABB's drives life cycle classification, which supports decision making on modernization of equipment if equipment are in obsolete or limited phase.

When considering capital investments life cycle costing (LCC) is one way of analysing equipment purchase choices. If the analysis is completed correctly, all factors are addressed, and the quality of information is good, the item that costs the least amount to own (buy and use) over its working life would be selected. When compared to other suitable items this piece of equipment would perform its lifetime service with the least total cost to the organization.

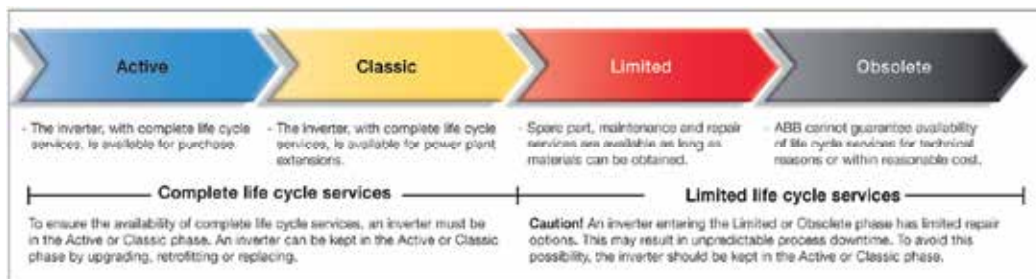


Fig. 13. Example of solar drives life cycle classification (ABB, 2011)

When buying equipment there are three things to know - purchase cost, running cost and maintenance cost. The combination of these over the equipment's life is its LCC. A low LCC means the least amount of money necessary was spent on it, while a high LCC means extra money was spent and that money was then not available for other things. From a purely financial viewpoint it is sensible to go for equipment with the lowest LCC possible. But it is not only the cost of equipment that needs to be considered when purchasing it.

As a simple example of the process we will choose a lawn mower. The options are a reel mower or a rotary mower. First is started by developing a simple table like the one below listing the frequency and costs of the activities expected to occur throughout its working life. The costs and frequency are the standard ones from the manufacturers and the parts and service people. Then we take the recommendations of the manufacturers and service specialist so that the comparisons are based on facts and opinion of knowledgeable persons.

	Reel Mower	10 Year Cost	Rotary Mower	10 Year Cost
Purchase Price	1 off	\$900	1 off	\$700
Fuel for 10 Years	120lt.	\$120	120lt.	\$120
Service Every	5 year	\$240	3 year	\$240
Replace Blades Every	3 year	\$600	1 Year	\$500
Total Cost for 10 Years		\$1860		\$1560

Table 2. LCC calculation sheet

Above calculation shows that rotary mower has the best LCC being the cheapest to own. Does that mean people will not buy a reel mower? Of course not. People buy reel mowers because they leave a better quality of cut on the lawn and are self-propelled. It is not always the cost that determines the selection, at times the functionality of the equipment is also important. Putting a value on functionality is difficult when compared to putting a value on a piece of machinery. Functionality is measured in job time savings, accidents not incurred, overtime not worked, people not having to be employed, etc. LCC falls short in that aspect of justifying equipment.

Outcomes of this process phase are investment and major repair plans for the equipment owner. These long term plans are extremely important to give the owner the chance to plan future expenditure and also to evaluate risks related with delaying investments.

6.6 Summary

The Reliability Maintenance Process is a good example of how operational excellence is implemented in practice; there is well defined standard process to be followed and all actions are carefully documented. As a result of successful work significantly reduced failure rates, reduced maintenance cost and improved reliability of machinery can be achieved. Also maintenance work is more motivating for the employees due to fact that only meaningful maintenance actions are kept and executed.

7. Supporting the process management – Key information systems considerations

There are huge volumes of various information to be managed related to the maintenance of production equipment e.g. equipment technical data, warranty information, all planned work details, various reports and test results, monthly KPI information, personnel information and drawings. Commonly this data is scattered around the organization into different systems or archives, some data is in electronic format and some only exists on paper. On top of data management there is the challenge to make relevant data available for all personnel requiring access to it. An extra challenge comes when a service provider works for a different company than that of the machinery owner. These two companies will most probably have different IT/IS policies which can create obstacles for effective data sharing and access. And adding to this challenge, existing systems are not often capable of providing information easily and with user friendly interfaces.

When finding solutions for the above mentioned challenges there is often a lot of design work done before setting up any IS solution. The IS team who will be responsible for configuring the new system (CMMS or other knowledge sharing system) will be first updated with maintenance and production strategies so that they fully understand what the priorities are. Then that team will gather the reporting needs from maintenance, e.g. what KPI's are needed to be available from the system and what other standard reports are needed. When understanding needs it is easier to create standard workflows for maintenance (see figure 4 In section 5.1.3 as example of the workflow). Then all of this information is translated into configurations in the CMMS and other information systems. ABB has traditionally selected IBM Maximo to be utilized as a global standard solution for maintenance management. Into that global system standard workflows have been created for maintenance activities. This standardization brings benefits in faster start-ups of new installations and also when personnel move between sites it is easier to adapt into new working environment when there are familiar functions in the system, this also reduces training requirements.

The basic principle in ABB has been that the CMMS is the heart of knowledge, all maintenance related information should end up in that system. Unfortunately not 100% of information is economically viable to keep in that system, e.g. consider the cost of digitizing 100.000 paper format drawings only to have them in CMMS for an uncertain future need. But still, when ever new projects is executed and above mentioned principle kept in mind it steers the companies into requiring new documentation from supplier in such a format that it can be electronically linked to equipment in the CMMS. The same principle applies to reports created by maintenance or their subcontractors, e.g. thermography, oil analysis and

vibration measurement reports should be also linked to the relevant equipment. Collecting comprehensive information can greatly help future planning, failure prevention and troubleshooting.

There is also information needed to be shared which is not necessarily so relevant to be kept in CMMS. Let's say for example the monthly performance reports generated for the customer need to be available easily and to a large audience in two different companies. The newly developed SharePoint solutions bring a good platform for sharing various kind of information not shared through the CMMS.

IS solutions are one of the most challenging areas to be well managed when creating a partnership with two companies, these systems need to be in place to ensure a high quality service, open communication and development based on facts. Modern IS solutions offer all the needed functionality, although the cost to fully implement those is usually high, so to guarantee value on money spent advance planning is essential and must be completed with care.

8. Closing the loop – Measures and assessment of the service delivery

8.1 Measuring service delivery

Performance of the service delivery is measured with a predefined set of Key Performance Indicators (KPI). A Key Performance Indicator is a common word for identifying the most important measures of the performance. KPI's are usually supported with a set of Performance Indicators (PI's). KPIs are commonly used by an organization to assess its success or the success of a specific activity in which it is engaged. A Key Performance Indicator is a measurement used to quantify advancement towards strategic objectives set as elements of a strategy. These indicators will differ depending upon the nature of the business and its strategic objectives. KPIs differ per business areas where companies are functioning, although there are some common KPI's that can be used in any business the KPIs that maintenance a service company might use are: safety indicators (e.g. Lost Time Incidents, near misses) customer satisfaction, revenue, profitability, maintenance cost/produced unit, spare parts consumption cost, spare parts stock value, employee satisfaction, personnel utilization rate, portion of preventive and predictive maintenance out of total maintenance hours.

Service providers should invest a considerable amount of time and resources in understanding what is really the most significant performance information that describes success and indicates if the service unit is on track in executing its strategy. It is also significant to notice what KPI's are most suited to different level of the organization – not all KPI's that are critically important to maintenance team are so important for the finance team for example.

Then after KPI's have been agreed, those should be kept in force long enough to be able to show the development of the KPI result. It is vitally important to follow long term trends together with short term ones. For its service delivery ABB has developed a follow-up tool that fulfills the reporting needs of service delivery. An example of the output of one KPI is presented in Figure 14. Naturally all KPI's should be available in the same format. It is important to record why results have been reached, since KPI's must be later on analyzed.

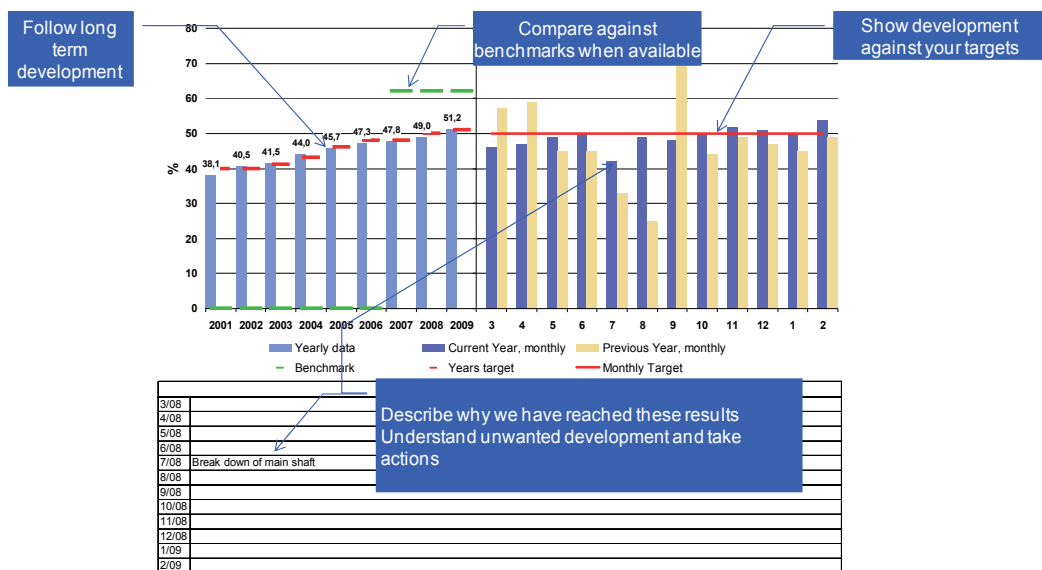


Fig. 14. Example of Key Performance Indicator follow-up (ABB, 2006)

If benchmarks are available for the measured KPI's (either internally from the corporation or even external) those should be used to gain wider understanding of how much more room for improvement there is before becoming best in class. Most importantly there must be targets set for each KPI, otherwise less effective to measure.

Due to the need for understanding of what is significant the choice of KPI's is often associated with the use of various techniques to assess the current state of the service delivery, and its key activities. These assessments can be internal development meetings or external assessments of the service unit's performance. These assessments often lead into the identification of improvement potential and as a result, realization of the performance indicators normally initiates improvement projects. In the next sub-section the method ABB uses to assess its service delivery performance is described.

8.2 Assessment of service delivery

Full Service Assessment closes the loop for ABB Full Service® operational excellence. Assessment is the tool to verify how efficient the service unit is in the implementation of the Full Service model and how well it is fulfilling the value proposition previously supplied to the customer. The assessment model is an adaptation of a common quality and business excellence model for the maintenance outsourcing business.

Utilizing global and regional teams ABB performs assessments for every large contract bi-annually or more often if needed. The assessment is a major approach to educate, support and share leading practices as well as to strengthen the partnership with the customer.

After an assessment, the service unit and upper management will have a clear picture where the service unit stands compared to other ABB Full Service® units. Scoring identifies where the site is good and where major areas for improvement exist. By way of simple recognition the higher performing service units are rewarded with bronze, silver or gold certificates.

The goal of the assessment process is to ensure that the service unit has a sustainable business providing Client Value, ABB Value and People Value. The main objectives are:

1. To ensure contract renewal and to guarantee results according to the business objectives
2. To ensure the ABB Full Service® concept is implemented as proposed

Other objectives are:

1. To identify and share Leading Practices
2. To support implementation of standard ABB Full Service® processes and tools
3. To provide analyses of assessed sites in terms of scoring, Client, ABB and People Value
4. To support gathering and harmonizing the main KPIs for benchmark purposes

8.2.1 Assessment methodology

The **results criteria** of the assessment cover Client Value, ABB Value and People Value. The assessor needs to get an understanding of the KPIs utilized and other measures under these areas. The important topics are to have good coverage on KPIs, positive trends to reach the targets and comparisons or benchmarks.

The enablers are the important approaches with which the service unit reaches its results. ABB Full Service® can be defined as a set of core management and support processes with relevant phases, activities and tools which are made available commonly for all service units. In the enablers' criteria consist of an assessment of approaches, their implementation level and the way approaches are reviewed.

The Full Service® Site assessment is not a desktop study. That is why the program includes visits to the main production facilities as well as to the maintenance workshops. During those visits assessors will have the opportunity to get a good general view of the processes and can in turn relate interviews with the real situation. Before finalizing the site visit, it is a standard way to have a formal wrap-up meeting with the site management. Assessors provide feedback immediately with key findings prior to the supply of a written assessment report.

8.2.2 Assessment reporting and learning

Delivering the high level report from the assessment is the main learning part, both for the site itself and for the service community. The Assessors will typically divide the responsibility for different criteria assessed. However in reporting the goal is to finding consensus, not compromise. Assessors will agree on the main messages as well as on the detailed report and scoring:

1. **The Site Assessment Report** is the document where the main observations and recommendations are detailed by each assessment criteria. The document is drafted so that it can be shared with ABB site personnel and customer personnel. The Maintenance Management Master Plan (MMMP) is the document where the improvement actions developed from the findings are captured and tracked.
2. **Scoring** is the consensus by assessors on which level of maintenance is in place at the site. Scoring is affected by results and enablers but also by financial results. The scoring is then categorized to form the basis for the formal Site Certification. Based on

assessment scoring and the financial results from the site, the ABB Full Service® Product Manager agrees on the Certification level with the main assessor. The Certification is to prove at which level the site is in terms of Full Service implementation thus giving tangible target setting for the continuous improvement.

Part of the learning process is to share the findings with other service units. Reports are stored in a common database where other service units have controlled access. Another important topic is Leading Practices. Assessors identify any leading practices and share them in the company's intranet based database.

Global assessors make analyses between results and enablers as well as between the individual scores, Customer Satisfaction/loyalty, People Satisfaction and EBIT. With the analyses complete ABB will understand better the relationship between the different aspects of the business.

The most important thing is to close the loop of continuous improvement. The assessor makes it clear that the reports, findings and recommendations are understood by the site. The ABB Site Manager's task is to review the recommendations with site personnel and with the customer as applicable and to integrate them into the service unit's strategy (MMMP).

Business excellence in the assessment process is not just writing the report but also supporting and helping the site to move forward. On a regular basis after the assessment the assessor and company management should review the action planning and accomplishments of the recommendations. The assessor should give guidance to the site on how to continue improvement based on and beyond the recommendations.

9. Summary and future challenge

In this chapter the authors have explained the business rationale behind modern performance based maintenance outsourcing, and also presented a validated approach for managing operational excellence. More detail has been given about one core process, called here Reliability Maintenance. The intent is to identify the nature of outsourced maintenance service, delivered at a customer's premises and repeated hundreds of times at global environment.

It is about changing service intangibility into tangible.

The challenge of successful and repeatable maintenance outsourcing activities across multiple regions and countries is to change

The success in running this business is heavily about managing the customer relationship extremely closely during the whole life-cycle, identifying a compelling business case and having the capability to design and implement a business model and set of processes that continuously address the strategy and requirements of the customer – with which the organization runs a long term, performance based agreement. Successful deployment is highly important; professionals having high level technical skills as well as strong leadership and change management are the vital success factors to implement the processes in consistent way.

The future challenge for the outsourced maintenance business model is to further add technology and automation into the solution to strengthen the maintenance role in asset

performance management and data analysis. The market needs also more consistent, capable partners to utilize the benefits of long term performance based agreements and to jointly innovate new solutions to increase the competitiveness of the partners.

However the model will be seen successful only when good results have been proven. To demonstrate this by example ABB Full Service® pursuits have delivered the following typical results over the course of the last 10 years:

1. Plant Overall Equipment Effectiveness increased 17 percent points in 4 years.
2. Total maintenance cost decreased 20% while production was increased by 20% over three years.
3. Exceeded 14 production records out of 15 measures over three years.
4. Unplanned breakdowns due to maintenance reduced by 90% in four years.
5. Achieved 105% of rated capacity in Greenfield plant just in three months.
6. Achieved 1000 days with no lost time due to injury from the beginning of the agreement.
7. In 5 months ABB have made significant changes to our plant. The same would have taken us 5 years.
8. ABB Full Service site was selected the organization of the year 2006 by New Zealand's government.

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Balanced Scorecard's Interpretative Variability and Organizational Change

Geert J.M. Braam

*Institute for Management Research, Radboud University Nijmegen
The Netherlands*

1. Introduction

The Balanced Scorecard (BSC) is a strategic management system that aims to clarify strategy and to translate it into action (Kaplan and Norton, 1992, 1996 and 2001, 2004, 2006; Kaplan, 2010). It is widely used by organizations as a tool to assess and manage their companies' performance. In their past studies, Kaplan and Norton have emphasized the need for companies to align the BSC with their strategy in order to reach maximum benefits. However, in contrast with technical innovations, which tend to have tangible designs and content, management innovations like the BSC typically lack strong physical components. As an 'ideational' innovation, i.e., set of novel ideas that lack a material component, the BSC lends itself to various interpretations (Benders and Van Veen, 2001). Under the same label, the BSC can be used in various contexts involving many different functional areas and indicators. Empirical evidence suggests that varying professional communities may interpret and use the BSC in possibly conflicting ways, which may have both functional and dysfunctional effects on organizational behavior and change (Braam, Benders and Heusinkveld, 2007; Braam and Nijssen, 2011; Modell, 2009; Speckbacher, Bischof and Pfeiffer, 2003; Wiersma, 2009). In addition, different ways of implementing and using the BSC may affect performance and the competitive position of an organisation (Braam and Nijssen, 2004; De Geuser, Mooraj and Oyon, 2009).

This book chapter explores how professional groups may differently interpret the BSC, and how various interpretations and manners of use of the BSC may affect organizational behavior and performance. Particularly in complex and uncertain situations, such insight is important as knowing how to deal with the BSC can help organizations to control their organizational change processes, and reach strategic goals and objectives. Because little was known about how different professionals may interpret the BSC, it can provide managers with a useful guidance as how to optimize the benefits of this management innovation.

The remainder of this chapter is organized as follows. First, literature is reviewed concerning the management innovations. This chapter also describes why the BSC can and will be interpreted and implemented differently by different professional groups. The next section describes the research method and the findings of the study are reported in the following section. Finally, this chapter concludes with a discussion of the benefits and suggests some implications for theory and practice.

2. Theoretical background

2.1 Management innovations

Management innovations like the BSC are important sources of firms' competitive advantage. Specifically, these organization concepts would play an important role in shaping contemporary organizational processes, structures and organizational behavior. The prescriptions of innovating and organizing are suggested by academics, gurus or consultants, and they are meant to be used or 'consumed' by managers. For practical reasons, these prescriptions are simplified, but often they are not specific and have a certain degree of vagueness (Braam et al., 2007). A lack of clear description and detailed instruction makes them open to multiple interpretations. As a consequence, they lend themselves to a wide variety of interpretations (Benders and Van Veen, 2001; Giroux, 2006). This interpretative variability or conceptual ambiguity is not a coincidence but could be considered a precondition for ideas to 'flow' (Røvik, 2002) and become popular among managers (Abrahamson, 1996; Brunsson, 1993; Kieser, 1997). On the supply side of the diffusion process, different kinds of 'producers' with varying agendas may use the concept's interpretative variability to shape a concept in different ways and in various contexts to get attention from different intended audiences.

On the 'consumption' or demand side, interpretative variability may also provide opportunities to eclectically select elements that appeal to them, or that they opportunistically select as suitable for their purposes (Benders and Van Veen, 2001: 37-38). Variation in interpretations may arise intentionally or unintentionally, i.e., those who enact a management innovation may or may not be aware that they are actively shaping and therewith changing its contents. A consequence of this shaping by users is that what happens under a label's guise may be loosely coupled to the contents which its launchers had in mind. Consumers' and producers' interpretations thus shape the actions undertaken under a particular label and vice versa (Braam et al., 2007).

Adoption of management innovations like the BSC is generally not a straightforward process. Adoption of these non-material innovations involves many subdecisions, different functional areas and indicators, and customization is often required before firms can enjoy the benefits of these innovations (Braam and Nijssen, 2011). The interpretative variability of these ideational innovations makes their implementation processes even more complex, and – partly as a consequence – their use will not automatically improve company behavior and performance. Empirical studies show that the way of interpretation of management innovation like the BSC is key for successful application. More specifically, the manner of its use matters: different ways of implementing and using the BSC may have different effects on company performance and firms' competitive positions (Ax and Bjørnerak, 2005; Braam and Nijssen, 2004; De Geuser et al., 2009; Malmi, 2001; Ittner, Larcker and Randall, 2003; Speckbacher et al., 2003). This raises the question of how a company should interpret and use management innovations to achieve favourable results such as substantial performance improvement.

The extent to which management innovations are received could be context specific (Mazza and Alvarez, 2000; Rüling, 2005). Past studies revealed that the way a concept has been taken up is largely impelled through the actions of specific professional subgroups (Shenhav, 1999) and suggests that different concept discourses co-exist with different 'speech communities' (Raub and Rüling, 2001). Common backgrounds of individuals, for

instance their professional origins are likely to influence the specific ways in which they interpret a particular concept (DiMaggio and Powell, 1983; Heusinkveld and Benders, 2001; Scarbrough and Swan, 2001). Individuals who share a common background often make similar interpretations, which differ from individuals belonging to other groups. Such interpretations, which are displayed in specific professional discourses, shape how they translate the abstract notions contained in a concept into actions (Zbaracki, 1998). In other words, the concepts takes shape in particular forms when it is transferred across different contexts (Braam et al., 2007). In complex processes, which often involve many organization members, the abstract notions contained in organization concepts are translated into actions. The end result is what Czarniawska and Sevón (1996) called “translations” of a concept, i.e., the particular forms in which a management concept takes shape when it is transferred across different contexts.

In sum, understanding of how different professional groups may differently interpret and implement a management innovation like the BSC is important, as it may advance management's knowledge about the effectiveness of the innovation in their specific organizational context while reducing uncertainties and risks associated with it. The next section describes the evolution of the BSC.

2.2 Balanced scorecard

Initially the BSC was developed as a comprehensive performance measurement system encompassing a coherent set of financial and non-financial performance measures covering different perspectives of the organization (Kaplan and Norton, 1992). Managers did not only focus on financial measures when taking decisions, but also non-financial criteria had to be taken into account. When integrated carefully and in a balanced manner in a “scorecard” it would provide managers with a comprehensive and timely view of their business. Four different key perspectives were identified as being critical and thus should be included, i.e., the financial, customer, internal-business-process, learning and growth perspective. Although Kaplan and Norton (1992) emphasized that “The Balanced scorecard puts strategy—not control—at the center”, directions on how to link an organization's strategy formulation and its measurement system were limited.

Since 1996, the authors have extended their view, developing and formally proposing it as a strategic management system stressing the importance of aligning the scorecard-information with the business strategy. To translate the strategic goals efficiently into tangible objectives and measures, Kaplan and Norton suggested four interrelated management processes: clarifying and translating vision and strategy, communicating and linking strategic objectives and measures, business planning and target setting, and enhancing strategic feedback and learning. In 2001, Kaplan and Norton introduced five principles to strategically focus organizational management processes: translate the strategy into operational terms, align the organization to the strategy, make strategy everyone's everyday job, make strategy a continual process, and mobilize change through executive leadership. Subsequently, they extended and refined the tool by describing and explaining the tool's management processes and principles in more detail and by showing how strategy may be “mapped” using a formal and integrated set of financial and non-financial strategic performance measures allowing for alignment between the control system and firm strategy (Kaplan and Norton, 2004, 2006; Kaplan, 2010).

Thus, in their work Kaplan and Norton gradually moved from defining the BSC as a comprehensive performance measurement system to the BSC as a strategic management tool describing management processes and principles to develop and implement a strategy-focused and aligned management system built on sound, formal accounting principles (Kaplan and Norton, 1996; 2001; 2004; 2006; Kaplan 2010). Partly as a consequence of these conceptual developments, under the label 'BSC' tools of various interpretations and ways of use might exist (Braam and Nijssen, 2004).

3. Research method

The description of the evolution of the BSC indicates that the BSC can be viewed as an umbrella that may encompass a large variety of interpretations. However, where the diffusion of material innovations can simply be measured by repeated counts of their incidence within a population (Rogers, 2003), it is more difficult – and far from straightforward – to catch purely ideational innovations empirically. In addition, and as argued, a major problem in the empirical study of the diffusion of non-material innovations is the possibility, and indeed likelihood, of loose coupling between label and content. A study on the diffusion of innovations (Rogers, 2003) is often taken as the model, yet this cannot be applied to non-material innovations without further ado. Managers may answer “yes” to the question whether a BSC is used in their organization, but this might cover many different interpretations and actions. Studies on the diffusion of organization concepts like the BSC generally suffer from the weakness that the researcher has no clue as to what interpretations of a concept have been made. Therefore, in order to determine how the BSC is interpreted and used in practice, it is important to develop an understanding of what people mean when they say they have deployed a concept. Particularly, it requires a systematic process of discovery to develop a notion of how different communities within different contexts have constructed such a concept in time (Braam, Heusinkveld, Benders and Aubel, 2002; Braam et al., 2007). However, data about the actual use of the BSC in practice is scarce.

To show how the concept of BSC has been translated and has become associated with organizational behavior and performance, this study draws on an inductive approach in which we used three different, but highly interrelated sources of empirical evidence. Using this variety of interrelated empirical sources is necessary to both enrich and verify the translations and associations that emerge from analysis of the data (Braam et al., 2002; Strauss and Corbin, 1998).

First, this study draws on content analysis of publications on the BSC. In spite of the fact that published discourse must be distinguished from the actual use of the BSC in practice, content analysis, or ‘any systematic procedure devised to examine the content of recorded information’ (Gunter, 2000: 56), can give indications about the professions and/or sectors in which the BSC enjoyed popularity and may reveal ways in which the concept has been received in these different populations. In addition, the texts found may also contain empirical data such as case studies and surveys that can give indications about how and how many organizations used this management innovation. The empirical work was conducted in two steps. First, this study used print media indicators as a starting point to select the papers (Abrahamson and Fairchild, 1999; Barley, Meyer and Gash, 1988; Benders, Nijholt and Heusinkveld, 2007; Giroux, 2006; Shenhav, 1999). Second, the publications

found were further examined by content analysis. This study draws on content analysis of publications on the BSC in Dutch discourse over the period 1992-2007 (Braam, Benders, Heusinkveld and Aubel, 2001; Braam et al., 2002; Braam et al., 2007). Two raters examined the content of these articles in qualitative terms following established techniques of analyzing qualitative data (Glaser and Strauss, 1967; Strauss and Corbin, 1998). This entire analysis followed an inductive approach in which all final coding categories were developed from a preliminary, exploratory coding of data (Braam et al., 2002; Braam et al., 2007).

As a second source of evidence we used Dutch case studies and surveys to increase insight into the variation in the translations of the BSC and its associations with organizational change (Braam et al., 2001; Braam et al., 2002; Braam and Nijssen, 2004; Braam et al., 2007; Braam and Nijssen, 2011). As a third source of evidence we used several semi-structured in-depth interviews with leading management intellectuals and experienced practitioners from the Netherlands to explore their views on both the variability in interpretations of the BSC and the organizational dynamics associated with the BSC (Braam et al., 2001; Braam et al., 2002; Braam et al., 2007).

Finally, this study used an inductive analysis and logic of constant comparison (Glaser and Strauss, 1967; Strauss and Corbin, 1998) to develop a balanced view on how the BSC has been translated in practice. The data from the different sources were continuously compared and contrasted to advance our knowledge about the ways the BSC has been interpreted and used in various professional communities and is associated with changes in organizational behavior and performance.

4. Balanced scorecard translations

The inductive approach to describe how the BSC has been interpreted in practice by various professional communities and is associated with organizational behavior and performance resulted into two dominant, interrelated yet loosely coupled clusters of interpretations: a technical and an organizational translation. These should be regarded as distinct contrasting categories that are closely related to different social groups in which they are shaped. The technical translation is the dominant translation. It presumes the strategy as known and interprets the BSC as a tool that facilitates and controls the translation of a firm's strategy into operational terms. On the other hand, the organizational translation perceives strategy as ambiguous and subject to change. The BSC is regarded as a strategic learning system in which the hypothesis embedded in a business units' strategy are tested, validated and modified. The intention of this strategic management system is to result into action, i.e., to increase motivation and to guide interactive and comprehensive organizational change processes. For this reason, the BSC offers opportunities to conceptualize strategy and performance measurement next to technical, social, behavioral, political and economical aspects in a coherent way.

Next, these two contrasting translations are further explained. These translations are described in accordance with three main themes that have evolved from the inductive approach (Braam et al., 2002; Braam et al., 2007). First, the association with strategy is discussed. Second, the perceived functions of the BSC by different professional groups are described, including the sub questions to what extent the BSC gives reason to rethink the position of the professional. The third theme deals with the question how to put the BSC into practice.

4.1 Technical translation

The technical translation presumes the strategy as starting point. It repeats the message of Kaplan and Norton (1992, 1996, 2006) that it is important to strategically align a firm's comprehensive performance measurement system. The BSC offers a structured approach to translate and implement this strategy using an integrated set of performance measures. Within this translation, three dominant (sub)clusters of interpretations emerged. These interpretations are strongly associated with the professional disciplines of Accounting, Information technology (IT) and Human resources management (HRM) in literature.

First, and especially in the *accounting* discipline, the BSC is associated with improving performance measurement systems and reporting formats by measuring and presenting coherent sets of financial and non-financial performance indicators allowing for alignment between the control system and the strategy of a firm. The BSC helps to think strategically about performance measurement and to broaden insight into actual and future organizational success. In addition, it widens the range of performance indicators to improve organizational control. Systematically streamlining and optimizing the performance measurement system should ensure that the resulting financial and non-financial information becomes one of the most important control instruments for management. However, as accounting-based management innovation the BSC also helps the accounting professionals to realize that the traditional accounting and control instruments are not adequate anymore. It emphasizes to look beyond the traditional perspective of accounting and control and stresses the importance to broaden the role of the management accountant and business controller. For this reason, the BSC matches the need to think over further professionalism of planning & control cycles, and is strongly associated with the changing role of the controller from corporate policeman to business improver and change agent.

In the *IT* interpretation, which has close similarities with the accounting interpretation, the BSC is strongly associated with data and information processing. To improve the accessibility of information, the BSC is accentuated as tool to structure data in databases. The BSC should help to computerize the assumed relations between the dashboard indicators. In addition, the BSC is perceived as a useful concept to control and improve the quality of IT-projects. In particular, the IT discipline suggests to use an IT-scorecard to measure 'IT performance' and manage IT implementation projects.

In the *HRM* discipline, the BSC is particularly interpreted as a strategic evaluation and control instrument for human capital. The BSC makes the increasing importance of intellectual capital and especially HR as strategic asset and source for competitive advantage visible, thus indirectly emphasizing the essential role of HRM. BSC implementation and use should help to create alignment between the actions and behavior of teams and employees and the strategy of a business. The BSC offers a framework to show how people within the firm create value by strategically measuring and evaluating performances of teams and individual employees in both quantitative and qualitative terms. In addition, the linkages between the scorecard results and the reward structures should increase people's motivation and commitment. The HR interpretation also stresses the importance of an additional HR measurement perspective. When used effectively, it shows the importance of the human resource function for the achievement of strategic goals and objectives. In addition, it helps to demonstrate the contribution of HR to a firm's financial performances

(Becker, Huselid and Ulrich, 2001; Huselid and Becker, 2006). On the other hand, the growing realization to think in terms of strategic relevance gives rise to questions like: what is identity of HR professional and how is HRM value-adding? Within this context, the BSC is also perceived as helpful to evaluate and restructure the HRM department and develop a strategy for the HR function.

Within the technical translation, *implementation processes* can be characterized as 'deductive' and 'linear', which means that in an instrumental way step-by-step plans and conditions are formulated to implement the presumed strategy successfully. Despite the fact that the idea of the BSC as a strategy implementation tool is widely accepted, a wide range of implementation problems is identified. Obviously the methods and techniques described by Kaplan and Norton (1996, 2001) do not sufficiently serve as implementation guidelines. In spite of the step-by-step recipes, the translation of an assumed strategy into operational terms appears to be difficult in practice. It suggests that in spite of the fact that the BSC concept is clear, it is too vague for concrete interpretations in local contexts. In addition, when management sees implementation and usage of the BSC as an 'end' rather than a 'means' to a goal, measurement applications may be too instrumental and performance may be harmed rather than helped. Many leading practitioners, management intellectuals and authors recognize BSC imperfections and give critical enumerations of conditions for successful implementations and pitfalls (do's and don'ts). The saying 'easier said than done', which is applicable to many management innovations, can also be put on the BSC (Braam et al., 2002; Braam et al., 2007). At least two groups of closely interrelated implementation problems are recognized.

Instrumental difficulties

Examples of difficulties that are associated with deploying the concept are:

- Strategic goals and objectives are unclear, ambiguous and give insufficient guidance to define performance indicators;
- Performance indicators do not or cannot measure what they should measure, the quality of the underlying data may be questionable, data are not available;
- It is difficult to set targets and to link rewards to the measures;
- BSC implementation and use is too mechanistically, which may result in over bureaucratization and focus on details rather than on the overall picture and the strategic direction. In addition: "The focus is too much on designing and implementing a dashboard. However, by looking only at the dashboard you cannot decide where you want to go" (Braam and Nijssen, 2004:344).
- (Causal) relationships between different performance measures are not as obvious as suggested. Despite the fact that associations between the perspectives exist, their relationships are not always unambiguous and quantifiable. Maybe it is even a fallacy to think that the BSC can make one to one causal relations between the four perspectives and their performance indicators (see also Nørreklit, 2000 and 2003).

Underestimation of social consequences

The technical translation emphasizes the instrumental aspects of BSC implementations, while it underexposes its social aspects. Critical social success factors are almost neglected, such as culture, management style and commitment, communication and training. In

addition, social consequences that the BSC implementation and use indirectly involve are overlooked, like transparent information that might prove to be a threat to some managers and departments. BSC implementation makes differences in understanding, vision, secret agendas and fear to be accountable transparent and visible (Braam et al., 2002). For a successful implementation, these aspects have to be overcome, since the implementation may be sabotaged otherwise, or the performance indicators may be distorted (Van den Heuvel and Broekman, 1998). So, BSC implementation is a dynamic process in which interventions - partly through 'learning by doing' - might help to embed the management principles and processes of the BSC 'right', i.e., as intended, into the organization (Van der Meer-Kooistra and Vosselman, 2000).

In spite of the fact that in the technical translation instrumental use of the BSC appears to be the dominant interpretation, the comments indicate that a successful, strategy-focused and aligned BSC implementation is not a sinecure, but a complex process with uncertain outcomes. The presumed strategy of an organization is often unclear. In addition, the required organizational changes are comprehensive, interrelated, multi-disciplinary, and with far-reaching consequences for diverse actors within the organization. The necessary changes go beyond the traditional reach and instrumental attitude of the professional disciplines of Accounting, IT and HRM, which gives cause to discuss the role of these professionals. Ironically, Kaplan and Norton (2000, 2001, 2004, 2006) increasingly emphasize the importance of the BSC as a framework to manage strategy. The organizational translation closely fits this focus.

4.2 Organizational translation

The organizational translation associates the BSC with a holistic, organic concept for managing *strategy*. By testing, validating and modifying the hypothesis embedded in a business units' strategy and initiating discussions about connections between strategy and management control and their supposed means-end relationships, the BSC offers a continuous strategic learning system (Kaplan and Norton, 1996, 2001, 2004, 2006). So, the BSC is considered as a management philosophy - a 'mental' framework - that creates a cause and effect mindset. It helps managers and employees realize what they do and why they do it by discussing and clarifying the underlying strategy and its relationships with the management system. This translation is mostly associated with the discipline of management.

The consciousness of the comprehensiveness and complexity of the organizational changes that the BSC might induce is closely associated with the changing *role of management*. The BSC is a performance measurement-based management tool that aims to help (senior) management to look at the organization in a distant way. To deal with contingencies, it has to initiate processes aimed at strategic learning. And for that purpose, it may need to change its management style and ways of communicating, to motivate and involve employees. The introduction of the BSC may involve unanticipated dysfunctional consequences for individual behavior and corporate culture. For instance, people may feel threatened by the close monitoring system, leading to feelings of distrust towards company top management. To overcome these feelings, top management should engage in trust building behaviors, including taking the lead and endorsing openness, transparency and benevolence in favor of overall company effectiveness and efficiency (Dirks and Ferrin,

2001). In addition, the BSC aims to clarify strategic goals and objectives and alignment of resources. This may be very confronting because explicating these goals and objectives and the resulting actions implies that, on a deeper organizational level, the underlying norms have to be clarified and targets must be made explicit and have to be met. Maybe in the actual culture it is not done to address somebody on his not-achieving performance targets. So, a successful BSC implementation may imply that management has to change both its management style, the mindset of its employees and corporate culture to support effective execution of the strategy.

Within this translation, the *implementation processes* may be characterized as 'inductive', nonlinear and comprehensive. The holistic nature of the BSC appears to offer opportunities to conceptualize strategy and performance measurement next to technical issues and behavioral, social aspects in a coherent way, which creates opportunities for integration and synergy. To bridge the gap between strategy and operations, these continuous recursive and multidimensional learning processes have to result into action, i.e., interactive, multiplicative organizational change processes. In this perception, the BSC aims to function as an intermediary - an organizing framework and communication mechanism - to motivate and guide organizational change processes and develop a matching culture. The BSC should induce ongoing processes of interaction and participation aimed at developing a way of working in which teams increasingly are self-driven and self-organizing. Therefore, interrelated key success factors have to be stressed, such as:

- Commitment of top management and the management style;
- Engagement and motivation of employees;
- Continual willingness to change individual behavior and corporate culture;
- Creation of multidisciplinary and empowered teams that gradually have to implement the BSC, both on central and local level;
- Capacity to deal with contingencies;
- Reduction of formal procedures and highly standardized processes that act as barriers for dynamic organizational adaptation;
- A high level of information exchange between organizational departments that allows for resolving differences and overcoming resistance.

5. Management implications

The findings have several implications for organizational changes associated with the BSC. First, there are different BSC translations and interpretations which are related to specific groups of professionals. As a consequence, use of the BSC in practice may not be considered as homogeneous. For instance, managers might rely on different discourses as sources of inspiration and legitimization and be influenced by different specific ideas than professionals in the Accounting, IT and HRM disciplines (Braam et al. 2007). This suggests that BSC implementation may become a matter of internal organizational confusion, if not conflict. Contrasting yet latent views on what the BSC is may become manifest during its implementation and use, possibly creating 'contested zones': accountants are likely to have other preferences than HR managers, which is likely to affect the way(s) of use of the BSC in an organization. Implementers and users who are aware of such possible contradictions may be able to counter their effects and reconcile different interpretations to align organizational and behavioral change processes (Braam et al., 2007).

Second, the empirical findings suggest that BSC use in practice lags Kaplan and Norton's intended use aimed at strategic focus and alignment (1996, 2001, 2004, and 2006). However, although empirical evidence on actual organizational changes in practice is somehow limited, evidently the BSC has impact on organizational control. In a variety of professional disciplines the attention for the BSC has stimulated an increased understanding of the importance of performance measurement-based strategic management. The strong association of the BSC with changing roles of professional practitioners, like the business controller, the HR manager and the senior manager, illustrates this point. At the same time research also suggests that BSC use that complements corporate strategy positively influences company's competitive position and company performance, while BSC use that is not related to the strategy may decrease it (Speckbacher et al., 2003; Braam and Nijssen, 2004; De Geuser et al., 2009; Braam and Nijssen, 2011). These findings stress the importance of BSC implementation as strategic management system. However, the translation of vision and strategy into operational measures is a complicated and dynamic process. To structure this process Kaplan and Norton (1996:286) described an implementation program in which the BSC '*should be continually reviewed, assessed, and updated to reflect new competitive, market, and technological conditions*'. Consistent with the organizational translation, our empirical findings confirm the need for continuous adaptation, although the empirical findings also show that this may be difficult to realize in practice.

For this reason, it is important to improve managers' understanding of conditions facilitating or inhibiting BSC-implementation as a strategic management system. Based on our findings, Kaplan and Norton's roadmap' can be supplemented with some additional suggestions:

- Use *multidisciplinary project teams* to help effective implementation of the BSC. It will create involvement from different functional areas and use knowledge from different disciplines to integrate and optimize processes. Moreover, it may help create momentum particularly when people with a positive attitude towards adoption are selected. In addition, active support by top management underlines the strategic importance of the BSC and may help overcome resistance by (teams of) employees to this management innovation and the organizational changes that it might induce.
- Create a *multidimensional and balanced baseline set of performance indicators*, and start measuring and monitoring. Use simple measures initially, and focus on the ones that are considered as key for organizational control and strategy.
- Introduce *more unique measures* subsequently that better reflect the specific market and strategic conditions of the company or business unit in order to build a more tailored measurement system. This *fine-tuning* involves an *iterative and partly experimental process* and should be based on careful monitoring of initial BSC measurement effectiveness.
- *Careful validation* of the instrument's effectiveness in measuring firm efficiency and effectiveness is critical.
- A *proactive stance is critical*. Top management should be alert to the dynamic environment of the firm affecting the fit between its strategy and the BSC. Changing contexts may require varying the set of indicators used and re-balancing the BSC-profile across the perspectives, rather than just fine-tuning the measurement system.
- Formal procedures, highly standardized processes and delineations of tasks may negatively influence BSC's implementation. To increase the effectiveness of its

implementation, the negative effect of the organization's level of formalization could be reduced by *involving department heads* and *empowering* them.

- *Interdepartmental communication* may facilitate BSC implementation by reducing ambiguity, and integrating and aligning the multidimensional performance indicators of different departments into a single "strategy map" (Kaplan and Norton, 2001, 2004; Kaplan, 2010). It helps to generate a common understanding, support, and commitment for implementation of this complex management innovation.

6. Conclusion

Despite its promise (Kaplan and Norton, 1992, 1996, 2001), managers should be aware that BSC use may not result in better company performance. This chapter contributes to understanding on usage of the BSC by studying how professional groups may differently interpret the BSC, and how the variety of interpretations and manners of use of the BSC may affect organizational behavior and performance. For this reason, this chapter described two dominant, loosely coupled clusters of interpretations: the technical and the organizational translation. These clusters could be regarded as distinct and contrasting categories and are closely related to the different professional groups that shaped them. In the technical translation, which is closely related with the professional disciplines of Accounting, IT and HRM, the BSC is frequently associated with implementation problems. In this 'deductive', 'linear' translation, which shows to be far dominant in practice, strategy is presumed as known and the BSC is instrumentally interpreted as a control instrument to translate this strategy into operational terms. On the other hand, the organizational translation, which is relatively more closely associated with the discipline of management, interprets the BSC as a strategic learning system. In this 'inductive', holistic interpretation, hypotheses embedded in a business units' strategy are tested, validated and modified to result into strategy-focused and aligned organizational change.

In spite of the fact that the BSC is an interesting and potentially powerful management tool that can positively influence organizational behavior and enhance company performance, the findings of this study suggest that managers should be careful of the requirements for its implementation and use. Particularly in complex ambiguous situations different professional groups may interpret and use the BSC in various ways. BSC implementation may induce both functional and dysfunctional behavior and does not guarantee improved company performance.

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Uncovering the Pre-Dispositional Roots of Job Satisfaction

Hisham Hamid Hawass
*Business Administration,
 Faculty of Commerce in Damietta,
 University of Mansoura
 Egypt*

"He who lives in harmony with himself lives in harmony with the universe"

Marcus Aurelius

1. Introduction

Understanding the determinants of Job satisfaction has long been the main focus of academic research in various business fields including; marketing, human resource management and organizational psychology. Business managers consider job satisfaction as one of the most important employee attitudes because of its positive work-related outcomes such as enhanced employee's job performance, organizational commitment and citizenship behaviour. In service-oriented firms, a satisfied employee may be the facilitator of customer-orientation implementation. A number of studies have found a positive relationship between employee satisfaction and customer satisfaction. In this context, the positive emotions and attitudes towards an organization motivates the employee to kindly treat customers simply because they are the ultimate source of organization success.

The vast majority of satisfaction studies has focused on work characteristics which may induce positive attitudes towards the organization such as organizational culture, structure, leadership style and pay. This research stream assumes that employee attitudes are influenced by a number of environmental stimuli in which managers have to carefully embody within the organizational system. Although many of the assumptions of the job characteristic model has been empirically proven, I believe that the causes of job satisfaction are also rooted deeply within the psycho-cultural fabric of the individual. This belief is motivated by the findings of recent dispositional research which emphasize that job satisfaction is a stable individual attitude which continues, at the same level, for a long period of time even when the nature of the job slightly changes. Dispositional studies also suggest that job satisfaction correlates with specific personality traits such as extraversion. However, the dispositional research stream has not yet explained the cultural background upon which the relationship between personality traits and job satisfaction occur. In other words, it ignores the role of cultural values in shaping personality traits which, in turn, affect employee attitudes and behaviours. This is possibly due to the shortage in organizational behaviour studies which focus on geographical areas other than North

America. Thus, the dispositional perspective of job satisfaction deserves more attention whilst focusing on the cultural dimension of the society under examination.

The purpose of this study is twofold. First, it provides a theoretical examination of the concept of job satisfaction, its antecedents and consequences. The study also theoretically examines the personality psychology literature in general, and the big five model of personality in particular while emphasizing the relationship between personality and job satisfaction. The study provides a theoretical analysis of the Egyptian culture as an example of a distinctive Middle Eastern culture based on Hofstede's analysis of cultural values (1980). Second, the study conducts an empirical analysis of the relationship between personality traits and job satisfaction in the context of the Egyptian pharmaceutical salesforce. The study, hopefully, sheds a light over the cultural differences which explain the way personality traits may relate to satisfaction in a cultural context that differs in many respects from that of the United States. The cultural analysis of Egypt is conducted to add more depth in the reasoning of the hypothesized relationship between personality and job satisfaction.

2. Literature review

2.1 Job satisfaction defined

An individual's attitude represents his affective and cognitive evaluation of the entity in question. The affective component of an attitude describes the feelings (e.g., love and hate) a person forms towards a specific object. On the other hand, the cognitive aspect of an attitude represents the set of beliefs and values upon which the individual forms his evaluation to the object. For example, wine may not generate positive attitudes in conservative Islamic countries because of the religious teachings which prohibit drinking. In this context, the affective and cognitive aspects of attitudes have been found to significantly relate to many individual behaviours (Fisher, 1998). However, the attitude-behaviour relationship is a complex phenomenon to explain. An attitude does not necessarily lead to a specific behaviour unless the individual's intention to do this behaviour is relatively high. A satisfied employee may not choose to improve his productivity level if he does not intend to do so. In this context, Ajzen and Fishbein (1977) emphasize that researchers can detect the attitude-behaviour relationship if they can adequately measure the individual's attitude in question and the set of expected behaviours that may result accordingly. Thus, when evaluating a specific attitude-behaviour relationship, a researcher should indicate the exact focal object in which the attitude is directed to and the correspondent set of expected behaviours. The argument emphasizes that attitudes are deep and multi-faceted concepts. For example, employee commitment is a personal attitude that may be directed towards the organization, co-workers or the supervisors. Besides, organizational commitment can be affective, transaction-based or normative (Meyer and Allen, 1991). This explains the difficulties associated with measuring attitudes and their associated behaviours.

Job satisfaction is an attitude which represents a positive emotional reaction to a particular job (Brief *et al*, 1995). The positive affectivity towards the job results from the cognitive assessment of the actual job outcomes in comparison to those expected (Oshagbemi, 1999 and Locke, 1976). The degree to which the worker perceives that the work environment

fulfils his needs and aspirations influences his emotions towards the organization (Tsigilis et al, 2003 and Dawis and Lofquist, 1984). The definitions of job satisfaction agree that the cognitive element of such an attitude precedes and influences the emotional element.

Job satisfaction can be evaluated from both a holistic/general perspective and a multi-faceted perspective (Cranny et al, 1992). General job satisfaction demonstrates the employee's emotional reaction to the overall work environment. On the other hand, the multi-faceted perspective emphasizes that an employee can be satisfied with certain aspects of the work environment. For example, an employee may feel satisfied with pay, co-workers, leadership style and promotion packages (Friday and Friday, 2003). The multi-faceted perspective implies that job satisfaction is a complicated attitude which may positively or negatively change according to modifications in some work-related characteristics (Baran, 1986). However, dissatisfaction with certain aspects of the job may not ruin the employee's overall job satisfaction when there are other aspects in the job that can still please him (Kalleberg, 1977). In this sense, the maintenance of balance between what satisfies and dissatisfies an individual at work can help him maintain an overall job satisfaction.

Job satisfaction can also be considered a highly personal job attitude (Scott and Judge, 2006). It reflects the emotional and cognitive evaluation of the activities which constitute a man's self-identity. People are defined by what they do. A high level of job satisfaction may imply that the individual strongly feels that the job does not only fulfill his needs, but also clearly defines him in the way he wishes the world to know him.

2.1.1 The outcomes of job satisfaction

2.1.1.1 The behavioural outcomes

It has been emphasized that attitudes can direct an individual to commit certain behaviours provided that he strongly intends to do these behaviours. The business and psychology literature have reported significant relationships between job satisfaction and many constructive work-related behaviours. Hereunder is a theoretical examination of the potential behavioural outcomes of job satisfaction;

1. Job Performance

The relationship between job satisfaction and performance has been extensively investigated in organizational psychology. However, there is a controversial debate over the variable which influences the other (Brown and Peterson, 1993 and Bagozzi, 1978). An extensive line of research proposes the classical attitude-behaviour consequence and provides an evidence that satisfaction is an antecedent to performance. The underlying logic is that a satisfied employee may be motivated to improve his work performance in order to continuously control the factors which keep him satisfied such as pay and rewards (Gu and Siu, 2009). This line of thought is deeply rooted within the premises of the human relations movement which attempts to increase employees' productivity by satisfying their needs (Vroom, 1964). In contrary, another line of research emphasizes that individual performance causes individual satisfaction (Petty et al, 1984). Their underlying logic is that the conscientious employee derives satisfaction from his internal motivation to work and the successful implementation of work objectives (Christen et al, 2006 and Deci and Ryan, 1985).

Judge et al (2001) have portrayed multiple models which explain the potential nature of the satisfaction-performance relationship. They have pointed to research that investigate the potential reciprocal relationship between both variables. In this context, high performance leads to job satisfaction which, in turn, motivates the employee to enhance his work performance. This research model has been criticized for the lack of theoretical explication of the dynamics upon which this reciprocal relationship occurs. Besides, Judge et al have presented a different model which assumes that the satisfaction-performance relationship is moderated by other variables. For example, pay has been regarded as a strong moderator which strengthens the impact of performance on satisfaction. Performance will not influence satisfaction unless performance is linked to pay and rewards. In a different context, self-esteem has also been found as a strong moderator. Job performance can influence satisfaction when the performer enjoys a high level of self-esteem. In the absence of self-esteem, hard work may not be a source of job satisfaction.

Regardless of the causal direction between satisfaction and performance, a considerable body of research has found a significant positive association. Moreover, the strength of association between both variables is substantiated when the measurement of performance includes behaviours that are not usually reflected in performance appraisals such as citizenship behaviours (Organ, 1988). This argument opens the door for the inclusion of other productive work behaviours which may enrich the employee's contribution to improved organizational effectiveness.

2. Employee Citizenship Behaviour

According to Organ (1988, P.4), organizational citizenship behaviour OCB is an "individual behaviour that is discretionary, not directly or explicitly recognized by the formal reward system, and in the aggregate promotes the effective functioning of the organization". The employee devotes extra unpaid time and effort in order to successfully implement organizational objectives. This productive behaviour is expected to improve organizational effectiveness, although empirical research is still needed to uncover the nature of the relationship between OCB and organizational effectiveness.

A number of research studies has found a positive association between job satisfaction and employee citizenship behaviour (Wagner and Rush, 2000; Kemery et al, 1996 and Moorman, 1993). In this context, Murphy et al (2002) have found that job satisfaction strongly correlates with the three behavioural components of OCB, namely; time devoted to the fete, number of committees joined and attendance at staff socials. Thus, a satisfied employee will be glad to commit extra effort to maximize the efficiency of organizational operations. Their findings agree in substance with that of Organ (1988) which emphasize that human resource managers should look beyond traditional job descriptions and performance appraisal contents in order to uncover the actual effects of satisfaction on employees' constructive activities inside the organization.

3. Employee Turnover

A wide research body has empirically found that job satisfaction is negatively associated with employee's intention to leave the organization (Lambert et al, 2001; Kohler and Mathieu, 1993 and Williams and Hazer, 1986). Singh and Loncar (2010) have found that satisfaction with pay level, structure and raises is negatively related to employee turnover. Further, the study

indicates that the overall employee satisfaction with work environment is a stronger influencer on employee's intention to leave than pay satisfaction. Their findings recommend that managers should put into consideration pay and other work-related stimuli in order to better keep their employees inside the organization. However, in their analysis of salesforce withdrawal behaviours, Futrell and Parasuraman (1984) emphasize the role of employee performance in moderating the relationship between job satisfaction and turnover. In the context of low performing salesmen, job satisfaction appears to have a strong effect on the employee's decision to leave the organization. On the other hand, satisfaction appears to have a less impact on high performers' decision to leave. Their findings imply that low performers may not quit the organization if they are satisfied with the work environment. In this sense, job satisfaction motivates low performers to keep working in the organization which, in turn, may have adverse impact on organizational effectiveness. The findings emphasize the importance of classifying employees according to performance levels when investigating the effects of employees' attitudes on work behaviours.

Job satisfaction has also adverse effects on different withdrawal behaviours including; lateness, absenteeism, grievances and decision to retire (Zeffane et al, 2008 and Saari and Judge, 2004). Less satisfied employees are more prone to lateness and absenteeism than those satisfied.

2.1.1.2 The attitudinal outcomes

An extensive line of research has empirically proven the significant impact of job satisfaction on different constructive work-related behaviours. Interestingly, job satisfaction can also initiate new positive employees' attitudes towards their organizations. The argument agrees in substance with studies which focus on the analysis of satisfaction-commitment relationship.

Organizational commitment is defined as 'the relative strength of an individual's identification with or involvement in a particular organization' (Porter et al, 1974; P. 604). Accordingly, the committed employee strongly believes in the organization's values and shows a high level of loyalty to its objectives. He is willing to exert an extended effort in order to serve and implement organizational strategies. It should be noted that Porter et al's definition focuses on the affective dimension of organizational commitment. Further commitment studies have emphasized the multi-dimensionality of the organizational commitment construct (Jaros *et al*, 1993; Mayer and Schoorman, 1992; O'Reilly and Chatman, 1986). In this context, the most popular conceptualization of organizational commitment is that of Meyer and Allen (1984). They view organizational commitment as a complicated psychological state which develops through three main dimensions. The affective dimension emphasizes the extent to which the organization represents a great personal meaning to the individual. This dimension corresponds in meaning to porter et al's conceptualization of organizational commitment. Second, the continuance commitment dimension shows the extent to which an employee prefers to stay at work because of the scarcity of available job choices. Commitment is the result of the economical calculation of job-related profits and losses. In this sense, Continuance commitment is an artificial organizational commitment that does not involve positive affective attitudes toward the organization. This, in turn, can negatively influence employee performance and organizational effectiveness (Hawass, 2011). Third, normative commitment is the degree to which an individual prefers to stay as a return of favour to the organization which has

contributed to his overall well-being (Meyer and Herscovitch, 2001). From the employee's perspective, staying in the organization is the right thing to do (Marsh and Mannari, 1977).

The causal direction of the satisfaction-commitment relationship is a controversial topic in organizational behaviour research. An extensive line of research demonstrates that job satisfaction boosts an employee's commitment to the organization (Jernigan et al, 2002; Feinstein and Vondrasek, 2001 and Gaertner, 1999). In their analysis of a group of American sales people, Boles et al (2007) note that different aspects of job satisfaction have varying relationships with affective commitment. Interestingly, satisfaction with work better predicts affective commitment than satisfaction with pay and promotion. Their findings reveal that relationships differ according to gender responses. Moreover, Yilmaz (2002) conducted a mail survey on sales men in 1181 new-car automobile dealerships and found that both intrinsic and extrinsic job satisfaction positively affect job satisfaction, although the intrinsic dimension plays a stronger role in this context. The findings also reveal that the relationship between satisfaction and commitment is moderated by career stage.

On the other hand, a number of studies has revealed an inversed causal direction of relationship between organizational commitment and satisfaction (Bateman and Strasser, 1984). Their underlying logic is that organizational commitment contains positive emotionality towards the organization which may reinforce an individual's sense of satisfaction with various work-related aspects.

2.1.2 The antecedents of job satisfaction

The valuable behavioural and attitudinal outcomes of job satisfaction have motivated scholars in diverse academic disciplines to uncover the determinants of job satisfaction. The extant research has, generally, attributed job satisfaction to two main groups of factors, namely; personal/ demographic characteristics and work-related characteristics.

2.1.2.1 The personal characteristics

The relationship between age and job satisfaction has received a wide academic interest. Research in industrial psychology has consistently found that older workers tend to be more satisfied with their jobs than younger ones (Bilgic, 1998; Rhodes et al, 1983; Wright and Hamilton, 1978 and Siassi et al, 1975). Mottaz (1987) attributes the positive relationship between age and satisfaction to the fact that older employees develop more work experience which enables them to get more satisfying jobs. Besides, older workers who spent more time in their organizations are better able to internalize organizational values than younger employees. The internalization or accommodation of work values enables the individual to accept work conditions and be more satisfied. However, Luthans and Thomas (1989) emphasize a curvilinear relationship between age and satisfaction. At a specific point of time, older workers may be overwhelmed with increasing job duties and responsibilities which cause stress and fatigue. In this context, Oshagbemi (2003) calls for more attention to the type of job while analyzing the age-satisfaction relationship. Indeed, one may wonder about the nature of the relationship between age and satisfaction in creativity-based jobs versus physical jobs. Creativity-based jobs usually require ground-breaking cognitive abilities and an extended work experience from which intuitive thinking is derived. On the other hand, logic may tell that jobs which require an appropriate level of physical fitness may not be satisfying for elders. Further research is needed to solve this dilemma.

The analysis of the effects of gender differences on job satisfaction has also received an equal attention (Mason, 1995). However, the nature of the relationship is complicated and confusing. There is no general consensus over which sex is usually more satisfied than the other at work. Some studies have even found no significant association between the two variables (Smith and Plant, 1982 and Bledsoe and Haywood, 1981). Testa and Mueller (2009) argue that the differences between males and females about job satisfaction is due to differences in socialization orientation. Women usually value concern for others and selflessness which, in turn, motivate them to happily accept jobs that promote supportive and constructive interaction with colleagues. On the other hand, the socialization orientation of men is generally directed towards the value of self-expansion and assertion. Accordingly, work-related characteristics such as pay and leadership style may be valued differently by men and women which causes differences in their levels of job satisfaction.

Length of service has also been found to positively relate to job satisfaction (Okpara, 2004). The extended length of service provides an emotional support from which employees feel protected against job loss (Abraham and Medoff, 1984). The employee's feeling of job protection contributes to job satisfaction. In this context, Oshagbemi (2000) compared between British academics who usually move from one university to another and those who prefer to stay for longer periods at their current universities. The findings reveal that academics who stay at their universities for longer periods are more satisfied than those who frequently change universities. An extended length of service in a particular location may also allow employees to adapt to the current organization's values and accept its norms and traditions. On the other hand, the continuous change of locations may not enable the employee to get accustomed to the organization's traditions and social networks which might cause less satisfaction.

A number of research studies has also found different other personal determinants of job satisfaction such as rank (Holden and Black, 1996), educational level (Rogers, 1991) and the quality of the employee's marital status (Bures et al, 1996). These demographic studies have provided an empirical evidence that job satisfaction may be attributed to differences in the personal characteristics of the employees. However, further studies have empirically revealed that work-related characteristics are more influential determinants of job satisfaction than the personal characteristics (Carlan, 2007). Their findings imply that the nature of the job context itself deserves more investigation than the personal characteristics of the employee while predicting job satisfaction (Abdulla et al, 2011).

2.1.2.2 The work-related characteristics

The job characteristics model (Hackman and Oldham, 1976) is one of the earliest attempts to investigate the environmental determinants of job performance and satisfaction. It is built on the assumption that improved work conditions and enriched job contents can influence the employee's positive responses to the job and the organization as a whole. The model defines five job characteristics. First, skill variety represents the extent to which a job requires a collection of different skills and talents to effectively implement its objectives. Second, task identity is the degree to which a job consists of an identifiable piece of work with determined outcomes. Next, task significance reflects the extent to which the job has a profound impact on the lives of others inside or outside the organization. Fourth, autonomy is the degree of freedom that a job grants for an employee in terms of scheduling the work and determining the procedures required to implement the work objectives. Finally, job

feedback is the degree to which a job allows the employee to get an immediate response concerning his work performance and the relevant accomplishments.

The job characteristics model considers three psychological states as moderators between job characteristics and the expected outcome variables. In the absence of any of the three psychological states, the relationship between job characteristics and satisfaction and effectiveness is weakened. The first psychological state is to feel that the work is meaningful and worthwhile. Secondly, the employee should also accept the fact that he is responsible for the activities and outcomes of his work (i.e., personal responsibility). Finally, the employee should develop an appropriate knowledge concerning the results of his own job.

According to Hackman and Oldham (1976), skill variety, task identity and task significance affect the individual's feeling of meaningfulness of work. Whereas autonomy affects the individual's experience responsibility. Finally, job feedback is found to influence the employee's knowledge of the results of his job-related activities. These relationships are presented in the following motivating potential score formula:

$$MPS = (\text{skill variety} + \text{task identity} + \text{task significance} / 3) \times \text{autonomy} \times \text{feedback}$$

The job characteristics model has been empirically tested and proven in multiple job contexts (Faturochman, 1997; Fried and Ferris, 1987 and Loher et al, 1985). Further research has also identified several environmental characteristics which influence employee's attitudinal responses to the organization. Hereunder, is a categorization of other work-related characteristics;

1. Organizational Culture

According to Kilmann et al (1985; P. 5), organizational culture is the 'shared philosophies, ideologies, values, assumptions, beliefs, expectations, attitudes and norms that knit an organization together'. The degree to which the employee's values correspond to the premises of the organization's culture predicts his attitudes towards the organization (O'reilly, 1989). For example, a creative employee who works in an organization which encourages a culture of innovativeness is more likely to be satisfied with his job than that who works in a bureaucratic organizational setting. A number of studies has found a positive association between organizational culture and job satisfaction. In an analysis of three Taiwanese companies, Silverthorne (2004) investigated the relationship between three cultural orientations, namely; bureaucratic, innovative and supportive cultures, and job satisfaction. He found that bureaucratic organizations have a great problem with maintaining job satisfaction than the other cultural orientations. In a similar context, Lund (2003) adopted Cameron and Freeman's (1991) typology of organization cultures to investigate the type of culture which affects job satisfaction. According to Cameron and freeman, organizational cultures are usually located within one of four main categories. First, the clan culture is one which encourages participation, team work and interpersonal cohesion. Second, the adhocracy culture stresses on the values of creativity, flexibility and adaptability. Third, the hierarchical culture emphasizes the importance of order, rules, regulations and uniformity. Finally, the market culture is a goal-oriented culture which opts for the creation of competitive advantage and market superiority. It should be noted that both clan and hierarchical cultures are more oriented towards smoothing activities and functional integration (i.e., internal maintenance) whereas adhocracy and market cultures

are externally positioned for competition and market differentiation. The findings reveal that clan and adhocracy cultures are more strongly linked to job satisfaction than those of market and hierarchy. The clan culture is strongly associated with job satisfaction because it stresses on the importance of employee interdependence and spreading an environment of mutual help and assistance. On the other hand, the market culture is found to be less associated with job satisfaction because it encourages a sense of individuality and independence. Interestingly, the study was held in the U.S.A whose culture embraces individualism (Hofstede, 1980). Gounaris (2008) surveyed a sample of employees in large Greek hotels to uncover the relationship between internal market orientation and job satisfaction. In this sense, internal market orientation is a cultural value which emphasizes the importance of satisfying employee needs first in order to effectively satisfy the end customers. This cultural orientation is found to positively relate to job satisfaction and, also, moderate the relationship between job satisfaction and empowerment and participative management.

Business ethics studies have also found an association between the organization's emphasis of an ethical culture and job satisfaction. Koh and Boo (2001) found that job satisfaction is positively related to top management support for ethical behavior and the organization's ethical climate. Further, Vitell and Singhapakdi (2007) found that the strong institutionalization of an ethical climate should strongly lead to employees who are committed to their organization, satisfied and co-operative.

2. Leadership Style

A leader is a manager who is efficient at managing people and directing them through social interactions to successfully implement organizational goals (Skansi, 2000). The organizational leader can adopt several types of leadership styles. Leadership styles may include the participative, strategic, charismatic, transformational, transactional or ethical styles. However, it should be noted that the right leadership style depends on the organizational setting in which the manager works within. Lok and Crawford (2004) also emphasize the role of national cultural differences in determining the right leadership approach. They compared between management leaders in Australia and Hong Kong and found differences in their styles which are considered successful in their respective cultures.

Numerous studies have found a positive relationship between the leadership style and employee satisfaction. Their findings are logically justified because the successful implementation of organizational objectives largely depends on the leader-member relationship. A good leader is one who can efficiently get the maximum work output from his workers by exercising motivation, encouragement, providing honest job feed back and careful goal-setting. In this sense, the constructive relationship between leaders and their employees motivates employees to be better performers and contributors to their organizations and thus, affect their attitudes towards the organization. Rad and Yarmohammadian (2006) empirically investigated this relationship in the context of Iranian university hospitals and emphasized that employee dissatisfaction may be caused by leadership's lack of respect and recognition of employee performance. Moreover, Iverson and Roy (1994) noted that the transformational leader's orientation toward employee empowerment and careful vision crafting often lead to an increased level of employee satisfaction and organizational commitment.

2.2 National cultural differences and personality effects: Missing key words

Figure 1 summarizes the key antecedents and outcomes of job satisfaction which have been empirically examined in relevant research. The main research stream attributes the causes of job satisfaction to both personal and work-related characteristics. However, these research studies have not considered the cultural context within which employees form their work-related attitudes. They assume that culture is a constant variable which mistakenly implies that the antecedents of job satisfaction in one geographical area are the same in another. In this sense, I do not argue that there are no similarities between nations in terms of the causes of job satisfaction, but, I believe that these causes may differ in terms of relative importance for employees across the globe.

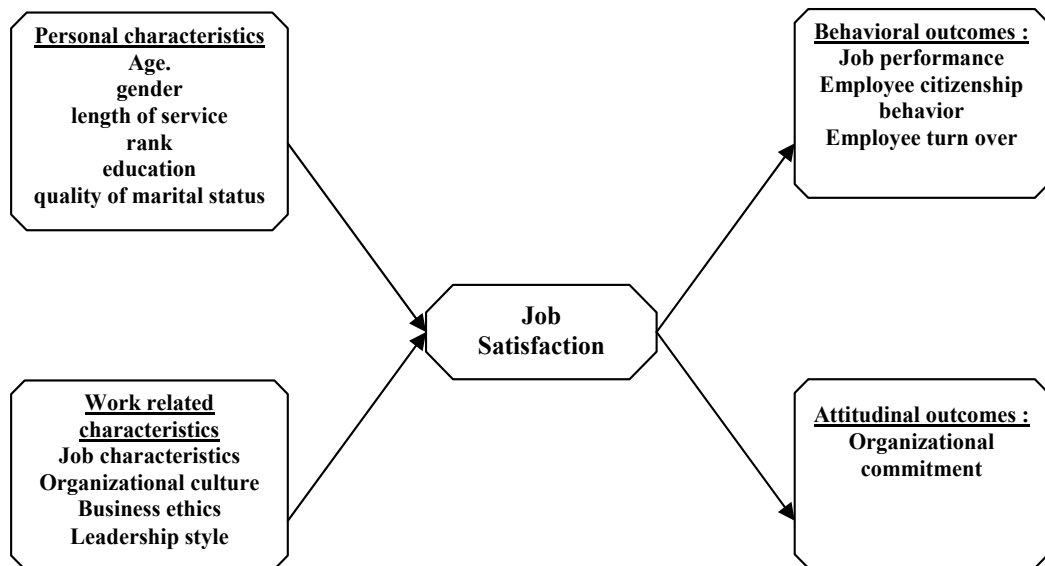


Fig. 1. A graphical summary of the determinants and consequence of job satisfaction

Few studies have provided an evidence that national cultural values play an important role in shaping individuals' attitudes toward work. Money and Graham (1999), compared between the determinants of job satisfaction in the context of American and Japanese sales men. They found that satisfaction, in the American context, is mainly driven by the level of pay. On the other hand, satisfaction, in the Japanese context, is strongly influenced by the individual's relationship with his colleagues and happiness at work. This clearly agrees with the collectivistic nature of the Japanese culture that supports value congruence among group members and social participation. In a similar context, Noordin and Jusoff (2010) compared between middle level managers in Malaysia and Australia. Their study reveals the existence of differences between the two groups on the level of individualism and collectivism and that Australian managers appear to be more satisfied than their Malaysian counterparts. Eskilden et al (2010) provided a comprehensive analysis of the cultural correlates of job satisfaction across 22 nations based on Hofstede's theory of cultural dimensions. Their findings emphasize the impact of cultural differences on the levels of job satisfaction across the tested nations. The dimensions of masculinity and uncertainty avoidance were found to be the strongest predictors of job satisfaction. Westover and Taylor

(2010) explored the relationship between job satisfaction and its key intrinsic and extrinsic determinants in West Germany, Great Britain, the USA, Hungary, Norway and Israel. They used non-panel longitudinal data which cover a wide span of time (1989-2005). Their findings indicate clear differences in the determinants of job satisfaction across the examined nations. However, they found that intrinsic rewards and work relations with management explain the most variance in the respondents' job satisfaction, whereas work relations with co-workers has a weaker impact on job satisfaction.

The previously discussed research findings call for more attention to the analysis of the cultural background of the tested samples because Job satisfaction is a universal attitude with culture specific determinants that vary across nations.

The main research stream in satisfaction has also been criticized for not considering the dispositional aspects of personality traits which could affect employee attitudes. Although a growing body of research in personality psychology has found an evidence that satisfaction can be partially explained by several personality traits. Judge and Larsen (2001) provided a detailed theoretical review on the dispositional aspects of job satisfaction. They found that job satisfaction is influenced by the individual's positive and negative affectivity levels. In this context, positive affectivity represents the extent to which the individual consistently enjoys high energy, and enthusiasm whereas negative affectivity represents the individual who is deliberately distressed and nervous. Logically speaking, An individual with high positive affectivity is highly likely to perceive job conditions in a more positive manner and enjoy higher levels of job satisfaction than those who suffer from generally dark affection. Besides, they found that job satisfaction can also be affected by the individual's core self-evaluations. Core self-evaluations are the premises that individuals hold about themselves (Judge and Bono, 2001). The construct consists of four main dimensions. First, self-esteem refers to the individual's self-acceptance and self-respect. Second, generalized self-efficacy represents the extent to which an individual thinks he can perform specific courses of action in different situations. Third, neuroticism refers to the degree to which a person generally feels depressed, nervous and anxious. Neurotics are usually more prone to negative affects than others. Finally, locus of control represents the perceived degree of control in life. Internally controlled individuals are those who believe that success in life is the result of one's perseverance at work. On the other hand, externally controlled individuals are those who believe that success or failure in life is attributed to external powers and luck.

A number of research studies has also found an association between emotional intelligence and positive work attitudes such as job satisfaction and organizational commitment (Chiva and Alegre, 2008). Emotional intelligence is defined as 'the ability to perceive emotions, to access and generate emotions so as to assist thoughts, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth' (Mayer and Salovey, 1997; P. 5). It is considered a personality trait (Schutte and Malouff, 1999) which consists of three mental abilities. First, the ability to appraise and express emotions in the self and others. Second, the ability to manage one's emotions and the emotional reactions of others. Third, the ability to use emotions in adaptive ways such as in flexible planning, creative thinking and motivating others. In this sense, Carmeli (2003) found that emotionally intelligent managers are more emotionally committed to their organizations and satisfied with their job because of the three mental processes that keep them tolerant with themselves and others.

A growing research trend has also focused on the big-five model of personality traits to predict employee attitudes toward organizations. The big five model is the product of successive research work that originated in the early years of the last century (Hawass, 2011). Allport and Odbert (1936) have used an unabridged English dictionary to make a list of personality-relevant attributes. They have listed 18000 terms which could define the personality attributes of individuals. Following the work of Allport and Odbert, several researchers have attempted to develop an organized categorization of these terms to obtain a comprehensive taxonomy of personality traits (Tupes and Christal, 1961 and Fiske, 1949). Their great efforts have yielded a five-factor structure of personality traits; a) extraversion, b) agreeableness, c) conscientiousness, d) neuroticism and e) openness to experience which is considered representative for the personality traits of human beings across the universe. Each factor or dimension of personality includes a large number of distinct personality characteristics.

Extraversion represents the talkative, assertive, energetic and enthusiastic individual. Extroverts usually enjoy positive emotions and can effectively develop strong interpersonal ties with others (Bakker *et al*, 2006). Accordingly, they are closely attached to social events in which they can spend more time with friends (Judge and Ilies, 2002). It would be logical to assume that extroverts are more satisfied with their jobs than non-extroverts because of the power of positive emotions which affect their reaction to different work stimuli (Connolly and Viswesvaran, 2000).

On the other hand, a neurotic is an individual who is severely affected by negative life events. They are usually depressed, anxious and overwhelmed with thoughts concerning different life situations. In the middle of a problem, a neurotic applies a disengagement coping tactic (Conner-Smith and Flachsbar, 2007). Disengagement coping refers to the individual's attempt to avoid a problem through withdrawal and escaping from the causes of the problem. Unfortunately, this tactic inflates problems to the degree to which they can not be solved. In this respect, Hawass (2011) found that neuroticism is negatively associated with Egyptian salesmen's commitment to their organizations even if alternative job choice are scarcely available. Further, Connolly and Viswesvaran (2000) emphasized that neuroticism is the prime input of negative affectivity which, in turn, badly influences job satisfaction.

The agreeable are helpful, forgiving and trusting people. They demonstrate acceptable work behaviours and value friendships even more than work and career success (Judge *et al*, 1999). It has been noted that agreeables enjoy greater life satisfaction and happiness than non-agreeables (McCrae and Costa, 1991) because 'they have greater motivation to achieve interpersonal intimacy, which should lead to greater levels of well-being' (Judge *et al*, 2001; P. 531). Job satisfaction can be considered a component of an individual's overall life satisfaction. In this sense, agreeable employees may be satisfied because of their enhanced sense of well being resulted from the social network of colleagues developed through work.

Conscientiousness is considered the strongest predictor of performance across jobs because it refers to the degree to which the individual perseveres until the work is successfully accomplished (John and Srivastava, 1999 and Barrick and Mount, 1991). The conscientious employee is a reliable individual who works hard to get results. In this context, Behling (1998; P. 81) gives a realistic example of a conscientious subordinate who is strongly committed to the organization's work environment:

"He arrived at our first meeting with a typed copy of his daily schedule, a sheet bearing his home and office phone numbers and addresses. At his request, we established a time table for meeting for the next four months. He showed up on time every time and carefully listed tasks and due dates. He questioned me exhaustively if he didn't understand an assignment and returned on schedule with the completed work or with a clear explanation as to why it wasn't done."

Based on the conscientiousness-performance relationship, the conscientious employee could also be more satisfied than the non-conscientious because high performance leads to increased intrinsic and extrinsic rewards which, in turn, contributes to employee happiness at work (Organ and Lingl, 1995).

Finally, openness to experience refers to the extent to which an individual is imaginative, creative and original. Creative scientists tend to be more loyal to their professions than their organizations because job-related accomplishments are considered a matter of well-being and pride (Mumford et al, 2000). The relationship between openness to experience and job satisfaction is confusing partly because work experiences may not always be positive which may negatively influence the creative individual's well-being and sense of pride (Judge et al, 2002).

In general, it appears that a number of studies has found an association between the big five model of personality and job satisfaction. However, the dispositional research in job satisfaction can be criticized in one respect. Almost all personality-satisfaction studies cover North-American samples. These studies did not explain whether findings may differ in variant cultures. Besides, these studies did not even attempt to explain the cultural values of the society which may affect the personality-satisfaction relationship.

According to McCrae (2000), the relationship between personality traits and culture can be investigated at three levels of analysis. First, the transcultural level is concerned with the universality of traits across cultures. It aims to investigate whether universal age and gender differences do exist. In this regard, research in the big five model of personality traits has enabled scholars to observe differences in traits across national cultures (Costa et al, 2001). Second, the intracultural level explores culture-specific expressions and investigates the operational meanings of specific traits in different cultures. as McCrae (2001) put it, the meaning of openness to experience, for example, in Castilian Spanish reflects the traits of 'extravagant, eccentric and Bohemian) while in other cultures it may emphasize the intellectual interests of the individual. In fact, it would be important to construct culture-specific big-five models that cover different cultures such as the Middle-East, although studies have found consistencies between the Middle East and other nations (Hawass, 2011). These culture-specific models would allow researchers to attain more accurate results concerning the impact of personality on individuals' attitudes in different cultures. Finally, the intercultural level aims to explore the cultural differences in traits by attempting cross-cultural studies. Costa and McCrae (2004) found that cultures may have unique collections of personality traits which might differ from those of other cultures.

The current study aims to investigate the personality-satisfaction relationship based on the context of the Egyptian culture. The next section provides a detailed theoretical analysis about the Egyptian culture based on Hofstede's cultural dimensions theory. This should allow for understanding how and why specific personality traits may relate to satisfaction in a culture that differs, in many respects, from that of North America. It is not a cross-cultural

study, but it theoretically highlights the cultural differences between Egypt and America, as an example of a sax-Anglo culture, which may lead to differences between personality study findings in both countries.

2.3 The Egyptian culture: Insights from Hofstede's Theory of Cultural Values

In an analysis of the cultural values that shape the behaviour of employees in 67 countries, Hofstede (1980; 1984) succeeded in exploring the cultural differences among societies. According to Hofstede, nations differ in four major cultural dimensions¹:

1. Individualism Vs Collectivism

The 'individualism Vs collectivism' dimension measures the extent to which society members are highly dependent on each other (i.e., interdependent). In individualistic cultures, individuals are strongly tied to their direct families and are concerned with their individualistic goals. On the other hand, in collectivist cultures, participation between the individual and other social entities (e.g., the broader family and friends) is considered a life living key word.

2. Large Vs. Small Power Distance

The 'large vs. small power' dimension describes whether a society may accept the unequal distribution of power in their organizations. In large power distance societies, the unequal distribution of power is widely accepted through their job hierarchies. In contrast, in small power distance societies, the unequal distribution of power is highly disregarded especially when it is not legally or reasonably justified.

3. Strong Vs. Weak Uncertainty Avoidance

The 'uncertainty avoidance' dimension describes the extent to which a specific society is capable for adapting to uncertain or ambiguous situations. In strong uncertainty avoidance societies, individuals prefer to work and live within formalized work systems which provide standardized codes of conduct because they do not tolerate deviance. On the other hand, weak uncertainty avoidance societies include people who prefer more flexible work environments and social systems because they depend more on practice than principles.

4. Masculinity Vs. femininity

The 'masculinity vs. femininity' dimension is concerned with the degree to which a society distributes social roles according to gender differences. In this context, masculine societies prefer material success and are considered achievement-oriented whereas feminine societies are more sensitive to the quality of life and are considered relationship-oriented.

Based on Hofstede's theory of cultural values, the Egyptian society inherits a collectivist culture. The supervisor-subordinate relationship is of a parental nature. The Egyptian employee generally obeys his manager's orders out of respect for authority and loyalty to the

¹ This study does not provide a cross-cultural analysis of personality effects on job satisfaction. Rather, it aims to investigate the relationship between personality and satisfaction in the context of the Egyptian culture. Thus, the study points to the cultural specialties of the Egyptian society and tries to discuss how their values might theoretically affect the hypothesized relationship.

organization (Leat and Al-Kot, 2007). Besides, friendship is considered a key word in the Egyptian organizational behaviour. Parnell and Hatem (1999) emphasize that friendship at business is usually prioritized over the task requirements of the job, simply, because the Egyptian culture stresses on the importance of providing distinctive favours to true friends. Hawass (2011) proposes that these culture-bound behaviours are associated with the concept of agreeableness in personality psychology. The agreeable individual is a trusting, forgiving and easy going person who values friendship more than work and career success (Judge et al, 1999). Although the relationship between agreeableness and collectivism has not been maintained in Hofstede's analysis of cultural values and personality traits (1991), the literature description of The Egyptian employee should motivate further research in this concern.

The Egyptians also score high in terms of the power distance dimension of cultural values. In this sense, the Egyptian employee prefers to tolerate his behaviour according to management orders, partly, because of the Islamic teachings which motivate Muslims to strongly support leaders' decisions (Kabastakal and Bodur, 2002). Hofstede and McCrae (2004) have revealed a positive association between high power distance and conscientiousness. According to McCrae (2001), high power distance societies place heavy emphasis on complying with orders and respecting authority which strongly motivate or direct individuals toward perseverance at work.

Concerning the uncertainty avoidance dimension of cultural values, the Egyptians rank higher than Americans and many Western European societies (Hofstede, 1984). They prefer to work within highly formalized and standardized systems. In this respect, heavy formalized systems provide an immunity against the uncertain future. Hawass (2011) proposes that this cultural dimension is perfectly compatible with Egypt's high power distance values which favour parentalism at work and strict abidance by rules. Further, it should be noted that parts of the Islamic teachings ask the true believers to abide by Quran without reasoning because philosophical questioning might lead to confusion and distortion of the purity of their souls. Thus, working within a highly defined business system is highly favoured in the Egyptian society. Hofstede and McCrae (2004) have noted that neuroticism is positively associated with uncertainty avoidance. Hawass (2011) reveals that "If the Egyptian society scores high in the neuroticism continuum, this may be due to frustrations concerning the bad economic conditions and corrupt political systems which have recently motivated Egyptians to revolt and seek comprehensive change". The Egyptian revolution in January 2011 was a last resort from the side of the Egyptian people to end a political system which had put the country in a state of severe economic uncertainty. Thus, neuroticism arises in uncertainty avoidance societies because of the growing fear from future uncertain events and the escalating need for an organized working system which erases those fears.

Finally, the Egyptian society is characterized by a moderate masculine culture. Masculine societies are more achievement-oriented and prefer richer job contents by which individuals maintain their career status. Although the cultural dimension of masculinity may conceptually relate to the conscientiousness aspect of personality, Hofstede and McCrae did not find a significant association between them.

3. Hypothesis development

This study aims to uncover the personality traits associated with job satisfaction in the Egyptian context. Egypt inherits a culture that differs, in many respects, from that of

America, for example. The study hypothesizes that specific personality traits may influence job satisfaction because of the cultural values that differentiate its people from those of other nations. The study does not offer a cross-cultural analysis of personality effects on satisfaction. Rather, it attempts to theoretically explain how a national culture may influence the personality-satisfaction relationship in organizations.

3.1 Personality traits and job satisfaction: Expected relationships

According to the big five model of personality traits, agreeableness represents the helpful, forgiving and trusting personality. The agreeable employee prefers active socialization with his own colleagues and often regard friendship a priority of higher importance than that of work achievements. It has also been noted that agreeableness may be positively associated with job satisfaction because melting with social groups and the creation of a friendly work environment provides the agreeable worker a greater sense of well-being and personal achievement (Judge et al, 2001). Thus, the positive attitudes that the agreeable person forms regarding his organization basically stems from his success in building a network of trusted friends at work.

From an Egyptian cultural context, the strict obedience to management orders and compliance with rules and written procedures are considered signs of a good employee who commit respectable work behaviour. Besides, individuals who accept to work within the parental supervisor-employee relationship orientation are considered the good people. In many circumstance, the direct objection of managerial decisions is considered a violation of this cultural value and, in turn, may cause a negative response not only in the side of the managers, but also in the side of one's colleagues. These negative responses may badly affect the employee's self-evaluation unless he accepts the parental orders of the manager. Thus, agreeableness is considered a favourable personal trait in Egyptian organizations because it directs one's behaviour to respect orders, trust leaders and sincerely help them to maintain their objectives which would create a satisfying work environment for the employee.

H1: Agreeableness is positively associated with job satisfaction.

The big five model of personality traits emphasizes that the conscientious employee is a hard worker who perseveres until job-related objectives are successfully implemented. The conscientious employee is regarded as a reliable person whose performance records are usually admired by his supervisors. The management appreciation of the conscientious employee's performance is usually interpreted in terms of intrinsic (i.e., emotional appreciation) and extrinsic (i.e., pay and promotion) rewards. Consequently, it is believed that these rewards play an essential role in affecting the conscientious employee's positive attitudes regarding the job (Organ and Lingl, 1995).

From a cultural perspective, high power distance societies, such as Egypt, usually involve employees with higher levels of conscientiousness than those of low power distance societies (Hofstede, 1984). The application of strict organizational rules and formalized systems motivate employees to work hard and enthusiastically implement organizational objectives (Hofstede and McCrae, 2004). Consequently, those employees do naturally deserve rewards for their sincere efforts which, when collected, can lead to enhanced job satisfaction.

H2: Conscientiousness is positively associated with job satisfaction.

Neuroticism represents the anxious individual who is generally depressed and worries a lot about negative life situations. In this sense, neuroticism is considered an input for negative affectivity which is inversely related to job satisfaction. Accordingly, it is logical to assume that a neurotic is more affected by negative work situations which would deeply keep him unsatisfied with his job.

From a cultural perspective, neuroticism rates increase in societies with high levels of uncertainty avoidance. In the Egyptian organization, neuroticism may be the result of unclear organizational systems that do not properly define jobs or determine career prospects. The organizational injustice and corrupt political relationships inside organizations may also infuse higher levels of negative affectivity in the mind of neurotic employees and consequently cause job dissatisfaction.

H3: Neuroticism is negatively associated with job satisfaction.

Finally, extraversion is expected to be positively associated with job satisfaction. The extravert employee enjoys positive affectivity and views the world from a colorful angle. He is an enthusiastic person who enjoys creating friendships. Erdhiem et al (2006) found that extroverts tend to be affectively committed to their organizations because of their general positive emotions which direct them to commit positive attitudes toward their organizations. In this sense, it would be logical to hypothesize that extrovert employees are more likely to experience job satisfaction than non-extroverts.

H4: Extraversion is positively associated with job satisfaction.

4. Data analysis

4.1 Measurements

The study applies a questionnaire methodology to investigate the relationship between personality traits and job satisfaction. The data are obtained from a questionnaire which was used in an earlier study to understand the relationship between personality traits, commitment and job satisfaction (Hawass, 2011).

The study applies the big five inventory measurement scale in order to define the respondents' dimensions of personality traits (John et al, 1991). The big five inventory scale consists of 44 items or short phrases which describe the trait adjectives that constitute the personality of the respondent. It uses short phrases to eliminate the ambiguity associated with understanding complicated single terms. These items have been accurately translated into Arabic in co-operation with experienced academics in the fields of English linguistics and Psychology. For the purpose of the study, the items have been subjected to minor adaptations to the Egyptian culture. These adaptations were considered important in order to better assist and motivate markers to accurately respond. For example, the term 'talkative' in the Egyptian culture is considered an offence or insult to the reader. Therefore, it has been watered-down by means of a short phrase which conveys the core meaning without inflicting any sense of insult humiliation. The short phrase indicates if the marker 'likes to present his or her ideas in a repetitive manner'. In a similar context, the item 'can somewhat be careless' has been translated into Arabic to indicate if the marker 'sometimes

feels careless about things occurring around him/her'. The item 'tends to be lazy' has been translated into 'I generally tend to be slow in doing things'. In the same context, the item 'tends to be disorganized' has been subject to an adaptation to indicate if the marker 'does not care a lot about 'organizing' issues and the arrangement of things'.

On the other hand, job satisfaction is measured using the scale of Jaramillo et al (2006). It measures the extent to which the employee likes the job and prefers to work in the organization. A self-report job satisfaction scale is used in order to figure out what the employee personally feels about the organization.

4.2 Data collection and sample characteristics

Egypt is the most populous country in the Middle East (CIA factbook, 2011). It is considered one of the major labour (white-collar and blue-collar) suppliers to Gulf countries (Latowsky, 1984). In this sense, analyzing Egyptian employees helps both local managers and international managers make better decisions regarding applicant suitability.

The study targets Sales representatives mainly because a salesman's effectiveness is deeply influenced by his personality traits. According to Sojka and Deeter-Schmelz (2008), Affectively oriented sales representatives perform better at work than less affective employees. Affective-oriented sales representatives are more capable of managing their emotions through social interactions and judgments. In a similar context, persistence and enthusiasm are considered key personality traits of considerable influence on salesmen performance (Anselmi and Zemanek, 1997).

The study focuses on sales representatives at the Egyptian pharmaceutical industry. Pharmaceuticals heavily depend on personal selling as a direct marketing initiative to attain sales objectives (Hawass, 2011). Personal selling in the pharmaceutical industry is important because products are of complicated scientific nature and require careful presentation to doctors and chemists who form valuable customer segments.

The study uses an in-depth questionnaire to target sales representatives at six Egyptian pharmaceutical companies. The companies are located in three of the biggest cities in Egypt, namely; Cairo, Alexandria and Mansoura. The author asked a group of five postgraduate students to co-operate in handing these questionnaires to respondents at their companies. The group of five postgraduate students managed to collect completed questionnaires from 119 sales representatives which count for approximately 60% of the salesforce size (the overall salesforce size is 205) in these companies. Table 1 describes the demographic characteristics of the sample.

4.3 Findings

Table 1 displays the means, standard deviations, correlations and reliabilities of the examined scales. The correlation matrix provides an initial support for three of the hypothesized relationships. For example, agreeableness is positively correlated with job satisfaction ($P < .05$). Besides, the table shows that conscientiousness is positively associated with job satisfaction ($P < .01$). It also demonstrates that neuroticism is negatively associated with job satisfaction ($P < .01$). However, $H4$ has not been successfully met in the correlation matrix. A multiple regression analysis would be conducted in order to achieve more accurate findings concerning the way personality traits predicts job satisfaction.

Sample size*	119 respondents
Gender characteristics	
Male	103 respondents
Female	16 respondents
Educational level :	
Bachelor degree	108 respondents
Master degree	1 respondent
Non-university degrees	10 respondents
Age:	
Range	From 23-43 years old
Average age	28 years old

* The data were collected in the three largest cities of Egypt namely: Cairo, Alexandria and Mansoura.

Table 1. Descriptive statistics :

Variables	α	Men	SD	1	2	3	4	5
1- Openness vs extraversion	0.7	14.8	3.6	-	0.19*	0.5**	0.21*	0.2
2- Neuroticism	0.7	14.3	4.1	-	-	0.17	0.07	0.4**
3- Conscientiousness	0.71	12.6	2	-	-	-	0.22*	0.3**
4- Agreeableness	0.7	11.2	2.3	-	-	-	-	0.13
5- Satisfaction	0.69	11.8	2.7	-	-	-	-	-

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level. (2-tailed)

Table 2. Means, standard deviation, correlations, and coefficient alphas of study variables.

A principal component analysis has been performed to examine whether the big five inventory of personality traits (BFI) and job satisfaction are multidimensional scales in nature. This is a necessary step that should precede multiple regression analysis in order to further purify the scales by extracting un-important items which would better improve the quality of analysis predictions. Table 3 shows that the BFI construct is replicable in the Egyptian sample but generates only three pure components and one bipolar component (openness Vs. extraversion). The bipolar component implies that the personality traits of openness to experience and extraversion melt together into one concept. This new concept may be of importance to sales management since that effective sales representatives are those who show social intelligence and the ability to experiment creative selling procedures according to the needs of their customers (Stevens and Macintosh, 2002). On the other hand, table 4 shows that job satisfaction is a uni-dimensional component that tests only the employee's general attitude concerning his job.

A multiple regression analysis has been conducted to better predict the relationship between personality traits and job satisfaction. Table 5 shows that the strongest predictor of job satisfaction is neuroticism ($B = -.374$, $P < .01$) which implies that neurotics are usually non-satisfied employees because of their amplified negative emotions and frustrations about different life situations. The table, also, shows that conscientiousness is positively associated

Construct name	Factor title	Items code	Loading factor (a)	Variance extracted (b)
	(1) Openness vs. Extraversion	origin enthus assevt invent curuous	0.802 0.759 0.688 0.622 0.521	0.1662
	(2) Neuroticism	tense moody worries depress nerous	0.77 0.731 0.633 0.632 0.54	0.144
	(3) Conscientiousness	thoro efficien preserver	0.845 0.621 0.513	0.1233
	(4) Agreeableness	trust forgive help	0.798 0.668 0.603	0.115

(a) Variamax orthogonal rotation and Kaiser normalization converging within 5 iterations

(b) Factor loading below 0.5 are suppressed.

Table 3. The principle component analysis of the big five inventory scale :

Construct name	Factor title	Item code	Loading factor (a)	Variance extracted (b)
(1) Employee performance	Performance	attract knowserve objective markshar knowneed relation contriht inform	0.854 0.834 0.831 0.827 0.815 0.798 0.771 0.538	0.623
(2) Employee satisfaction	satisfaction	satisfid dislike prefer	0.895 0.794 0.634	0.611

(a) Variamax orthogonal rotation and Kaiser normalization converging within 5 iterations

(b) Factor loading below 0.5 are suppressed.

Table 4. The principal component analysis of the job satisfaction scale.

with job satisfaction ($B = .183, P < .05$). The finding clearly supports our hypothesis that conscientious employees are highly likely to be satisfied employees. Hard work usually brings rewards, intrinsic and/or extrinsic, which, in turn, positively influence job

Variable names	The personality – satisfaction model		
	β	t	VIF
Neuroticism	-0.374	-4.441*	1.04
Conscientiousness	0.183	2.118**	1.87
Agreeableness	0.118	1.3888***	1.081
Overall model coefficient of correlation (r)		0.462	
F-ratio		10.141	

* significant at $p < 0.01$

** significant at $p < 0.05$

*** significant at $p = 0.1$

Table 5. The regression analysis of the relationship between personality traits and job satisfaction :

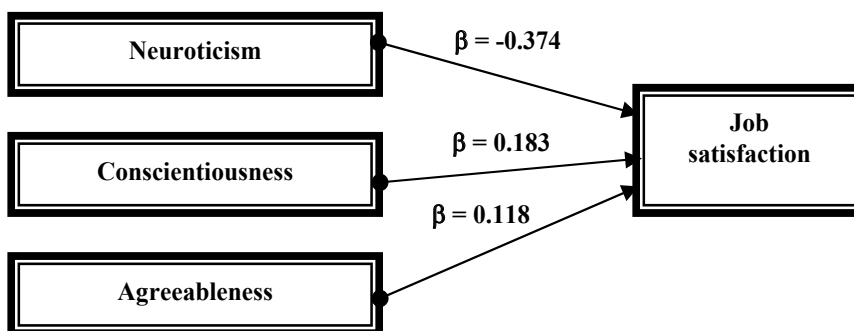


Fig. 2. The personality – satisfaction relationship model :

satisfaction. Finally, the table indicates that the weakest predictor of job satisfaction is agreeableness ($B = .118$, $P < .1$). In this sense, it should be noted that hypotheses 1, 2 and 3 have been met, whereas hypothesis 4 has not been met in congruence with the findings of the correlation matrix (table 2).

5. Discussion

The findings confirm the pre-dispositional roots of job satisfaction. They reveal that the conscientious and agreeable salesmen tend to be generally satisfied with their jobs. The findings also indicate that neurotics are generally less satisfied with their jobs. These findings agree in substance with those of other dispositional research studies held in the United States.

However, the study has also attempted to investigate the cultural background which may influence the personality-satisfaction relationship. Depending on the psycho-cultural analysis of Hofstede and McCrae (2004), it can be argued that a culture; a) shapes the personality traits of the individual and b) forms a strong basis from which these personality traits can actually influence the individual's attitudes regarding job and other issues. In the case of Egypt, it is proposed that high levels of uncertainty avoidance and power distance

shape the Egyptians' personality traits and, consequently, influence their attitudes regarding the job. High uncertainty avoidance societies are usually risk-averse and prefer to work under a heavy institutionalized system of rules and written operating procedures. These standardized working systems motivate individuals to work hard according to roles in order to attain the desired benefits and rewards which, consequently, contribute to the employee's sense of happiness. Besides, recent research has found that conscientious employees tend to be less adaptable to rapid work-related changes (Griffin and Hesketh, 2005) which may also explain why an Egyptian 'conscientious' employee is satisfied with a job in a heavy standardized organizational system. In this sense, rapid work-related changes is a condition which might not be tolerated in a society high in uncertainty avoidance.

On the other hand, the relationship between agreeableness and job satisfaction can also be attributed to the Egyptian cultural values of high power distance and collectivism. In high power distance societies with a collectivist cultural orientation, the individual regards the manager as a parent who deserves respect, commitment and obedience because of his superior skills, qualifications and work experience. In the Egyptian society, agreeableness may be regarded a key personality trait which guarantees success and satisfaction at work. In such cultures, the employee should value friendships at work, develop strong ties with the boss and colleagues and be of sincere help to them, even at the expense of organizational order, in order to gain positive views from the top management. In this sense, it is not preferred to have different point of views, especially, when the opposing employee is at a fairly lower job rank in comparison to the management. Different points of views are not socially tolerated at work and might negatively influence the management's attitudes and evaluations of the employee. Thus, in order to gain social acceptance at work and overall job satisfaction, the employee should consistently show signs of an agreeable personality.

The negative relationship between neuroticism and job satisfaction, in the Egyptian sample, is believed to be associated with uncertainty avoidance values. The need for a clearly defined work system that well presents an appropriate career path for the employee is an Egyptian dream. An old Egyptian proverb effectively describes the true risk-avoidant nature of the Egyptian person by emphasizing that 'what we know is much better than what we don't' (Hawass, 2011). In this context, many reasons can inflate the negative emotions of the neurotic employee such as organizational injustice, corruption and damaged manager-employee relationship. These factors keep the Egyptian 'neurotic' employee in a foggy condition where he feels that job security can easily be compromised. This would, certainly, lead to job dissatisfaction.

5.1 Research implications

It is widely believed that job satisfaction might be of considerable value to organizational growth and development. Satisfied employees can be highly committed to organizational objectives, perform organizational functions more effectively than others and show higher levels of sincere citizenship behaviours. Earlier research studies have emphasized that personal characteristics and work-related characteristics are the dominant antecedents of job satisfaction. However, recent dispositional research has indicated that job satisfaction can also be partially influenced by the personality traits of the individual. This study confirms the dispositional roots of job satisfaction in the Egyptian context. The results imply that the employee's personality plays an essential role in determining the employee's potential for

future job satisfaction. Thus, it is necessary to conduct in-depth personality-based tests to uncover the applicant's true personality traits and investigate their suitability to the organizational values. Furthermore, the study recommends for HR specialists to critically analyze the cultural beliefs of the applicants. The cultural values of the applicant are believed to influence his personality traits and attitudes towards the job. However, this does not mean that an employee with a collectivist orientation can not work at an individualist-oriented organization. Indeed, human beings differ from other living beings in terms of the ability to adapt and change. However, it is the responsibility of managers to educate the new comers about the cultural values of the organization and the country within which it operates. It is necessary to keep employees from different cultures informed with the new cultural values of the hosting society. The cultural education of new comers should allow them to understand differences in social interaction mechanisms. By carefully learning these new social mechanisms, the new employee would be able to adjust his own work-related expectations, and in turn, form his attitudes according to a newly learned code of work-related values. I believe that the cultural education of new comers is a continuing education system that would effectively lead to results through the careful coaching of these employees. In other words, it is not a two-day session conducted at the organization's training center.

5.2 Future research directions and limitations

I strongly suggest that future dispositional research incorporate the concept of cultural values while analyzing the relationship between personality traits and work-related attitudes. National culture differences contribute to the variances in evaluating different life situations among human beings. It is necessary to investigate the dimensions of cultural values that specifically influence the dynamics of personality-attitude relationships among nations. In this sense, future dispositional research should put more attention to cross-cultural analyses to better spot differences in organizational behaviour across nations. Indeed, one of the weakest points in modern organizational behaviour studies is the shortage of having an international focus which deeply affects issues of research generalizability.

The current study is not without limitations. It depends on a convenient sample of a relatively moderate sample size. A bigger sample size is needed with a focus on different types of jobs to better accomplish generalizability. Besides, the study is cross-sectional which may prohibit inferences of causality. However, cross-sectional studies enable readers to effectively predict associations between the examined variables. Finally, the study evaluates the general attitudes of employees concerning the job. It did not analyze intrinsic and extrinsic job satisfaction. However, it should be noted that this research study was part of a larger project that aims to investigate the associations between personality traits and different employee attitudes and behaviours (Hawass, 2011). In other words, the study is constrained by the analysis of the original research project.

6. References

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An Exploratory Study of Problems Facing Small and Medium Sized Contractors in the Free State Province of South Africa

Wellington Didibhuku Thwala and Godfrey Mofokeng
*Department of Construction Management and Quantity Surveying,
 University of Johannesburg
 South Africa*

1. Introduction

The construction industry has unique characteristics that sharply distinguish it from other sectors of the economy. It is fragmented, very sensitive to the economic cycles and political environment, and has a significantly high rate of business failure (Enshassi, Al-Hallaq and Mohamed, 2006). The South African construction industry is an industry that is increasingly becoming more complex in terms of growth which is caused by the amount of investments made by the public and the private sectors in constructions projects. The industry's fortunes tend to fluctuate with the general economy, and it has a cyclical nature and quick response to the changes in the economy (Enshassi, Al-Hallaq and Mohamed, 2006).

Ogunlana. (1996) stated that the industry's problems in developing economies can be categorized into three areas: (1) problems of shortages or inadequacies in industry infrastructure, (2) problems caused by clients and consultants, and (3) problems caused by contractor's incompetence/inadequacies. Ogunlana and Olomolaiye (1989) indicated that the major problems faced by contractors in developing countries have been classified as problems imposed by the industry's infrastructure, problems of inaccurate information and frequent changes in instructions and failure to meet obligations on the part of clients and consultants, and problems imposed by their own shortcomings. In 2004 minister Stella Sigcau was quoted saying:

"Liquidation is one indicator of poor sustainability and the failure rate is unacceptably high. It is evident from the findings on industry performance, which follow, that the high rate of failure reflects demand volatility and high levels of competition. Industry respondents confirmed that there has been a long-term decline in profitability in the industry and many companies confirm profit levels as low as two percent. Many of the enterprise failures are taking place in the emerging sector, which is of particular concern, reflecting low entry levels, the awarding of contracts at unprofitable levels, poor and inconsistent procurement practices, abuse of subcontractors by main contractors, and an oversupply of micro and small businesses."

Any person who goes into business, their ultimate goal is to get maximum profit and it is no different to the contractors, which means them cutting their profit margins is making them run their business in difficult situations and having to cut costs in almost everything they

do, and sometimes compromising quality of work (Kashiwagi and Johnson, 2003). Complexity, risks involved in the construction industry have led to enormous failures especially in small contractors and those small emerging contractors harboring the wrong impression that there is quick money to be made are the mostly affected (Mvubu and Thwala, 2007). The aim of this paper is to investigate the causes of Small and Medium sized Construction Contractors to fail.

2. Problem statement

The problem statement to be addressed is the high failure rate among small and medium sized construction companies in South Africa. Statistics South Africa (2005) states that from 1995 to 2005, about 5907 construction companies were formally liquidated. The CIDB (2004) also highlighted that more than 1,400 construction companies were liquidated over the past three years. The Free State Province was used as a case study, were the majority of the companies in the Free State Province are companies that are not older than 10 years. This means that there is not much of experience involved within the company, therefore the management or the executive team (which includes the Owner, the CEO, Contracts Director, Financial Manager, Project Manager and the Construction Manager) is often faced with difficult situations which need great experience to tackle them. However the companies that are also young in their existence but with relevant experienced team members from either working at other companies for a long period of time or having a tertiary qualification or a combination of both can be an exception. Therefore can it be said that causes such as managerial, financial, expansion, and environmental are the ones that cause companies to fail?

Objectives: The objective of this research will be highlighted as follows:

- To investigate the problems facing small and medium sized contractors in the Free State Province that leads to the high failure rate.
- To investigate strategies employed by small and medium sized contractors in countering the challenges they are facing.

3. Research methodology

The study was conducted with companies that are situated in Welkom, Virginia, Kroonstad, Odendaalsrus, Allanridge, Theunissen, Winburg, Ventersburg and Hennenman which are towns that are all in the Free State Province. Each town had a maximum of four companies except Welkom and Kroonstad as they are bigger towns with more companies. The author worked as the fieldworker by undertaking visitations to these companies was over a period of approximately four weeks were the questionnaires were distributed and verbal conversations took place, and the primary focus was on their management styles in the company and interactions with everyone involved in the company.

The study also focused on qualitative data analysis where data was collected by talking to the managers and asking the experiences of running a company as well as the hidden challenges they face on a daily basis. Reviewing past studies on causes of company failures topics around the world and related literatures as well as gathering information through journal articles, internet, and construction magazines was used to gather literature on the

topic. Data analysis and identification of the most relevant factors influencing causes of contractor failures were the primary and secondary sources. The author then wrote a report that combined the relevant theory and previous research with the results of the practical research done.

4. Significance of the study

The significance of this study is to bring the difficulties faced by the small and medium contractors in the Free State Province to the attention of the development boards and government, that they are an important factor within the South African economy. Government then needs to adopt strategies to develop the small and medium sector because of the high failure rate amongst them. This will help the sector to grow so that it can be economically viable by contributing and strengthening the region's economy as a whole.

5. Limitations

The paper concentrated mainly on small and medium sized contractors in the Northern Free State region. The study did not look at the whole Free State Province. Being an outsider was also limiting to what was revealed, especially during observations.

6. Literature review

Small and Medium construction companies play an important role in the South African economy. For example at the end of June 2007, the total number of employees in the construction industry was 543 686 and large enterprises employed 35.6% (193 786) of the workers in the construction industry, followed by the micro enterprises employing 30.8% (167 620) and an increase of 24% in the last quarter of 2007 (StatsSA, 2007). In addition to earlier statements, recent studies have found out that despite their significance, small and medium contractors are faced with the threat of failure with statistics indicating that three out of five fail within the first few years (Thwala and Phaladi, 2009). According to Thwala and Phaladi (2009) lack of effective management during their early stages is a major cause of business failure for small and medium sized contractors and some key features of small-scale contractors are that they are largely unregistered, operate in informal sector of the economy and have very little formal business systems. Thwala and Phaladi also stated that these challenges include, amongst others, the lack of resources for training contractors, such as funds, poor construction procurement systems and lack of management capacity and resources to equip managers to operate their business enterprises effectively and efficiently. In addition, the relative lack of success facing emerging contractors in South Africa was discussed by (Rwelamila, 2002; Miles, 1980; Croswell and McCutchen, 2001; Mphahlele, 2001 and Ofori, 1991); International Labour Organization –ILO– (1987); as follows: Inadequate finance and inability to get credit from suppliers; Inability to employ competent workers; Poor pricing, tendering, and contract documentation skills; Poor mentoring; and fronting for established contractors; Lack of entrepreneurial skills; Lack of proper training; Lack of resources for either large or complex construction work; Lack of technical, financial, contractual, and managerial skills; and late payment for work done (Thwala and Phaladi, 2009).

7. Managerial factors

Experience in any kind of management is very important and it plays a crucial role in ensuring that a business succeeds or fails. Poor management has been posited as one of the main causes of failure of small enterprises (Longenecker, *et al.*, 2006). Lack of experience in the constructions industry can lead the manager to make bad business decisions. Good management implies an awareness of all factors making up a successful business namely good strategy, marketing, pricing and financial control (Douglas, 1985). Financial mismanagement and management incompetence have been cited among the attributes that lead to the prominence of construction failures (Kangari, 1988), (Henry, 1991), (Schleifer, 1990), (Potgieter and Frank, 1990).

8. Financial factors

The high competition among emerging contractors has contributed to increase financial failures of the emerging market, making the market unsustainable (Mvubu and Thwala, 2007). Financial Management is the key, which determines business growth (Young and Hall, 1991). The most prominent causes of failure with construction companies' results from inadequate cash resources and failure to convince creditors of the availability of money (Hsing-Hui, 1989), (Ren, 1992), (Jach, 1985) and (Tong, 1990). Jach (1985) concurs with this view that even profitable firms could be forced into liquidation, because the demand for payment or settlement of outstanding accounts could not be met at the critical time despite the fact that the assets are tied in long-term investments. Furthermore, capital is often required to smoothen out the strains on the cash flow resulting from the occurrence of cost and uncertainty (Ren, 1992). Lack of access to finance both during pre-construction which disqualifies emerging contractors from meeting guarantee and performance bond requirements and during construction which leads to cash-flow problems, incomplete work and even liquidation are financial constraints facing emerging contractors (Mvubu and Thwala, 2007).

9. Expansion factors

There are small and medium contractors who get to win more tenders than others, which means that the number of project they do increases but they cannot always manage because of the required production capacity. Over-expansion can drive a company to a higher-risk investment with financial debt; hence, increasing its chance to business failure (Enshassi, Al-Hallaq and Mohamed, 2006). A change in the type of work and where that work is going to be done also contributes to the expansion factor, when a contractor goes to do work outside his normal territory it might bring some difficulties as he will have to adapt to the new geographical location.

10. Economical factors

Rwelamila and Lobelo (1996) states that these factors are perceived to be beyond the control of management. Ntuli and Allopi (2009) states that while economic factors are worth nothing, however, they may be perceived as being external to a firm's operations, failure by firms to recognize that their efforts may lead to the termination of a firm's operations. It has been asserted that the construction industry has distinct characteristics that render it much

more susceptible to failure than others (Ren, 1992; Jack, 1985); Kangari, 1988; Davis, 1991). These are:

- Trading within a high uncertain environment e.g. uncertain ground conditions, unpredictable weather and labour availability.
- The necessity to price a product before it is produced.
- Competitive tendering as a means of pricing.
- The low fixed capital requirements for entry into market results in market being over capacitated.

There are many other exogenous factors like high interest rates, stringent rules, and regulations etc., which are set by the government which have been identified as prominent causes of business failure (Hall and Young, 1991). These factors are not under industry control and hence completely outwit the sphere of small and medium companies influence.

11. Findings and discussions

The findings provided were in respect of primary objective of the study which was to investigate the causes of failure among small and medium construction companies in the Free State Province and some of the possible factors were mentioned in the literature review in chapter two. As the problem statement brought it to light that there is a high failure rate of small and medium construction companies in the industry, the analysis will therefore provide evidence that there is indeed a high company failure rate and in the Free State Province in this regard and the possible causes.

Based on the first objective of the study *“to investigate the factors that cause failure amongst small medium contractors in the Free State Province”* financial factors were found to be amongst the leading causes of company failures, whereby 24% of the respondents in the questionnaire said that lack of finance was one of the main causes and 20% of the respondents said financial mismanagement. The response from the questionnaire also showed that the companies did not have adequate cost and accounting practices and systems in place which also affected the estimating and procurement systems to be done properly and efficiently. The long periods it took the clients to pay the contractors were detrimental because it also affected the whole companies' cash flow to be in a negative state. The researcher also established from talking to the different managers that the usage of company finance for personal usage was also common amongst small companies because these companies are not always audited and it was easier for them to use and therefore the companies suffered in that regard.

It is of vital importance that any company, whether small or large that it has got proper cost and accounting systems in place because it is were the companies' finances are directed. 56% of the respondents said that their companies did not have adequate cost and accounting systems in place while the other 44% said that their companies did have adequate cost and accounting systems in place.

It is anticipated that the higher the level of small and medium contractors' education the more skills they will have in managerial positions. Notably the small and medium contractors mostly hold a matric certificates and a post matric diplomas or certificates. These comprise more than half of the population sample with matric qualifiers making up 35% of

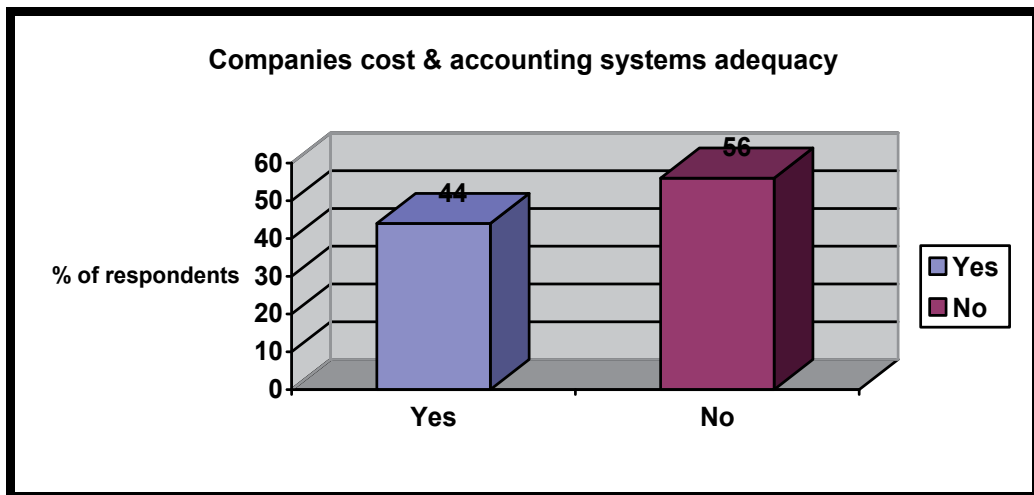


Fig. 1. The cost and accounting systems adequacy in the companies

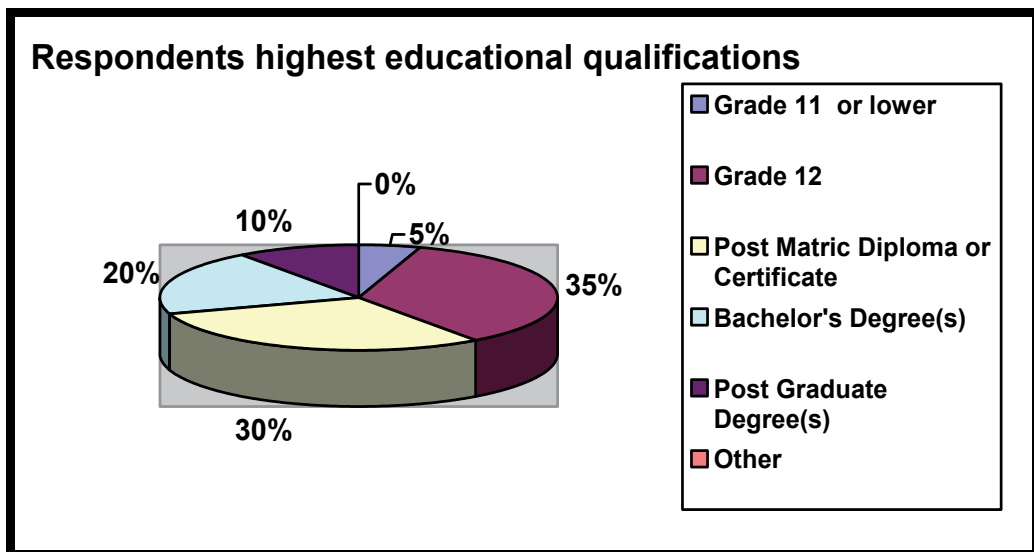


Fig. 2. The respondents' highest educational qualification

the companies. It was followed by post matric diploma or certificate at 30%. 20% is of those who hold a bachelors degree, while 10% have post bachelor's degrees. Evidently this is a group of educated people hence the assumption is that they are aware of methods of running a company in relation with experience. It is expected that the small and medium contractors should have qualifications in construction in order to run their businesses. Only 5% of the respondents have a qualification of grade11 or lower.

In every industry it is important to have experience in order for the role to be performed to excellence. The majority of the respondents are people who have a lot of experience in the industry which they acquired from working for other companies and then decided to go and establish their own companies. 40% of the respondents had experience of between

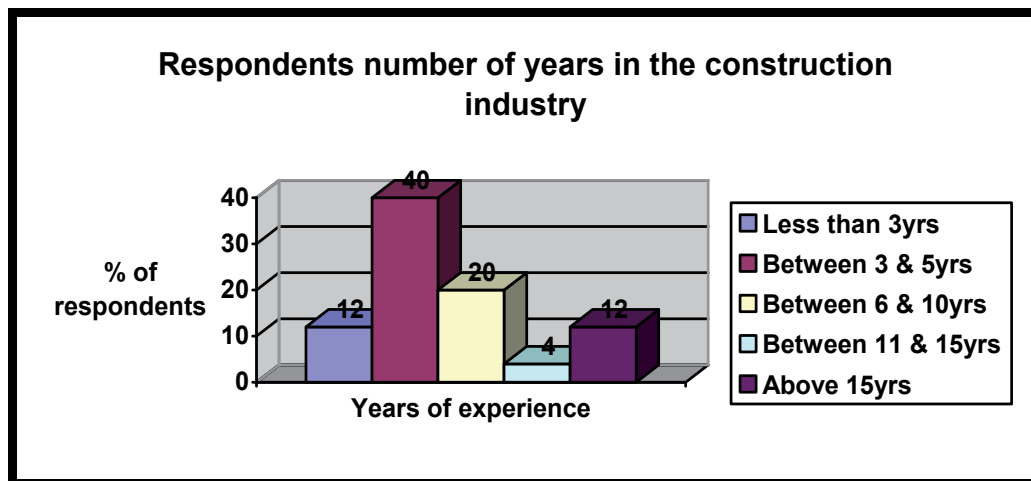


Fig. 3. The respondents number of years within the construction industry

3years & 5years, followed by 6years & 10years at 20%. 12% of the respondents had less than 3years in the industry while 12% had been in the industry for more than 15years.

In the open ended questions there were common responses which were mentioned by a majority of the respondents the arithmetic mean was used to find the appropriate weighting, and they were as follows:

Cause	Weight per %	Rank
<i>Not enough work</i>	32%	1
<i>Lack of finance</i>	24%	2
<i>Managerial skills & financial mismanagement</i>	20%	3
<i>Lack of experience in the industry</i>	16%	4
<i>Lack of skilled people</i>	8%	5

Table 1. The main causes of small contractors to fail

When asked about the challenges they encountered in the open ended questions, most respondents reported that *not getting work* was the greatest contributor to causes of contractors to fail, and 32% of the respondents correlated in that statement, 24% of the respondents said that *lack of finances*, 20% said *managerial skills and financial management* whereby the owners of the companies would use substantial amounts for personal usage. 16% of the respondents said *lack of experience* in the industry, and 8% said that *lack of skilled people* contributed to the main causes of small contractors to fail.

In the *likert scale* of 1 – 5 the researcher developed an index Challenge & Problem Index (CPI) to analyze the responses in a statistical method in question 17, it is explained as follows:

$$CPI = \frac{(1\alpha_1) + (2\alpha_2) + (3\alpha_3) + (4\alpha_4) + (5\alpha_5)}{\sum \alpha}$$

(1) = To no extent, (2) = To small extent, (3) = Moderate, (4) = To large extent, (5) = To very large extent.

α = Number of responses

Σ_{α} = Total responses per variable

	Weight	Rank
Finance	4.38	1
Lack of skilled people	4.29	4
Lack of marketing	4.19	3
Lack of cash flow	3.62	4
Lack of business management	3.52	5
Lack of estimating	3.38	6
Tendering	3.24	7
Lack of delegation	3.10	8
Lack of communication	2.86	9
Lack of project administration	2.71	10
Lack of project planning	2.57	11
Lack of implementation of Health and safety issues	2.24	12
Contract documentation	1.90	13
Lack of inventory management	1.71	14

Table 2. The Challenge & Problem Index (CPI)

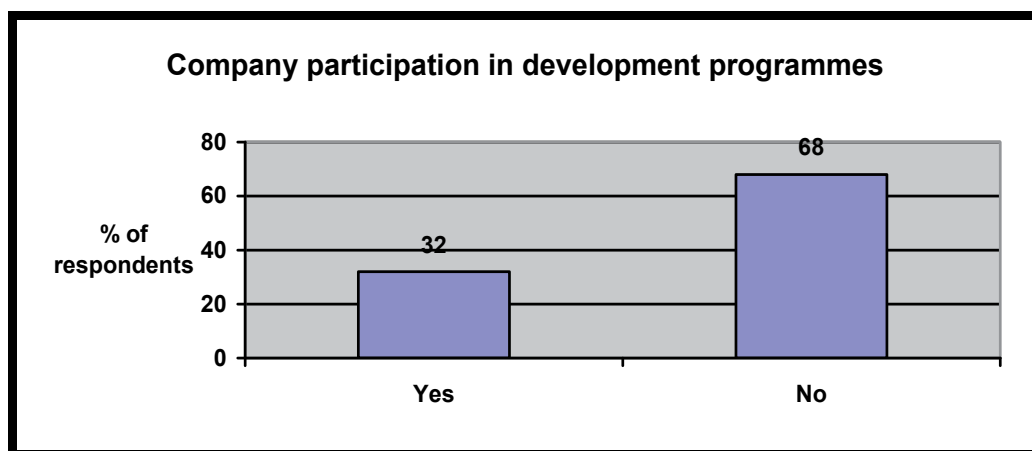


Fig. 4. The companies that participated in development programmes

The second objective "to investigate what strategies are employed by small and medium contractors in countering the challenges that they face" it was found in the open-ended questions in the questionnaire, that the challenges that were encountered can be overcome by participating

in development programmes and courses that will enhance their skills as well as expediting payments from clients.

Contractors in the Northern Free State region mentioned that they were not exposed to development programmes like in other provinces and that is why 68% of them said they did not participate in any development programmes and 32% did participate.

The responses below were the common solutions which were described by the respondents and they thought should be implemented.

Challenges and Problems	Weight per %	Rank
<i>By participating in development programmes & courses</i>	48%	1
<i>By expediting payments from clients</i>	32%	2
<i>By marketing the company and tender for private jobs and not only government jobs</i>	16%	3
<i>By negotiating better project prices & plant hire prices</i>	4%	4

Table 3. How the challenges and problems can be overcome

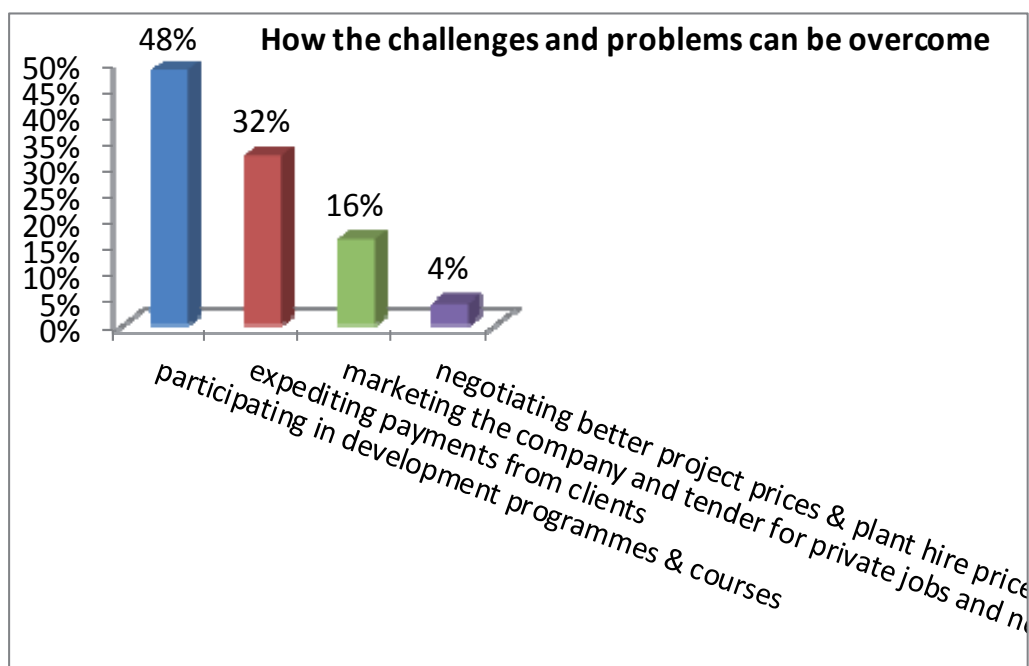


Fig. 5. How challenges and problems can be overcome

48% of the respondents said that the challenges and problems they experienced could be overcome by participating in *development programmes and courses* that will enhance their skills. 32% of the respondents said that *expediting payments from clients* will also tackle their challenges and problems, as long periods waiting for payments are a big problem for small and medium contractors. 16% of the respondents believed that *marketing their companies more*

and tendering in the private sector too will help as they only tendered for government jobs. 4% of the respondents said negotiating for better project prices and plant hire prices will help overcome the challenges they faced.

12. Recommendations

It is recommended that the following are interventions are made:

1. Training and development of small and medium contractors in the Northern Free State ranks as the most important intervention at this stage by the Free State government in particular. The procedure must ensure that these contractors as well as emerging contractors will benefit from these development programmes.
2. The companies must market themselves more and must not only depend on government jobs but must also tender in the private sector.
3. Strict rules and regulations must be put in place for the clients who do not pay the companies in time.
4. The registration of small contractors by the Construction Industry Development Board (CIDB) needs to be attached to the contractors' performance and the skills that are improved.
5. There must be a body that governs and regulates the construction industry for people who want to enter as construction business by screening them and identifying the possible risks to prevent possibilities of business failure.

13. Conclusion

The conclusion drawn by the researcher based on the problem statement is that the majority of small and medium construction companies in the Free State Province lack the managerial skills as well as the financial, environmental and expansion factors. These factors have an effect in the failure of a company and they can be improved and changes can be made in some areas.

Indeed it was established that a form of training like the Construction Education and Training Authority (CETA) is offered by the government, but the majority of small and medium contractors in the Free State Province are not exposed to these skills development trainings.

The findings have also revealed that the small and medium contractors in the Northern Free State do not get work regularly and that also contributes to the appropriate function of the companies, however the jobs that they do get are just to keep them surviving till the next job comes along. This means that the current state of many of these companies are not healthy because for a construction company to make a profit they need to participate meaningfully in the available construction job market.

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Section 2

Networks and Logistics as the Link to Success

Managing Networks in Business Organizations

Dangis Gudelis

*Mykolas Romeris University, Vilnius
Lithuania*

1. Introduction

Business organizations are embedded in many different network relationships (Granovetter 1983). Companies establish enduring relationships with their clients and suppliers, they collaborate with other companies in order to increase their market power, save costs, improve effectiveness, serve problems specific to customers, develop new technologies and for many other reasons (De Man 2004, 20). Business organizations are also involved in relationships with government institutions and non-governmental organizations for various purposes, such as lobbying, public-private partnerships, sharing of information or charity.

There are certain characteristics common to all types of the network relationships. First, they are oriented to some common goal which is beneficial to the partners who are not able to achieve the goal by acting alone. Thus the partners are supposed to comply to a formal or informal agreement on the importance of this goal. Second, the network relationships imply commitments and responsibilities of the partners involved to act according to the agreement. Thus companies taking part in various networks act not only for the sake of profit but they undertake certain responsibilities.

The article will discuss theoretical implications of the network management approach based on two behavioral assumptions: bounded rationality and bounded morality. Herbert's Simon's theory of administrative behavior (Simon 1997) will be extended in order to explain principles, modes and mechanisms of network organization. Recommendations and prescriptions for network managers of business organizations, including identification of various types of business networks, network analysis, development of network management strategies, integrating them with general organizational processes, will be developed.

2. Theoretical basis for the network management

2.1 Theoretical assumptions

The network management approach is based on two assumptions: the assumption of limits of human rationality and the assumption of bounded human morality. The assumption of bounded rationality means that individuals in their decision making are not able to evaluate all possible alternatives for those decisions, foresee their consequences, and choose the most optimal alternative promising the best results. Bounded rationality is conditioned by limitations of human mental abilities to process information, to focus attention, to

memorize, by habits and frames of thought (Simon 1997; Kahneman and Tversky 1979). Limits of human rationality are widely researched in cognitive psychology, experimental economics, the assumption of bounded rationality as an alternative to the neoclassical concept of the rational individual is widely used in organization theory, theory of social choice, public administration and public policy studies.

The network management perspective implies that business organizations as any other individuals or organizations operating in networks raise objectives and tasks, deliberate on measures to achieve them, take decisions and act in accordance with their specific frame of thinking and the information available, which means that their decisions and actions are not necessarily the best way possible. Due to bounded rationality network actors do not realize and do not see many opportunities for their action, thus it could be claimed that the potential of networks is not fully used. This does not mean necessarily that there are better ways of operating than those chosen by participants in the network, but the attitude based on the assumption of bounded rationality encourages the search of alternative ways of thinking and action and the openness to change and improvement. This approach also enables the deliberation on ways how to increase the rationality of network participants.

The assumption of bounded morality is no less important for the network management approach. It should not be identified with the assumption of moral opportunism, which states that individuals pursue their own interests with guile, involving some kind of deliberate deceit and the absence of moral restraint, the assumption important for transaction cost economics (Williamson 1975). Bounded morality implies that individuals obtain the moral sense and the ability to act according to moral obligations and responsibility, but such moral motives are limited by natural selfishness, bad habits, the weakness of will (*akrasia*), and ignorance (the failure to anticipate the negative consequences of certain behavior, frames of thought, distorting the understanding of moral values and norms). The approach that human morality is limited opens opportunities for the search of means such as moral education or the development of circumstances favorable for moral behavior by which human beings could be encouraged to act morally in different situations.

Moral behavior in the network management perspective is defined as behavior opposite to selfish behavior, when one's action is motivated by the common goal, common good or by obligations to principles, values, norms or agreements. Human relations and joint action are often conditioned by formal or informal agreements, commitments or common goals. Therefore, it can be claimed that networks provide a framework for the moral behavior and human morality is directly related to his or her involvement in various social networks – the human being in deciding to enter a social network, commits himself or herself to certain common goals and agreements at the expense of his or her personal interests. Networks which essential feature is the mutual trust would be impossible without the moral commitment of their participants.

Business organizations, from small enterprises to big corporations, are embedded in various social networks involving public, non-governmental and private organizations; they take part in various associations, clusters, and partnerships. Business organizations develop long-term relationships with suppliers and clients and are involved in various charity activities. It would not be exaggerating to say that the network embeddedness is a reality of each business organization. Each business organization has to take this reality seriously if it wants to be successful in its business. The network embeddedness creates challenges, risks

and opportunities to management of business organizations. Different network relationships have to be managed.

The network management approach is developed on the basis of recognition that there is a need to manage external relationships of business organizations. The theoretical basis for the network management approach is elaborated from the Simon's theory of administrative behavior (Simon 1997). This approach could be compared with other theories explaining external relationships of business organizations such as the open system theory (Katz and Kahn 1966). The open system theory examines organizations as open systems interacting with their environment. There are three basic differences between the open system theory and the network management approach. First, the open system theory is a theory explaining organizations, while the network management approach is prescriptive. Second, the organizational environment is understood broadly from the perspective of the open system theory while the network management approach focuses only on those elements of organizational environment which include individuals and organizations. Third, the network management approach, unlike the holistic open system theory, is elaborated on the basis of behavioral assumptions of bounded rationality and morality.

The network management approach could also be compared with the stakeholder theory (Freeman 1984). From the perspective of the stakeholder theory stakeholders are those who have stake in the organizations, they are already present and business organizations do not have an opportunity to freely choose their stakeholders. Stakeholders are organizations or individuals to whom the business organizations have moral obligations. The network management approach implies that business organizations could choose many of their partners voluntarily. Business organizations could enter or leave existing networks, change them, or create new networks. Thus moral responsibility is mutual because there are expectations that network partners also will be responsible. In the stakeholder theory stakeholders bound business organizations with moral obligations, however, this theory does not take into account the issues of moral responsibility of stakeholders themselves (see Table 1).

	Network partners	Stakeholders
Necessity of relationship	free choice	obligatory
Moral responsibility	mutual	unilateral

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Table 1. Comparison between the network management and the stakeholder theory

The approach of the corporate social responsibility which has been at the focus of business management theory and practice during the last thirty years (Carroll 1979; Schwartz and Carroll 2003; Jamali 2008; Carroll and Shabana 2010) could be derived from the assumption of network embeddedness. Stakeholder and network management approaches handle issues of corporate social responsibility in different ways. Stakeholder theory implies that companies are socially responsible if they take interests of their stakeholders seriously. Obligations for responsible activities stem from the implicit social contract between a company and various stakeholder groups. The contract does not have to be a real negotiated agreement between parties with different interests. It is sufficient that managers of the

company presuppose interests of their stakeholders and make decisions concerning their commitments to the imagined contract. The network management approach suggests that companies make socially responsible commitments to act according to an agreement achieved by network actors negotiating a common goal.

2.2 Network equilibrium

Organizations take part in various networks only if their network activities contribute to the achievement of their organizational goals. Thus the important question is how the organizational goals are matched to the common goals of the networks. Here the concept of the network equilibrium could be formulated following the idea of the organizational equilibrium developed by Chester Bernard and later elaborated by Herbert Simon (Simon 1997, 141). As well as individuals receive direct or indirect benefits from their participation in organizational activities, the participation of business organizations in network activities contributes directly or indirectly to their organizational goals. If the goals set in a network are valuable for the business organization the contribution is direct (as in the most cases of business participation in policy networks) and it could be said that the network has *positive externalities on the achievement of the goals of the business organization*. The contribution is indirect in the cases where business organizations receive rewards for their participation (e.g. payments to experts for sharing their know-how in knowledge networks). On the other hand, the network will exist if there are common goals for the achievement of which each network member is obliged to contribute something. Network participants consider the potential contribution of a new member to the network goals before making a decision concerning its membership. If a network participant fails to contribute to the common goal other network members could consider to exclude it from the network. Thus each business organization while deliberating whether to enter or leave a network assesses how it could contribute to the network and what it could receive from it.

How could business organizations contribute to the achievement of network goals? There are two options. Business organizations either conduct some specific activities which they would not have conducted if they had not took part in the network or their contribution is ensured without any costs additional to their activities which are directed to the achievement of their organizational goals. The second option points to some positive effects (or positive externalities) on network goals that are generated by business organizations pursuing their organizational goals.

The network management approach which is based on the assumption of bounded morality aims to reconsider the problem of collective action that was identified by Mancur Olson (Olson 1965). Olson questioned the feasibility of any collective activity if indirect rewards to participants of the collective activity are not provided. Olson argued that any collective action resembles the Prisoner's Dilemma situation where individual actors have incentives to free ride, that is, to choose a non-cooperative course of action which undermines the achievement of any collective goal. Following the logic of collective action business organizations will not be ready to experience any additional costs necessary for the achievement of network goals and that will result in disintegrating of most interorganizational networks (except those which are supported by positive externalities of their members). However, the assumption of bounded morality implies that, although there

is a risk of free-riding, there is also a potential for moral actions, that is, actions based on obligations to the network goal and on trust that other network members will act according to their own obligations.

2.3 Modes of network influence

Simon examined authority and communication as external modes of organizational influence and the criterion of efficiency and loyalty or organizational identification as internal modes of organizational influence (Simon 1997, 9). Thus it makes sense to identify four modes of network influence which affect decisions and behavior of individual network members (in this case, business organizations and their partners in various networks): *authority, communication, the criterion of efficiency and network loyalty*. It is also important to notice that those modes serve for the ensurance of coordination in networks.

One of external modes of network influence is authority. According to Simon, authority could be defined as a relationship between superior and subordinate (Simon 1997, 179). Superiors realize their authority by giving commands, that is, imperatives to choose a certain behavior alternative, which are followed by subordinates. However, although authority relationships in hierarchical organizations are usually clearly defined, the exercise of authority in networks is less obvious. Business organizations join networks voluntarily, thus the issue of authority, that is, the issue about who will give commands and who will obey them, how accountability will be exercised, and what sanctions will be, in the networks is a matter of the agreement among the network actors. There are two factors that might influence the appointment of the 'superior' among network members. First, the network actor who possesses resources such as finances or expertise which other network actors are dependent on is more likely to become the 'superior'. Second, the role of the 'superior' might be designated to the network actor who has initiated the network. In many participatory networks, however, authority relationships are replaced by other kinds of influence such as persuasion and suggestion. It could also be assumed that the area of acceptance that determines which decisions made by 'superiors' 'subordinates' are willing to accept (Simon 1997, 185) is much narrower in networks than in organizations.

Another external mode of network influence is communication. Simon defined communication in organizations as a two-way process: it comprehends the transmittal of orders, information and advice to a decision making center and from this center to other parts of organization (Simon 1997, 208). He also distinguished between vertical and horizontal, formal and informal communication. Communication in networks is organized in a manner less formal and hierarchical than in most organizations, however, some networks develop formal procedures and elements of hierarchical relationships. Channels of communication in networks usually determine structural relationships between network members. There are various media of formal communication. Simon identified several media of formal communication: oral communication, memoranda and letters, paper flow, records and reports, manuals (Simon 1997, 211 - 213). Taking into account the development of information and communication technologies in the past thirty years, the list of various media of communication should be definitely expanded: such media as mobile phones, internet, electronic mails, web-based social networks, videoconferencing systems, etc. have become widely used tools of both formal and informal communication.

Simon identifies the criterion of efficiency as an internal mode of organizational influence, that is, a decisional premise that the individual supplies himself or herself while making decisions in organizational settings. The criterion of efficiency dictates the individual to select the alternative which yields the greatest net return to the organization. This criterion could be defined in two ways: either as the maximization of income, if costs are considered as fixed or as the minimization of cost, if income is considered as fixed (Simon 1997, 250). What would be the implications of this criterion for decision making of business organizations in various governed networks? As it was mentioned above, in the networks business organizations have to balance organizational goals with the goals the network members have agreed on. The criterion of efficiency is a condition for the achievement of both organizational and network goals. If participation in the network do not seem to be efficient with regard to the profit maximization goal of the business organization, the organization might choose to leave the network. On the other hand, if the business organization does not act efficiently from the point of view of the network, it might be expelled from the network by other network members. Thus the business organizations have both internal and external incentives to the efficiency in networks, they also have expectations that partners in the networks will also be guided by such incentives. In order for a network to be efficient it is important for the business organizations to design performance measurement systems with indicators reflecting the network goals and resources necessary for their achievement. Such systems should be integrated with the performance measurement systems of the business organizations themselves.

Loyalty to network values and goals is another internal mode of network influence. As it was observed by Simon with regard to organizations (Simon 1997, 278), values of a certain network become internalized by its individual members. Business organizations by joining a network commit themselves to be loyal to goals and values of the network. Within networks business organizations identify themselves with certain roles which specify the particular values, facts and alternatives upon which the decisions of the organizations are to be based (Simon 1997, 278). The assumptions of bounded rationality and morality imply that behavior of business organizations, including their decisions to join networks, is determined by various frames which might result in sub-optimal knowledge and distorted values of the networks. In such cases network values might be undesirable from the point of view of more general social values. Simon explains this value conflict by introducing the distinction between subjective and objective rationality (Simon 1997, 85). It also makes sense to distinguish between subjective and objective morality. Some activities of business organizations are moral subjectively, that is, good from the point of view of organizations themselves, but immoral objectively, from the perspective of wider social consequences.

Those four modes of network influence have a function to secure network coordination. Coordination is necessary in order for various networks to be effective. There are different forms of coordination in networks. According to Simon, the simplest form of coordination is self-coordination, when individual participants adjust their activities by observing what others are doing. Another form is the examination of their own alternatives and the alternatives available to the group (or network). And the last, the most complex, form of coordination is based on expectations of the courses of action that will be followed by other actors which is achieved in the process of planning (Simon 1997, 113). Planning and review are two administrative techniques that are very important for coordinated decision making both in organizations (Simon 1997, 312) and in networks. In the following chapter it will be

examined how these two techniques could be applied in the context of network management.

3. Strategic network management

3.1 Types of networks

In order to assess the opportunities for a business organization to take part in various networks and to develop strategies of network management it is important to understand what options for such network participation are available. Thus the distinction between *governed* networks and *passive networks* will be discussed here and various types of networks will be examined. The governed networks at least some members of which are business organizations include *policy networks*, *knowledge networks*, *investment networks*, *service delivery networks*, *client networks*, *producer - supplier networks*. (see Table 2). What is specific about all of them as governed networks is that *they are mobilized, their members make agreements on particular goals and measures how to achieve those goals as well as moral commitments to act according to the agreements*. Those networks have properties similar to those of organizations such as goal orientation and division of tasks and they are being governed more or less by the same internal and external modes of influence which were described above.

Policy networks are the networks of actors taking part in processes of policy formation and implementation (Rhodes 1997; Kickert, Klijn, and Koppenjan 1997). Business organizations usually take part in various policy networks in order to protect their interests which might be affected by different public policies. Those networks are either informal or organized by special associations of business interest representation such as the association of industrialists, the union of employers, etc. Business organizations join policy networks if they feel that their interests could be better protected by cooperating with other organizations than by acting alone. In some cases policy networks might include also government institutions and non-governmental organizations – then the purpose of such network is not the protection of business interests but the achievement of some benefits to society with the help of certain public policies.

Another type of governed networks is knowledge networks. Knowledge networks are formed around the goal to accumulate and share knowledge which could be used for the public benefit. Those networks might include business organizations along with schools, universities, government agencies and other actors, however, the purpose of them is not to find and articulate solutions to one or another policy issue though the knowledge produced in those networks could contribute to public policies indirectly. Examples of knowledge networks are various centers of research and innovations, the centers of excellence.

The other type of the governed networks is investment networks. Members of those networks join together for the purpose of investment into various business projects. The networks might include corporate and individual investors as well as governments. Public – private partnerships are widely studied examples of investment networks. Other examples are joint stock companies, investment funds, cooperatives. Investment networks serve the public benefit because investments are beneficial to the society – either directly in the case of public-private partnerships or indirectly as positive externalities contributing to the economic growth.

Service delivery networks could also be identified as a type of governed networks. Business organizations along with public and nongovernmental organizations providing services as well as individual volunteers might cooperate for the aim to cope with some social or environmental problems. An example of such service delivery network is the 'Food bank', a project involving nongovernmental organizations and volunteers as well as shopping centers and mobilizing them for the purpose of collection and distribution of food products to poor people in Lithuania.

Other two types of the governed networks – client networks and producer-supplier networks – are related with the specific business environment. Business organizations develop long-term relationships with clients and suppliers in order to achieve their purposes of product quality, efficiency, and profit maximization.

Governed networks	Passive networks
policy networks knowledge networks service delivery networks investment networks client networks producer-supplier networks	common norms networks common interest networks common identity networks common values networks resource dependence networks

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Table 2. Types of networks

On the other hand, passive networks are systems of interrelationships between various organizations and individuals based either on actual interactions or on some communality. Passive networks lack the characteristics of organizations – they are not oriented to the common goals, their members do not realize the opportunities to do something together. Several types of passive networks could be identified: *common norms networks*, *common interest networks*, *common identity networks*, *common values networks*, *resource dependence networks*. The important feature of the passive networks is their potential to be transformed into governed networks.

The *common norms networks* include individuals and organizations regulated by the same legal norms or rules. For example, there are networks of charity funds, networks of banks, networks of universities, networks of employees or consumers and so on. Quite often it is a case that those organizations or individuals have nothing in common except that they have the same legal status, comply to the same regulations or are obliged to pay the same taxes. Such networks usually are loose and passive, however, they have a potential to be transformed into policy networks advocating public policies that could benefit to the interests of the network members.

The first step of such transformation is the realization of the common interest which is shared by all members of common norms networks. By realizing such common interest the common norms' networks are transformed to *common interest networks*. The next step of mobilization is the agreement on the common goal and means to achieve the goal as well as the obligation to act according to the agreement. Such is the transformation process resulting in the formation of policy networks.

There are also *common identity networks* which members share the same ethnic, religious, professional, gender or other identity. Those networks are loose and not mobilized until there is no threat to identities of their members. When there is a threat – for example, occupation of a nation by a foreign force – members of the network realize that they have the common interest and mobilize for the goal to protect their identity.

Common values networks usually are more integrated than common norms networks or common identity networks because their members share the understanding about values and principles guiding their actions. However, the agreement on goals for the joined action and what ought to be done is absent thus such networks remain inactive. To activate them and transform them into governed networks it is necessary to communicate the knowledge about policy problems, goals and actions needed to handle them. Sometimes those networks correspond to networks of certain identities, however, in many cases commitment to some values or principles is not dependent on a specific identity. An example of a common values network including business organizations could be a network of business organizations owned by diaspora entrepreneurs who are committed to the value to help their home country.

Another type of passive networks is *resource dependence networks*. Rhodes (1997) characterized resource dependence as an essential feature of policy networks. Interactions between suppliers and producers, producers and consumers, sellers and buyers, teachers and learners, principals and agents, contracting parties within different kinds of contracts create relationships of dependence between those who possess financial, material, informational, legal or other resources and those who exploit the resources for various activities. However, resource dependence networks are not necessarily governed networks. Along to the other inactive networks those networks also have to be transformed into the governed networks by agreeing on a joint goal and actions among their members.

In sum it could be said that the one of the tasks of network management is to mobilize networks – that is, to transform passive networks into governed networks for the governed networks which are goal oriented have the greater potential to be effective. Business organizations could initiate such transformation or they could support the initiatives of other organizations or individuals.

3.2 Network analysis and network strategies

How could network relationships be managed by business organizations? Managers of a business organization, aiming to improve relationships of their organization with various network partners, could choose to conduct the network analysis and develop a network management strategy. This strategy should be integrated into the general strategy of the business organization.

The network analysis should be conducted in order to examine the functionality and potential of networks the business organization is already involved in as well as to assess the potential of various alternative network relationships. The network analysis could apply the SWOT method for the assessment of strengths, weaknesses, opportunities and threats of the organization's participation in various networks.

The network analysis could start by identifying how general organizational processes – human resource management, financial management, production, service delivery, process

management, selling, marketing processes – depend on various network relationships. The types of networks which the business organizations is related with should also be identified. Then the network analysts should examine each of those relationships by answering such questions:

- Is the network governed or passive?
- What common goals are set in the network?
- Is there an agreement on specific actions to achieve the network goals?
- What are obligations of the business organization and its partners in the network?
- What is the impact of the organizational goals on the network goals?
- What is the impact of the network goals on the goals and processes of the business organization?

The general organizational processes are usually interrelated with various networks. For example, human resource management processes are dependent on the organization's relationships with other organizations through knowledge networks for it opens opportunities for the organization to acquire new knowledge and improve competences of its employees. However, there is also a threat that the participation in a network could make conditions for competitors to learn from the know-how of the business organization.

The financial management processes (budgeting, accounting, etc.) are also embedded in various network relationships. When the business organization joins a network (for example, an investment network), the task of financial management becomes to plan, allocate and monitor financial resources for the collaborative activities. Opportunities of the network participation could be the reduction of investment risk or benefits of collective deliberation on the investment decisions. The potential threats such as the dependence on the irresponsible partner activities should also be taken into account.

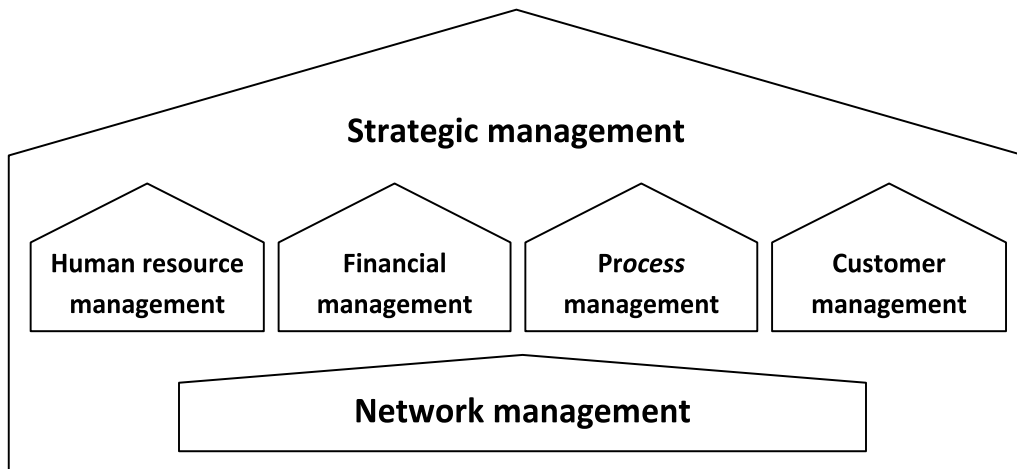
Network partners of the business organizations (for example, partners participating in service delivery networks or producer-supplier networks) should be integrated into production or service delivery processes ensuring that network and organizational goals will be achieved; it is the task of process management. The network analysis could reveal the potential of such integration. However, the threat is the low degree of integration and coordination of those processes.

Client management processes (marketing, etc.) are dependent on network relationships with clients of the business organization. There are both opportunities of participation for the business organization in client networks (guaranteed sales of the products, long-term contracts, etc.) and threats to loose new markets and clients as well as the ability to innovate.

After the network analysis and the assessment of the potential of network participation managers of the business organization should develop the network management strategy. They could choose one of several alternative strategies:

- strategy of building network relationships;
- strategy of mobilizing network relationships;
- strategy of sustaining network relationships;
- strategy of breaking network relationships.

No matter which alternative will be chosen the network management strategy should become a consistent part of the general strategy of the business organization (Figure 1). It



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Fig. 1. Integration of network management and strategic management in business organizations

also should be coordinated with the plans of the governed networks themselves if such plans are developed.

The strategy of building network relationships could be opted for if the business organization does not take part in some networks and the network analysis reveals that there are potential benefits of such network relationships. There are two ways to build network relationships – either to join already functioning network or initiate a new network. The following steps to build an efficient new network could be considered:

- Identify the mission of the network;
- Identify potential partners and their interests;
- Introduce your own organization and the mission of the network to potential partners;
- Select the partners of the network;
- Set and negotiate the plan of the network: common goals and means to achieve these goals;
- Identify resources needed for the achievement of the common goal;
- Make commitments to act and act according to the commitments;
- Monitor and evaluate actions of partners and your own organization;
- Monitor and evaluate the achievement of the common goals.

The strategy of mobilizing network relationships could be chosen if the network analysis indicates that the business organization is a part of some passive network which has the potential to be transformed into a governed network. In this case mobilization of a network could include the same steps as in the strategy of network building. However, the mobilization strategy could also be applied in order to make the governed networks more effective and efficient. Networks could be made more effective and efficient by applying various modes of network influence.

If the network analysis reveals a satisfactory condition of network participation of the business organization, the strategy of sustaining network relationships could be elaborated.

The strategy of breaking network relationships could be chosen if it is revealed that participation in networks becomes an obstacle to the achievement of the major organizational goals.

4. Conclusions

The network management approach discussed in this article has both theoretical and practical implications. The statements about mechanisms of network formation and types of networks elaborated on the assumptions of bounded rationality and morality could make a platform for the empirical or experimental research. The normative aspects of the network management such as democracy in networks are another important field of inquiry. What concerns practical significance of the network management approach, it could be noticed that business organizations could become more sensitive to opportunities of collaboration and to the issues of moral (social) responsibility if they start to manage their network relationships.

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Supply Chain Management in International Logistics – RFID Applications

Miguel Merino and Perfecto Mariño

*University of Vigo
Spain*

1. Introduction

The evolution of international transport is linked to the requirement of its customers and their needs. Modern logistics require compliance with a demand-based planning, hence the current management disciplines are grouped around the supply chain management (SCM) and seek to optimize the resources available to the transport, ie., ordering of supplies, time, cost and information. Production needs condition the next supplies the place of consumption, and the sequence or order of delivery. Information systems have played a key role in responding to these requirements and the Electronic data Interchange (EDI) has provided the necessary technologies to do so. Nevertheless, despite the extent of EDI systems that normalize the content of messages required for synchronization between systems, we encounter the difficulty of consolidating information between customers and suppliers with different software.

The intermodal traffic truck-boat-truck and stores (consolidation of cargoes in containers) and destination (deconsolidation and service picking/kanban) to Tier1 factories in automotive industry, is managed so that local optima are obtained in each of the processes involved in each of transport modes, storage and management of load / unloading of containers at ports of origin, transit and destination (Moyano, 2009).

The RFID applications provide an advantageous solution to specific scenarios and industrial sectors, especially those who are currently based on international standards as automotive industry. This chapter discusses, throughout a real case application as a representative scenario of “digital gap”, which is challenging the usability of those information tools. After a description of using “best effort” solutions in real applications, a more integrated information model is proposed where several agents must be involved, from network operators to service providers.

This chapter begins by analyzing logistic services in International Transport of goods. This is supported by standardized models based communication system in some cases, i.e. automotive sector, through EDI/ODETTE messages or alternatively ad-hoc messages based on FTP or SMTP. A key part of this study is the infrastructure of the Wireless Sensor Networks (WSN) and operating standards that make operating in many different conditions.

In terms of information system, the change means moving from a "push concept", in which events are transmitted by collecting the information by the means mentioned above, to a

"pull concept" in which interested parties consult the information at the time that the need to replenish their stocks, and flows of goods, as close to real time. This new approach is based on information directly supported by RFID tags (Ahson, 2008) (Morreale, 2010), retrieved through WSN, (Dargie, 2010), (Akyildiz, 2010), (Verdone, 2008) which in turn have the IP address which will be recognized on the Internet.

Tags based on RFID technologies (Fig. 1) provide the opportunity to incorporate the same content and routing information, which would not necessitate the transmission of messages or files between different actors. Complete information would be captured by WSN sensors and available for SCM. There are five major areas where RFID can be effectively used in a port cargo terminal: Access controls, Container security, Container identification and Location, Activity Tracking and Regulatory Compliance (Mullen, 2007).



Fig. 1. Tag UHF RFID. Courtesy of AV Converter RFID Company.

Regarding contents, we study the evolution from based systems barcode to RFID technology. The Electronic Product Code (EPC) standards and RFID technology give the global coding object to each entity as a unique code, and construct a global real-time network for sharing material goods information. EPC code + RFID + Internet put together Internet of things (IoT) (European Commission, 2009), (Forum Europe, 2010). EPC could be made by a bar code or RFID based. RFID technology is a cornerstone of the EPC, and it has become a Global Identification System (EAN.UCC System) (Laowe, 2010).

Finally the chapter will address issues related with a wide insight over the state-of-the-art of relevant international standards in the field of International Logistics provided from several institutions like: ODETTE, AIAG, European Union, IEEE, ISO, IEC and others; A proposal from the ICT market giving new information codes for RFID tags, better sensors deployment (WSNs in the access network) freight containers and vehicles; An open network structure in order to provide the basic rationale for potential users, network operators and service providers, in order to have a clear framework where new offers (infrastructure networks and ICT services) could be better integrated in existing business software tools.

2. Logistic services in international transport of goods

The evolution of international transport is linked to the requirement of its customers and their needs. Modern logistics require compliance with a demand-based planning, hence the current management disciplines are grouped around the Supply Chain Management (SCM) and seek to optimize the resources available to the transport, ie., ordering of supplies, time, cost and information. Production needs condition the next supplies the place of

consumption, and the sequence or order of delivery. Information systems have played a key role in responding to these requirements and the EDI has provided the necessary technologies to do so. Nevertheless, despite the extent of EDI systems that normalize the content of messages required for synchronization between systems, we encounter the difficulty of consolidating information between customers and suppliers with different software.

In the past 50 years the greatest innovation in international transport has been containerization. That it has done so can be attributed to the beneficial interaction of three broad kinds of factors: technical, economic and organizational (Frémont, 2009). We address the further case study, exclusively to transport in "containers" because the feature "multimodal" and the type of supply chain itself.

Since its advent of containerization this has been bringing about the integration of the transport chain (Brooks, 2000). On the other hand, shippers' and logistics operators needs have been increasing steadily as they take advantage of the opportunities offered by globalization, to develop their production and /or distribution activities at an international scale, and this necessitates synchronization of their activities in space and time through the introduction of logistics chains. The management of these chains is a source of control as well as providing a source of profit for all actors involved in these chains (Heaver T.D., 2001). All international transport companies now claim to be logistics operators capable of providing a customized response to the needs of their shipping clients (Frémont, 2009).

For container identification, the current standard which deals with the coding, identification and marking of containers is DIN EN ISO 6346, dated January 1996. (Fig 2) (BIC, 2010).

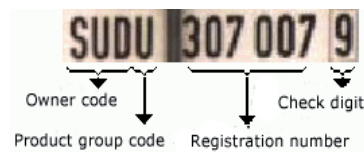


Fig. 2. Container's codification

In any case, these codes are targeted in preference to identify the physical units of containers and some supplementary information on the load (weight, dangerous load, etc.), but nothing about its actual content, or their origin or destination.

The current trend in port terminals, is to identify these codes using techniques of optical character recognition (OCR), with great difficulty due to positioning, light and contrasts that occur outdoors.

One important advantage of containerization is the development of logistics services. The entire logistics chain extends from supplier to end client. It must enable the overall management of resources in order to provide the best service for current and forecast customer demand, including physical transport flows, with their associated information flows and interfaces management between different actors in the chain from producer to consumer.

In sea transport there are a large number of intermediate agents (IA) involved, causing a large flow of information from the logistics operator to each of them. The only information

physically available is the number (code) that identifies the container, so that all information associated with their content and routing has to be transferred in parallel throughout EDI messages, EDI / XML, EDI / SMTP, to update the databases for each agent.

This approach would provide new services throughout the supply chain based on a container with extended encoding information relevant to such services (Table 1):

Logistic Services	Identification of container Current	Extended Container Identification Future
Container management	Tracking	Tracking and tracing + stowage + priority
Parcel	No	Pallet tags; Routing
LTL<. Consolidation warehousing	No	Cargo consolidation + routing
Location Tracking	CCTV/GPS/RFID	RFID/EPC/WSN
Activity tracking	GPS/RFID	RFID/EPC/WSN
Multimodal Transport	EDI/XML/SMTP	WSN/IoT
Logistic reception	EDI/XML/SMTP	WSN/IoT
Clearance	EDI/XML/SMTP	WSN/IoT

Table 1. Logistic services and technologies (Cárdaba, J., 2008) and own elaboration

2.1 Intermodal traffic in automotive industry

The automotive industry employs some of the most sophisticated networks of suppliers worldwide. Automobile manufacturers demand supply chains becoming more streamlined and efficient to support new models of development and shorter product life cycles. Logistics Services Provider (LSP) must manage "just-in-time" applications for distribution centers and transportation, as well as services related to receipt of goods by multi-modal transportation, consolidation or de-consolidation package, storage, inventory control, "picking" and sequenced synchronous or "Kanban" deliveries.

The current case study refers to companies acting as Tier 1 in supplying parts to assemblers of cars and trucks. These companies use the services of a global logistics providers for the supply of component parts of its products, from its factories in Asia to its plants in Europe, including consolidation centers and picking services from a store (MAF) close to its assembly plant, which also is the safety stock of components, for possible stock shortages driven by transportation and other incidents since the beginning (Fig. 3).

The physical flow of goods is based solely on the use of Odette standards (Odette Transport Label v3). The information about the part must be accessed via the relevant back-end system or other databases from each of the actors involved throughout EDI transmissions.

The data structures on the RFID tag in Odette recommendation permit three fundamentally different scenarios of the process design with RFID support, which place different demands on the total system (tag, reader, network, middleware, applications, organization, etc.) (Fig. 4).



Fig. 3. Flow of freights between Asia and Europe



Fig. 4. Reader RFID for logistics purpose. Courtesy Deister Electronic.

For some processes in the automotive sector, RFID is already superior to other identification procedures in terms of process efficiency and quality criteria. This technology distinguishes as before the class of parts (code number, type of container), but individual entities of a class (code number and serial number, or type of pallet cage).

The real potential of using RFID with automotive parts occurs when the different elements of the value chain use the same standards and technologies, and information is processed at every stage in an *open loop system* (Odette, 2010).

The matrix of considered scenarios is made in Table 2.

		Read/Write permissions on Tag	
		No	Yes
User-Data used	No	Scenario: 1 Tag contains only part ID	
	Yes	Scenario 2: Read access to user data	Scenario 3: Read/Write access to user data

Table 2. Matrix of considered scenarios

In Scenario 1, the only data field used is “part ID”, it is protected and cannot be overwritten.

The Scenario 2 covers other user data requirements, whereas in the Scenario 3 the user data can be modified in the process.

The principal structure of the data stored of the tag has been defined in the “air interface” standard according with ISO/IEC-18000-6C.

2.1.1 A model for data integration

The current model of information is based on the willingness of each event logistics management, to send to the recipients of that information by means, from traditional fax, e-mail or more advanced such as FTP that allow integration with their own information systems (like ERP, CRM,...).

This model used in intermodal transport and storage in automotive sector, it is based on a "push concept" in which events are collecting the information from intermediate for the management of each unit or flow control and transmitted through conventional means (Fig.5).

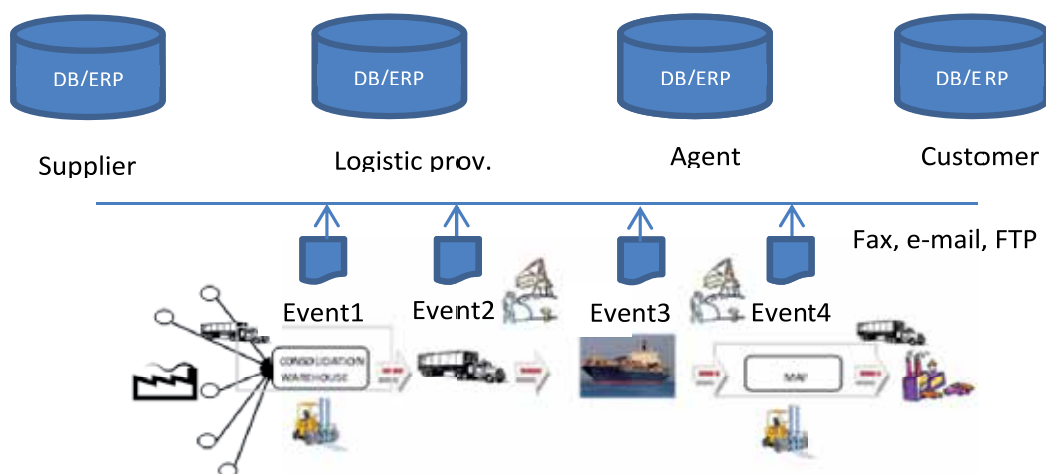


Fig. 5. Flow of information: push model

Introducing concepts and technologies such as Wireless Sensor Networks, Internet of Things, Cloud and IP Networks, we can move towards a “pull model”, where each entity can purchase your information when they want or need.

This new model based on Radiofrequency Identification (RFID) and Wireless Sensor Networks (WSN) and Cloud computing, is characterized by the ability to provide the information necessary to demand of each of the actors involved, and real time (Fig.6).

2.1.2 Data structure on the tag (Air Interface)

The principal structure of the data stored on the tag has been defined in the “air interface” standard in accordance with ISO/IEC18000-6C.

ISO/IEC 18000-6C assumes a logical division of the tag storage into 4 data segments, which are represented in the diagram below (Fig. 7):

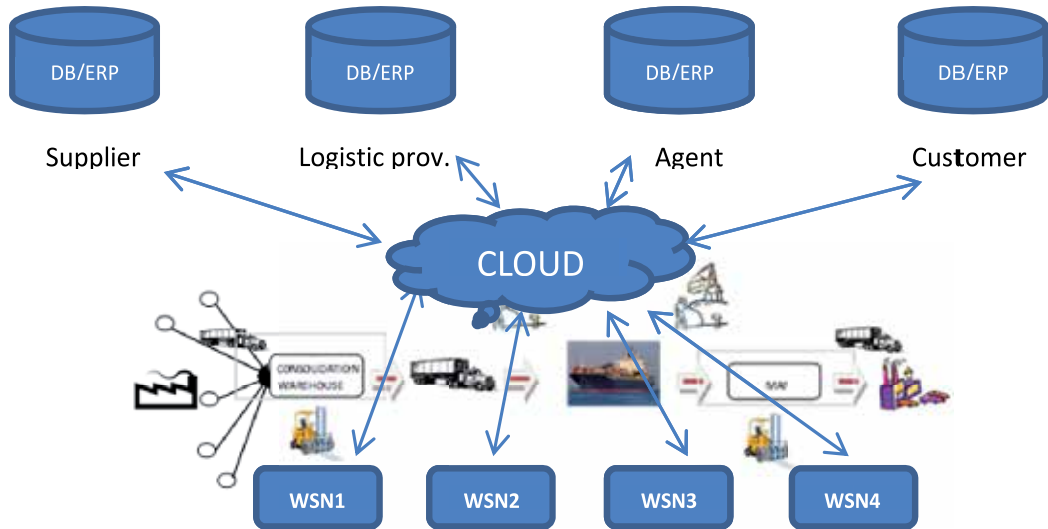


Fig. 6. Flow of information: pull model

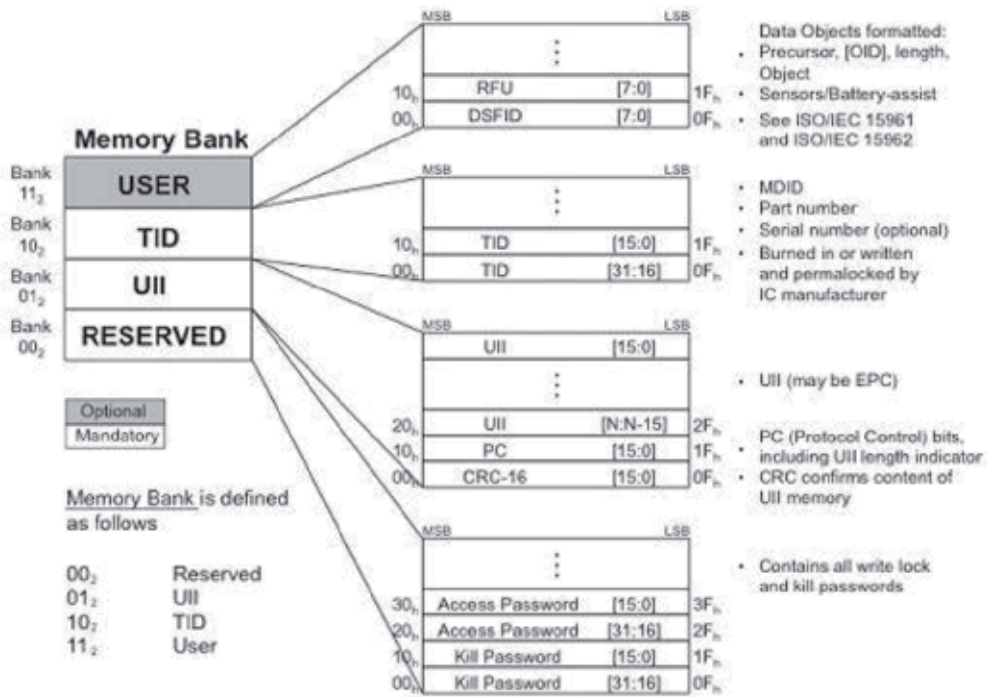


Fig. 7. Memory Structure of ISO/IEC 18000-6C tag

For some processes in the automotive sector, RFID is already superior to other identification procedures in terms of process efficiency and quality criteria. This technology distinguishes before the class of parts (code number, type of container), but individual entities of a class

(code number and serial number, or type of pallet cage). (is a part of Odette Recommendations).

USER: formatted and organized freely by the user.

TID: Unique part and serial number of the tag. Permanently locked.

UII: Unique Item Identifier.

RESERVED: Access and kill password.

3. Wireless Sensor Networks (WSNs)

3.1 Introduction to WSN

A WSN is a wireless network of sensor nodes oriented to the monitoring of real world measurable parameters, whether physical, biochemical, chemical, industrial, medical or anything others, for a data collection application. In that way a WSN is “data centric”, not “address centric” like Internet. A sensor node can include at least one sensor and actuators with capabilities for processing data and networking to manage the wireless access. An actuator can execute an action over the real world (i.e, trigger and alarm, turn on an electric motor, turn off a robotic arm, etc.) as a response to an input electric signal.

In data collection applications there are one or more nodes oriented to gathering, processing and controlling the received data from the sensor nodes. Those nodes are called “sink” ones. Therefore a typical WSN is a set of “wireless sensor nodes” delivering their data, also wirelessly, towards one or more “sink” nodes (Gómez, 2010).

The topology of a WSN can be “ad-hoc” if no connection is provided outside itself, or on the contrary “with-infrastructure” if it is connected to other networks (by wire or wirelessly) for remote access and management. An “ad-hoc” WSN is called MANET (Mobile Ad-hoc Network) when its nodes are also in motion (Conti, 2007), (Capps, 2001). When a WSN is “with-infrastructure”, its connection with the other network is made through an intermediate equipment called BS (Base Station), or AP (Access Point) or even, more technically “Gateway” (Misra, 2009), (ZVEI, 2010).

The three main topologies for WSNs are: Star (i.e., a “sink” node gathering all data from all surrounding “sensor” nodes), Tree (i.e., all “sensor” nodes are clustered over an specific “sink” node, and all the “sink” nodes are also connected like a star network centred over a global “sink”), and Mesh (i.e, all “sensor” nodes are connected like a grid where “sink” nodes are not required).

Like other computer network protocol architectures the WSNs follow a layered approach based on the OSI (Open Systems Interconnection) model (Mariño, 2003), where a bottom layer gives a set of services to the upper layer. Typically these protocols are: physical, link (MAC: Medium Access Control), routing, transport, data encoding and aggregation protocols.

The main areas of applications for WSNs are among others: environmental monitoring (Perry, 2002), health care (Cao, 2009), sports and fitness, assisted living, structural monitoring (Bur, 2010), automotive, logistics, home and building automation (Gómez, 2010), industrial monitoring and control, smart utility, urban monitoring and control, road usage

charging, disaster recovery, rural monitoring and control (Mariño, 2010), telecommunications applications, gaming, robotics and contextual awareness.

3.2 Operation and powering

Given their wireless nature WSNs are intended for “field applications”, that is to say, their deployment can be made in places with difficult access, or where wired infrastructures are impossible (very remote or wild zones) or not justified (economic or ecological impact, regulatory barriers, etc.). This rises a specific demand for this kind of networks about low power consumption (mW), because all energy for the sensors and sinks nodes in the network (whether “ad-hoc” or “with-infrastructure”) must be provided by batteries. Nevertheless battery replacement could be impractical or impossible for particular requirements from the WSN architecture (very high number of nodes, remote placement, etc.), rising the question about energy conservation for network survivability, as a fundamental restriction in WSN’s design (Schmidt, 2011).

Designing nodes for a WSN must balance consumption between communication tasks (protocols) and processing ones. Usually consumptions for communications are bigger than processing ones. Commercial microcontrollers embedded in sensor nodes have different power consumption modes like “active”, “idle” and “sleep”, in order to reduce the power when a full processing operation is not required. Also communication protocols in WSN’s nodes are more lightweight designed using a reduced number of bytes, short bandwidth requirements (kHz), reduced duty cycle (less than 1%), and low data rate transmissions (kbits/s).

Alternative sources of energy replacing batteries are well known such as solar (photovoltaic panels, 10mW/cm²), ultra-capacitors and fuel-cell. Other new approaches come from “harvesting” or “scavenging” energy timely on the environment and storing it for later use such as: vibration (100microW/cm²) (Buckley, 2009), heat (25microW/cm²) (Hammerschmidt, 2010), wind flows and electromagnetic radiation (0.1microW/cm²) (Neuquelman, 2011). Transducers that created electricity from readily available physical sources can be thermoelectric generators (TEG) (Armstrong, 2010) or thermopiles (temperature differences), and mechanical vibration or strain (piezoelectric or electromechanical devices) among others (Despesse, 2011), Jerez, 2011), (Ling, 2011).

3.3 Communication topics and RF bands

Propagation of radiofrequency (RF) signals is impaired by phenomena like interference, multipath and attenuation (TSE, 2005). In a WSN two nodes are linked when the signal power at the receiver antenna is above the receiver sensitivity. Therefore that signal power can be reduced with the distance between the nodes (attenuation), interference sources (multipath and undesired external signals) and the influence of materials in the propagation medium causing phenomena like reflection, diffraction and scattering (Pérez, 2008).

Robust modulation techniques provide to RF signals some mitigation of above mentioned impairment effects. Physical protocols for WSNs are intended for giving modulation schemes improving bandwidth, robustness against interference and enough data rate.

Radiofrequency bands are used worldwide using those intended for free use (unlicensed bands) on industrial, scientific and medical applications (ISM bands). Defined by the ITU-R (International Telecommunication Union-Radio) these bands may depend on regional or national regulations (i.e., about transmit power, duty cycle or modulation schemes). The acronym RFID (Radiofrequency Identification) is a WSN's particular application for product identification.

A subset of the ISM and other unlicensed bands (or "free" bands) available for WSNs are (band, availability and applications) (Gómez, 2010):

- 125-134.2 kHz, low RFID
- 140-148.5 kHz, RFID
- 6.765-6.795 MHz, worldwide, ISM
- 13.553-13.567 MHz, worldwide, ISM, high RFID
- 26.957-27.283 MHz, worldwide, ISM
- 40.66-40.70 MHz, worldwide
- 314-316 MHz, China, RFID
- 430-434 MHz, China, RFID
- 433.05-434.79 MHz, Europe, Africa and part of Asia, ISM, RFID
- 779-787 MHz, China, WSN
- 840.5-844.5 MHz, China, RFID
- 865-868 MHz, Europe, WSN, UHF RFID
- 868-870 MHz, Europe
- 902-928 MHz, Americas, Greenland and some Pacific Islands, ISM, WSN, RFID
- 920-926 MHz, Australia, RFID
- 950-956 MHz, Japan, RFID
- 2.400-2.4835 GHz, worldwide, ISM, WSN, RFID
- 5.725-5.875 GHz, worldwide, ISM
- 24-24.25 GHz, worldwide, ISM
- 61-61.5 GHz, subject to local acceptance, ISM
- 122-123 GHz, subject to local acceptance, ISM
- 244-246 GHz, subject to local acceptance, ISM

New band assignments from international and national telecommunication authorities have been studied for unlicensed usage, based on current paradigms such as cognitive radio (CR) technologies (Fette, 2009), (Wygłinski, 2009), (Zhang, 2010), by using licensed bands under strict requirements (Ray, 2011), or giving a "digital dividend" enabling the use of former UHF analogue TV bands (790-862 MHz) (Fitch, 2011), (Zhang, 2009).

A new trend in the use of electromagnetic spectrum for WSNs is the VLC (Visible Light Communications) proposal (Johnson, 2010). Like the IrDA (Infrared Data Association) standard (Mariño, 2003) from 1994 for remote control in home electronic products, VLC proposal intends the use of "vision band" (380-760nm wavelength) by means of cheap photoemissors (LED: Light Emission Device) and photodetectors (i.e: a photodiode), for avoiding the crowded RF bands from ISM.

Therefore a WSN based on VLC proposal will have "sensor" and "sink" nodes without RF antennas, only a couple photoemissor-photodetector for each node. The IEEE 802.15.7 will be the reference standard for VLC applications.

3.4 Software tools for WSNs

In a WSN a “sensor” node includes hardware elements like memory, input/output and communications. Therefore the resources of a “sensor” node must be managed by an operating system (OS) to make the hardware independent from the executed applications. Given that a WSN is a distributed scenario the OS should provide additional distributed capabilities as a “middleware” placed in the elements of the network. There are in the market a large range of OSs for “sensor” nodes like TnyOS and Contiki (Gómez, 2010).

Software tools intended for enabling the development, maintenance, deployment and execution of WSN applications, are useful for designers before and after implementing the real distributed wireless network (Dwivedi, 2011).

As a basic summary of requirements for implementing a WSN can be stated the following ones (Misra, 2009):

- Sensor node capacity
 - Power supply: battery power or harvesters
 - Size of on-board memory
 - Radio features (radio range, type of antennas, data loss rate, propagation impairments, etc.)
- Network scale and deployment setting
 - Size of the network and coverage zone
 - Node density (“sensor” nodes/km²)
 - Node distribution uniformity (existence of routing voids or not)
 - Homogeneous nodes or heterogeneous ones
 - Accessibility of the network
 - Availability of sensor node locations
- Application requirements
 - Traffic pattern (many “sensors” to a “sink” like in a “star”, or one-to-many as in a “mesh”, point-to-point routing or data-centric routing)
 - Traffic load (high “duty cycle” or low one like in message delivery)
 - Expected network lifetime
 - Data packet size and format
 - Quality-of-service (QOS) requirements on latency and throughput

Among the software tools can be found the following, intended for different or complementary purposes along the WSN’s designing cycle such as: simulators, emulators, data display, testbeds, debuggers, code-updaters and network monitoring.

A simulator is a software that imitates selected parts of a real WSN’s behaviour and is currently used as tool for its research and development. Depending on the simulator’s intended usage, different parts of the WSN are modelled and imitated, and these parts can also be of varying abstraction level. A simulator for WSN can imitate the wireless media and the restrictions of nodes in the network.

As a networked embedded system a WSN application involves sensor node hardware, its drivers, operating systems and communication protocols. As a result, the performance of the WSN application depends on all these factors in addition to its implementation. An emulator is a kind of simulator intended to enable realistic performance evaluation for

WSN applications, which can be directly run for testing, debugging and performance evaluation.

Visualization tools can support different data types gathered from WSNs, and usually saved as a numerical form in a central data base (DB). There are many programs that enable the viewing of these large amounts of data.

Testbeds are like an experimental benchmark for WSNs that provides support to measure a number of physical parameters in controlled and reliable environment. This environment contains the hardware, instruments, simulators, various software and other support elements to conduct a test. By providing the realistic environments for testing the experiments, the testbeds bridge the gap between the simulation and deployment of real devices.

Debugging tools in WSNs are aimed for diagnosing specific faults, such as detection of crashed nodes, sensor failures, or identifying faulty behaviour in nodes.

Code-updaters for WSNs can change the requirements from the network or the environment in which the deployed nodes may change after long periods of time. This may need modifying the executing application, or re-tasking the existing one with a different set of parameters.

Network monitoring tools enable accurate knowledge of network health status, including nodes and links of each type, for correctly configuring applications on real implementations or over testbeds for assessing the data collected from them.

3.5 International standards and RFID

Standardization development organizations in the world allow for global harmonization about the different communication protocols intended for WSNs. Some international agencies provide the “jure” standards from IEEE, IETF, ISO, CEN, CENELEC, ITU, ETSI, or the “facto” standards from industry alliances such as ZigBee, Bluetooth Special Interest Group (SIG), Z-Wave, Wavenis Open Standard Alliance (OSA), INSTEON, EnOcean and others. Each alliance creates “working groups” (WG) with specialized tasks for each protocol development (Festag, 2009).

A typical international agency is the Institute of Electrical and Electronics Engineers (IEEE), a professional association which develops and promotes engineering, computing and technology information. The IEEE has a particular committee (or WG) devoted to develop network communication standards, which code number is “802”. Therefore a code for any proposal from this committee is published under the format “IEEE 802.n.m”, where “n” stands for coverage (in wireless networks), and “m” indicates the kind of application intended for. For example, the “jure” standard IEEE 802.15.1 stands for WPANs (Wireless Personal Area Networks), where number “15” indicates a coverage until 30 meters, and number “1” means for applications in wireless audio, harmonizing with “Bluetooth”, an equivalent the “facto” standard promoted by Ericsson company.

Among the communication standards proposed for WSNs are the following (Willig, 2005):

- Bluetooth Low Energy from Wibree Forum
- Dash-7, based on ISO 18000-7 standard (Schneider, 2010)

- INSTEON from Smart Labs company
- MeshScape, based on IEEE 802.15.4 for automation from Festo company
- nanoLOC, based on IEEE 802.15.4 for automation from Danfoss company
- SP 100.11a based on IEEE 802.15.4 from ISA (International Society for Automation)
- Wavenis from Coronis System company
- WINA (Wireless Industrial Networking Alliance) for automation applications
- WirelessHART, based on IEEE 802.15.4 standard for automation applications (Hodkinson, 2008)
- WISA (Wireless Interfaces for Sensors and Actuators) from ABB company (ZVEI, 2010)
- ZigBee, based on IEEE 802.15.4 standard also for automation (Steigmann, 2006)
- Z-Wave from ZenSys company
- 6 LoWPAN (Low-Power WPAN) based on IETF standard for connection to IPV6 Internet (Ogden, 2009)

For applications in logistics a particular WSN's technology is called RFID (Radio Frequency Identification), as a means of identifying objects via radio frequency transmission (Bollic, 2010), (Finkenzeller, 2010). A typical RFID system comprises a tag, a reader, a host computer and a middleware (Hartmann, 2010). Middleware is a software that performs a connecting function between lower level objects, such as the readers, and the applications they support. For RFID applications the middleware sends control commands to the reader and responds with tag data received from the reader. In the WSN architecture the "tags" are the "sensor" nodes, and the "readers" are the "sink" ones.

In the enterprises world RFID is a third evolution on asset tracking by optical reading technology, from "bar codes" (1981) in the beginning, and "QR" (Quick Response) codes or 2-D codes after (Toyota 1994). In RFID based on relative distances from tags and readers, their respective antennas might operate in Near Field (NF) or Far Field (Radio Frequency or RF). In NF (ZVE, 2007), (Fischer, 2009), (Mager, 2011) operation distances between antennas are lower than 4cm, and the transmission effects are mainly inductive or reactive as in a transformer (Magnetic Field). In RF operation the respective distances could be bigger than 10m like in a typical WSN. An industrial RFID standard based on NF is RuBee (IEEE 1902.1, 2007) operating in the 131kHz band (ISM).

In RF operation, the tags are classified by their capacity for storing power as: Passive (without battery and the power comes from the reader only up to 10m), Semi-active (battery only for activation and the reader makes data transmissions up to 30m) and Active (battery for activation and transmissions larger than 100m). In NF transmission the tags are active.

4. A model for data integration in case study

4.1 Rationale for Automotive International Logistics (AIL) and description of basic operations

Relying on new ICT standards and available technologies, the authors propose to modify the operational support as follows (Fig 8):

- Planning the shipment according to production needs and safety stock located in the MAF (transit time forecast from port to port about 31 days).

- As supply chain pallets are being built, transport unit tags are loaded to pallet tags identifying contents, which built the shipment, purchase order number, and when the shipment was built. Pallets are sent to storage consolidation.
- In consolidation warehouse, as pallets are loaded into the container, pallet tags are loaded to container supply chain tags identifying contents, which built the shipment, purchase order number, container ID, eSeal ID, and when the container was stuffed.
- Container loaded onto chassis. When the tractor connects to the chassis, container information, chassis ID, and tractor ID is loaded to the On-board Unit (OBU) through Communication Air Network (CAN).

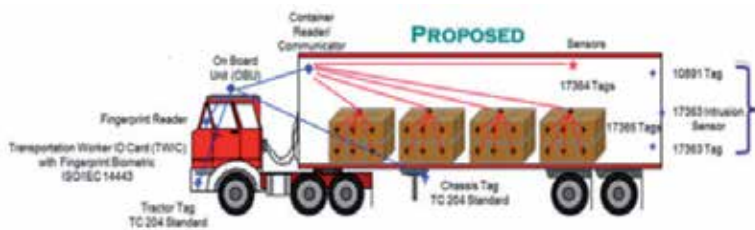


Fig. 8. On-board proposed operational support (Harmon, 2010)

- At the border crossing point in warehouse exit, the contents of the OBU are transferred to the Road-side Unit (RSU-WSN). The Road-side Unit (RSU) might also capture information from the Container ID, eSeal, and Supply Chain/Manifest tag.
- Well known wireless communication standards for Intelligent Transportation Systems (ITS) are CALM and WAVE. (ITU-T , 2007), (Uzcategui, 2009), (Williams, 2008)
- OBU also able to drive GPS system
- Information is available in the WSN through an IP network to be read from the management point LSP (Fig. 9).

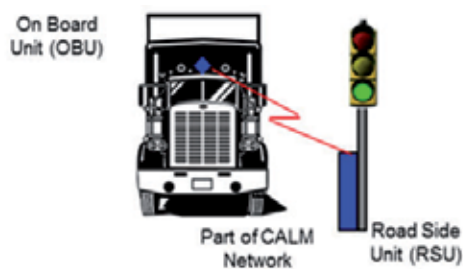


Fig. 9. Roadside operational support (Harmon, 2010)

- In MAF operations are symmetrical and inverse to the consolidation warehouse. The MAF input-output is linking to IP network through smart WSN.

The new basic operations in this case study, are affected by the following standards, under the recommendations of American Industry Association Group (AIAG) (Harmon, 2010) (Table 3):

Technology	RFID (ISO/IEC 18000); Sensors (IEEE 1451); Wireless Sensor Interface (ISO/IEC/IEEE 8802-15-4)
Data Content	Data syntax (ISO/IEC15434); Data semantics (ISO/IEC15418); Unique item identification(ISO/IEC 15459); Encoding (six bit) (ISO/IEC29162); Unique tag ID(ISO/IEC15963); Unique sensor ID(IEEE EUI-64 - ISO/IEC/IEEE 21451-4)
Conformance	Conformance to Air Interface; (ISO/IEC 18000)
Network	Sensor Networks (IEEE 1451)
Application Standards	Packaging (TC122-ISO 1736x); Freight container (TC104); Ships (TC8); ITS (TC204); Anti-Counterfeiting (TC247)

Table 3. Standards based upon ISO/IEC JTC 1/SC31

4.2 A new network model

In Fig. 10 is depicted a network model for AIL applications where all involved agents in the value chain, between the “product origin” (PO) and “product destination” (PD) are connected.

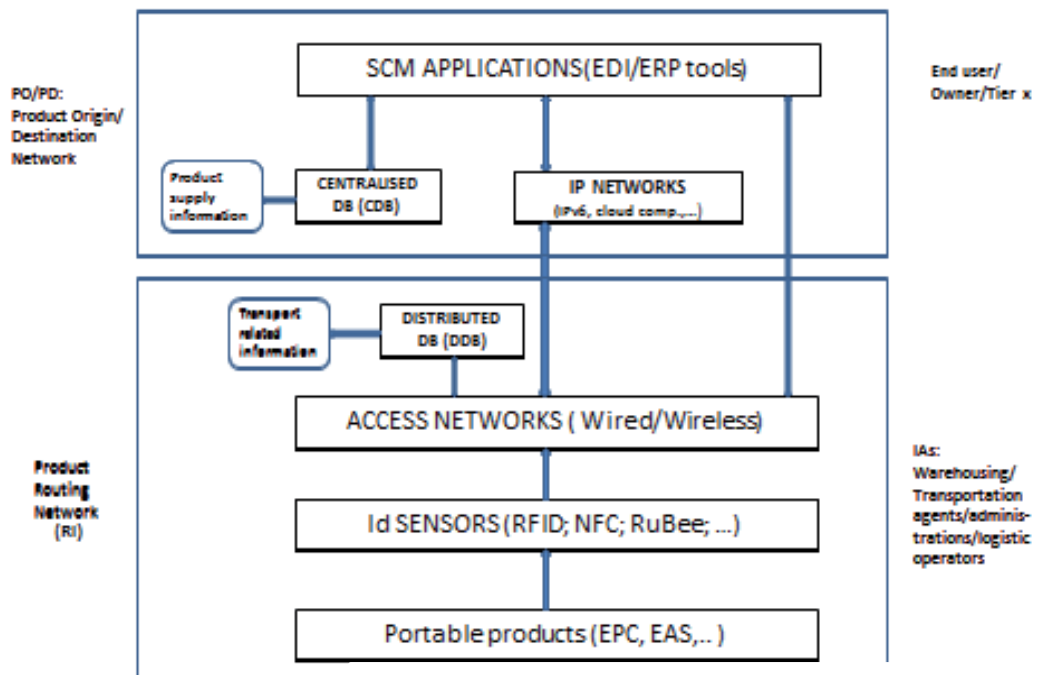


Fig. 10. Framework of SCM Information-Centric networking for AIL

Those intermediate agents (IAs): warehouses, carriers, administrations, legal advisers, logistics operators, etc., are considered “in-flight” or “on-route” producer-consumers (“prosumers”) of “routing information” (RI). Therefore there is a two-ways data flow $PO \leftrightarrow RI \leftrightarrow PD$, with multiple input/output operations depending on the use of particular “access networks” (AN) from the diverse aforementioned IA’s. In this network model all participants can access, if it is technically possible, to a distributed data bases (DDBs) or centralized ones (CDBs), whether directly or indirectly through the “cloud”, sharing real-time information about the state-of-routing from a given product between its origin and its destination.

Therefore some considerations should be made in order to assure the affordability of this model, if technical, economic and complexity barriers must be overcome for each involved enterprise. For example, in the value chain, SMEs could be not interested in complex procedures, using heavy ERP tools with specialised workers, and high communications costs, among other possible reasons.

In this model is possible given its open structure, to include other indirect partners from the information and communication technologies (ICT) providing: new ERP tools, more practical standards, affordable access networks and information-based logistic services. New ERP tools should integrate moreover its “product ID” also its “origin ID” and its “destination ID”. Each IA in the value chain can profit these data to give more flexibility to its business model.

More practical standards could facilitate information formats with generalized use by diverse AIs, in order to achieve compatible software tools and file transfers.

Affordable access networks are possible giving the new legal agreements from the providers’ sector about next generation networks (NGN), where networks operators can generate creative offers to new industrial customers not necessarily early-adopters minded, giving flexible and customized options for specialized demands.

Information-based logistic services could find a new niche market for creative service providers, able to collaborate with the IAs grouped in a particular “value chain”. Given the abovementioned model, an example could be an ISP providing services of hosting and housing for DDBs, CDBs and ERP tools in a particular AIL application.

In Fig.11 is depicted a network architecture for the proposed model, according to the requirements of Software Oriented Applications (SOA):

5. The need to deploy RFID reading infrastructures in seaports

5.1 Active RFID as a key enabler

Finding a data capture technology that would reliably identify trucks in the harsh marine environment was a key aspect of Port Authorities, (Fig.12). Especially, needed a way to “marry” containers and trucks in its management system, i.e. to track which inbound and outbound boxes were paired with which street trucks as they entered, transited and exited the terminal. (Identec, 2010).

In most ports, a high percentage of containers arrive and depart by truck, including many short-haul, time-sensitive moves. Truck drivers may visit the terminal several times a day

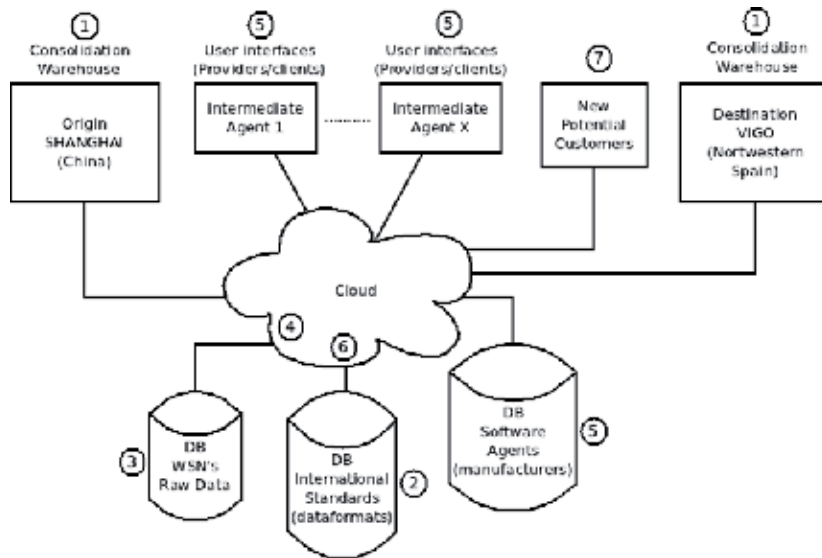


Fig. 11. SOA's testbed for SCM in AIL based on the new network model



Fig. 12. Reading infrastructures OCR/Rfid in Georgia Port Authority. Courtesy of Identec.

and need to be in and out as quickly as possible to meet shipper schedules. So planning for the future meant handling an increasing volume of trucks without compromising service levels.

License plate recognition software was considered, but discounted due to lack of consistency in license plate position and misreads due to dirty or damaged plates. Instead, radio frequency identification (RFID) technology won the day for its ability to uniquely identify assets in the most challenging conditions.

To capture key data and manage business processes, plus middleware to integrate data into central terminal management applications, use RFID, GPS & Wireless Sensor Solutions:

- Optical character recognition (OCR) to identify containers and chassis passing through the gates
- A position detection system (PDS) to locate containers and equipment in the yard

- RFID to track trucks moving through the gates and around the terminal
- A wireless local area network for data transmission

RFID solution to provide real-time visibility into truck inventory and enable data capture at the required hand-off points:

- Inbound and outbound gate moves for street trucks
- Container transfer between yard cranes and street trucks
- Container transfer between vehicles and mobile container handling equipment (CHEs)

5.2 Gate benefits

Combined with OCR for container ID, the introduction of RFID in Ports enable to move staff away from the direct gate area, alleviate the administrative burden of manual data processing and allow trucks to move faster through the system. RFID technology also supports to Ports Authorities (PA) web access system, a related efficiency measure introduced by the port for trucking companies to preadvise container pick-ups and drop-offs before arriving at the terminal.

Other key gains include the elimination of truck queues outside the terminal gates, with productivity benefits both for the port and truckers, reduced highway congestion and less pollution from idling trucks.

5.3 Yard benefits

Once empty and laden street trucks enter the yard, the RFID system helps manage the container hand-off process between trucks and yard cranes. As with the gate, use of RFID in the yard help PA to improve operational safety and productivity and provided real-time intelligence on truck and container inventory location.

Working conditions and efficiencies for the operators are also improved. They no longer have to look down at containers some 70-80ft below to manually read container ID numbers, while automated job promotion eliminates the need to scroll through a list of assignments on the cab data terminal in order to find the right task.

5.4 Commercial a security benefits

Ports can provide data feeds as required. A broad range of terminal operational data supporting security processes and logistics operational processes by use RFID active tags with commercial and security benefits as:

- Brand protection
- Reduce pilferage, damage
- Positioned for “green lane” (reduced inspections)
- Audit trails for isolation, recovery and learning (“inspected already” –quicker re-starts)

6. Conclusions and future work

The evolution of international transport of goods is closely linked to technological developments such as RFID technologies, and the adoption of standards, whether of

technologies as WSN, either of content from the initial EDI to the current based on ISO-18000c.

Some challenges should be overcome in order to enhance the productivity of the business involved in SCM domain. These challenges could be faced by the ICT market providing software tools (ERPs) better integrated in the business models.

First of all, is necessary to consider some important aspects such as the support for international transport for automotive parts (AIL) between suppliers to automotive constructors, where some SCM challenges have been detected in the “best effort” practices actually made, to say the least. Second, consider a wide insight over the state-of-the-art of relevant international standards in the field of AIL provided from several institutions like: ODETTE, AIAG, European Union, IEEE, ISO, IEC and others.

Also propose from the ICT market giving new information codes for RFID tags, better sensors deployment (WSNs) in the access network (RSUs), freight containers and vehicles (OBUs). Build a model based upon an open network structure in order to provide the basic rationale for potential users, network operators and service providers, in order to have a clear framework where new offers (infrastructure networks and ICT services) could be better integrated in existing business software tools.

Will be convenient studying infrastructures identification ICT already deployed in the most advanced ports and benefits from the standpoint of SCM and security.

Limitations of this developments:

1. Administrative complexity. Multiple administrations with different regulations and competences.
2. Limitations in current software tools don't provide the necessary standards
3. Incompatible technology platforms from different vendors

Future work:

One testbed could be implemented following these seven main points:

1. Involving the two extreme main places in international logistic traffic scenario.
2. Selection of suitable information standards, in order to achieve compatible software tools and file transfers through the “cloud”, over the unified data formats.
3. Involving network operators and ISP providers for giving suitable WSNs in a few points on the logistic chain, in order to maintain the model affordability whether by budgetary reasons or low-complexity purposes.
4. Involving hosting and housing service providers for implementing DBs in selected places “on-route” for producer/consumers of unified data formats, from the moving identified products.
5. Involving a bunch of Intermediate Agents (IAs) with compatible ERPs, user interfaces and AIL applications.
6. Developing a whole “case study” over the implemented testbed between two end points of the supply chain for selected moving products, in order to get valuable experiences and software tools refinements until to give a real SOA's application.
7. Further enhancements of flexible and customized software options able to be integrated in current business software tools, for new potential industrial customers.

7. Glossary

AIAG:	The Automotive Industry Action Group (AIAG) is a not-for-profit association of companies involved in the automotive industry in America
CALM:	Continuous Air-interface, Long and Medium Range
CRM:	Customer relationship management, is a widely implemented strategy for managing a company's interactions with customers, clients and sales prospects
EDI:	EDI stands for Electronic data Interchange and is the umbrella term for industry standards for the electronic exchange of business documents
EPC:	The Electronic Product Code (EPC) is designed as a universal identifier that provides a unique identity for every physical object anywhere in the world, for all time
FTP:	File Transfer Protocol (FTP) is a standard network protocol used to transfer files from one host to another host over a TCP-based network, such as the Internet
ISM:	The industrial, scientific and medical (ISM) radio bands are radio bands (portions of the radio spectrum) reserved internationally for the use of radio frequency (RF) energy for industrial, scientific and medical purposes other than communications
KANBAN:	Kanban is not an inventory control system. Rather, it is a scheduling system that tells you what to produce, when to produce it, and how much to produce
MAF:	Advanced warehouse consolidation, deconsolidation and security, for service to auto assembly plants
ODETTE:	Odette International is an organization, formed by the automotive industry for the automotive industry in Europe
RFID:	Radio Frequency Identification is a technology for the contact-free identification of objects of any type by means of radio waves
SCM:	Supply Chain Management, logistics process between suppliers and customers; also multilevel, i.e., the chain of all suppliers up to the completion of the end product
SMTP:	Is an Internet standard for electronic mail (e-mail) transmission across Internet Protocol (IP) networks
TIER 1:	A Tier 1 supplier would be a company who makes products specifically for one of the original equipment manufacturers (OEMs)
WAVE:	Wireless Access for a Vehicular Environment
WSN:	A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to <i>monitor</i> physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to a main location
XML:	Extensible Markup Language (XML) is a set of rules for encoding documents in machine-readable form

8. Table of standards referenced in this chapter (Odette, 2010)

Standard	Title
ETSI TR 102 436 V1.2.1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) intended for operation in the band 865 MHz to 868 MHz. Guidelines for the installation and commissioning of Radio Frequency Identification (RFID) equipment at UHF
EPCglobal	EPC global Tag Data Standards Version 1.4
IEEE 802.15.4	Specifies the physical layer and media access control for low-rate wireless personal area networks (LR-WPANs). It is maintained by the IEEE 802.15 working group
ISO/IEC 15418	Information technology --EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance
ISO/IEC 15961	Information technology --Radio frequency identification (RFID) for itemmanagement --Data protocol: application interface
ISO/IEC 15962	Information technology --Radio frequency identification (RFID) for itemmanagement --Data protocol: data encoding rules and logical memory functions
ISO/IEC 18000-6	Information technology --Radio frequency identification for item management -Part 6: Parameters for air interface communications at 860 MHz to 960 MHz
ISO/IEC 18000-7	Defines the air interface for radio-frequency identification (RFID) devices operating as an active RF Tag in the 433 MHz band used in item management applications
ISO/IEC 18046	Information technology --Automatic identification and data capture techniques --Radio frequency identification device performance test methods
ISO/IEC 18047-6	Information technology --Radio frequency identification device conformance test methods --Part 6: Test methods for air interface communications at 860 MHz to960 MHz
ISO/IEC 8859-1	Information technology --8-bit single-byte coded graphic character sets --Part 1:Latin alphabet No. 1
ISO/IEC 17367	Supply Chains Applications of RFID -Product tagging
ISO/IEC 15434	Syntax for high-capacity ADC media
ISO/IEC TR24729	Implementation Guidelines
ANSI MH10.8.2: 2006	Data Application Identifier Standard
Odette	Labels (OTL1, OTL3 and GTL)
Odette	RFID in supply chain container management

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Section 3

Money and Finance in Global Markets

The Determinants of Corporate Debt Maturity Structure

Ewa J. Kleczyk

*Custom Analytics, ImpactRx, Inc. Horsham, Pa.
USA*

1. Introduction

According to Stiglitz (1974) and Modigliani and Miller (1958), in efficient and integrated markets, the financial management policy cannot decrease the costs of capital due to the interrelation between the different types of capital costs. Consequently, there is no gain from substituting debt for equity. However, evidence has been found against this claim, demonstrating that equity financing is related to the predictability of stock returns. For example, firms issue equity when the equity premium is low in order to time an inefficient market and reduce the cost of capital borrowing and/or to optimize capital structure together with expected returns (Baker et al., 2003). On the other hand, there is substantially less literature on debt financing. For example, according to Bosworth (1971), debt maturity is related to market conditions, such as the interest and inflation rates. Furthermore, Barclay and Smith (1995) find firms with higher information asymmetries to issue short-term debt. They determine a positive relationship between debt-maturity and dividend yield as well as a negative relationship between the maturity of debt and the term-spread (Barclay & Smith, 1995). Although the above papers provide support for the association between debt and returns, none offers information on the cost of capital borrowing at different times of debt maturity due to lack of analysis of returns data.

The relationship between debt maturity and cost of capital borrowing is examined by Baker et al. (2003). In their paper, they analyze the variation in the maturity of debt due to debt market conditions (inflation and interest rates) as well as the excess bond returns. Excess bond returns are an index of investment-grade corporate bonds over commercial papers (Baker et al., 2003). In their article, the authors utilize aggregate annual time-series data and find a close relation between debt maturity and predictable variation in the excess bond returns. According to their findings, firms issue long-term debt when bond returns are low and short-term debt when returns are high. They explain the above evidence as managers timing an inefficient capital market using public information to guide their debt maturity decisions. They are, however, unable to conclude whether firms actually reduce the overall cost of capital borrowing from timing the market as a result of difficulties in interpreting the predictions of the regression results (Baker et al., 2003).

This paper extends the empirical analysis performed by Baker et al. (2003) to the pooled time- and cross-sectional data in order to examine the relationship between the excess bond returns and the corporate debt maturity structure. In addition, the analysis extends previous

studies such as that conducted by Barclay and Smith (1995) by incorporating the bond returns information in the corporate debt maturity structure research. As a result, the study accounts for the relationship between debt maturity and the cost of borrowing at different maturities.

The goal of this paper is to examine the hypothesis of the effect of the macroeconomics variables, excess bond returns, as well as the corporate debt determinants on the debt maturity structure at the individual firm level data. The Principal – Agent Theory and the Efficient Market Hypothesis provide the theoretical framework for the analysis. The Principal - Agent Theorem describes the relationship between the lenders (banks) and borrowers (firms) in the credit market as well as the process of loan issuance. As firms' investment decisions are not directly observable by the banks, the terms of the loan (interest rate, loan size, and length) are usually based on the firms' observable characteristics such as wealth and size. The Efficient Market Hypothesis states that it is impossible in an efficient market to profit from market timing in the long-run. Market timing is defined as the opportunity to obtain higher return on investment by simply observing and responding to the changes in macroeconomic variables (Baker et al., 2003). The Efficient Market Hypothesis widely recognized by economists has been questioned by financial analysts. Several empirical studies including studies by Baker et al. (2003), Bosworth (1971) and Malkiel (2004), however, have found support for profiting from market timing in the short-run.

Based on these theorems, it is predicted that small and unregulated firms with more investment growth options have less long-term debt. When the bond market cannot distinguish between high - and low - quality firms, defined by the firm's abnormal earnings, the high-quality firms will signal their wealth through issuance of less underpriced short-term debt. Both investors and low - quality firms realize the high - quality firm's behavior, forcing the high - quality firms to issue more short-term debt (Kale & Noe, 1990). Similarly, firms with large potential information asymmetries are likely to issue short-term debt due to their larger information costs associated with long-term debt (Flannery, 1986). On the other hand, when the high - quality firms are faced with low risk of debt refinancing, they are more likely to issue short-term debt while less creditworthy firms will issue longer-term debt. The very poor firms cannot issue long-term debt as they face a higher likelihood of reporting low profits and facing higher borrowing costs (Berlin, 2006).

Additionally, according to Baker et al. (2003) debt maturity is also related to debt market conditions, such as interest and inflation rates as well as a term spread. It is expected that the macroeconomic variables are negatively related to the maturity of debt. Following Baker et al. (2003), it is predicted that firms issue long-term debt when bond returns are low. Finding support for the impact of macroeconomics variables including excess bond returns on debt maturity decisions implies that in the short-run period firms lower the cost of capital borrowing from timing the market. In the long-term, however, this hypothesis should not be supported by the model's results as suggested by the Efficient Market Hypothesis.

The research objective is achieved by investigating the relationship between the excess bond returns, macroeconomics variables, as well as the determinants of the firm's debt and the corporate debt maturity structure. In order to perform the analysis, the pooled time- and cross-sectional (panel) data for year 1991- 2000 from COMPUSTAT as well as the Federal Reserve are utilized. The variables used in the econometric analysis are: the dependent

variable: share of long-term debt, and the explanatory variables: excess bond returns, market-to-book ratio, regulatory dummy variable, log of market value of firm, abnormal earnings, term spread, inflation, and short-term interest rates.

There are several Ordinary Least Squares (OLS) estimation methods employed to estimate the relationship between debt maturity and its determinants. First, the pooled OLS estimation is utilized; however, there is a problem of unobserved error term dependence, which results in biased and inconsistent findings (Wooldridge, 2002). In order to correct for this issue, a cross-sectional OLS regression method is utilized in combination with the time-series mean of each variable for an individual firm. However, this method only accounts for the variation across firms without analyzing the time-variation (Barclay & Smith, 1995).

In order to investigate the time-series dispersion, fixed and random effects regression models are employed. In the fixed effects regression, the cross-sectional variation is arbitrarily correlated with the explanatory variables. In the random effects regression model, it is assumed, on the other hand, that the cross-sectional variation is random, and it is a part of the unobserved variation included in the error term. The Hausman specification test is used to test for the sufficiency of random effects estimation. Finally, in order to correct for the existing heteroskedasticity and serial correlation across panels, the generalized least squares estimation is used to obtain efficient estimators (Wooldridge, 2002).

The results obtained from the OLS estimation provide evidence in support of a negative relationship between the debt maturity and the excess bond returns. Furthermore, the market-to-book ratio, abnormal earnings, as well as term spread and inflation are negatively related to the share of long-term debt. However, no statistically significant relationships were found for regulatory dummy and short-term interest rate although the coefficients of these variables had the predicted signs.

The results confirm the hypothesis of debt determinants and their impacts on the structure of corporate debt. The findings imply that firms with few investment growth opportunities, large in size, and of high quality have a large share of long-term debt in their financing structure. There is, however, an ambiguous result with regard to hypothesis of market timing lowering the cost of capital borrowing. On one side, managers time the debt market and incorporate the debt market conditions as well as the excess bonds returns in their debt financing decisions. On the other hand, the short-term interest rate does not have a statistically significant impact on a firm's financing decision as suggested by the Efficient Market Hypothesis. The research results add to the undeveloped literature of debt financing by extending the analysis of the impact of debt determinants on debt maturity and by analyzing returns data and providing evidence for relationship between debt maturity and cost of borrowing at different maturities.

2. Literature review

The notion of the corporate debt maturity structure is explained by the determinants of debt structure and market conditions. All of the hypotheses tested here are derived based on the Principal-Agent Theory and the Efficient Market Hypothesis. The hypotheses employed in this article include: Signaling and Agency Costs Hypotheses (all based on the Principal-Agent Theory), as well as Market Timing Theory (based on the Efficient Market Hypothesis). The following empirical analysis review represents the empirical evidence

either for or against the implications resulting from employment of the proposed theoretical framework when analyzing the financial decisions of corporate companies.

Several terms should be defined before in depth discussion of the empirical issues related to the cost of capital borrowing and corporate debt maturity structure. Table 1 defines finance terminology needed for the article understanding.

Terminology	Description
Share of Long-Term Debt to Total Debt	The percentage of the firm's total debt that has a maturity of more than three years
Excess Bond Returns	An index of investment-grade corporate bonds over commercial paper
Abnormal Earnings	The difference between next year's and this year's earnings per share scaled down by this year's share price
Market-to-Book Ratio	The estimated market value of assets divided by the book value assets
Real Short-Term Rate	The annualized Treasury bill return minus inflation
Term Spread	The difference between the Treasury bond yield and the annualized Treasury bill return
Inflation	The annual percentage change in the Consumer Price Index
Debt Market Timing	Responsiveness to the changes in macroeconomic variables

Table 1. Glossary of Finance Terminology

According to Barclay and Smith (1995), debt determinants are part of the agency cost and signaling hypotheses derived from the Principal – Agent Theorem. As discussed earlier, lenders are not able to observe directly firms' behavior. As a result, specific loan contract terms help banks to differentiate between different types of borrowers while observing firms' observable characteristics such as size and wealth. Based on the findings of the Principal – Agent Theory, the Agency Cost Hypothesis states that risky debt financing may enlarge the suboptimal investment incentives when a firm's investment opportunity set includes growth options. Managers undertake underinvestment¹ decisions controlled by issuing a short-term debt maturing before the firm's growth opportunity is exercised (Myers, 1977). Consequently, the agency cost hypothesis states that firms with larger growth options in their investment opportunity set issue more short-term debt.

Studies by Antoniou et al. (2002), Jun and Jen (2003), and Chen et al. (1999) find firms with larger growth options issuing more short-term debt. Antoniou et al. (2002) argue that the cost of financial distress of high growth firms is relatively high and therefore managers are reluctant to raise debt capital (Antoniou et al., 2002). Furthermore, according to Jun and Jen (2003), firms with greater financial flexibility and financial strength are more likely to issue more short-term debt. On the other hand, Harvey et al. (2001) also find that closely monitored debt creates shareholder value, because it reduces the agency costs associated

¹ **Underinvestment** – unwillingness of shareholders to take a positive net present value project when the profits will accrue mainly to the creditors (Foo and Yo, 2005).

with overinvestment. The lower costs of debt financing are a result of a long-term relationship established between the firms and the creditors (Antoniou et al., 2002).

According to Barclay and Smith (1995), firms with relatively large numbers of investment opportunities tend to be smaller and take on short-term debt to avoid the underinvestment decisions and paying higher issuance costs associated with long-term debt. Issuing short-term debt avoids the above problem as the price at which the firm repurchases its debt is fixed. Issuing a short term debt allows the stockholders to capture most of the returns from the new investments (Myers, 1977). Additionally, banks have a comparative advantage in monitoring and maintaining a stronger bargaining position when loaning short-term. Banks' monitoring is especially important for firms with large informational asymmetries as these firms use more bank loans with short-term maturity (James, 1987).

In accordance with the above hypothesis, larger firms issue debt with maturities on average longer by about 6 years (FEMA, 2006). However, Dennis and Sharpe (2005) find that as the borrower size increases, negotiating power with the lender and information transparency increase. The lender is able to spread the fixed costs of loan production across a larger dollar value of the loan and as a result, issue debt to larger firms (Dennis & Sharpe, 2005).

Finally, regulated firms issue longer debt maturity than unregulated firms. This follows from the fact that managers of regulated firms have less discretion over future investment. Lower level of managers' judgment over future investments lowers the adverse impact of the long-term debt. Consequently, a longer maturity period is preferred by the regulated companies (Barclay & Smith, 1995). In summary, it is predicted that small and unregulated firms with more growth options have less long-term debt.

In the Signaling Hypothesis, the pricing of long-term debt is more sensitive to changes in firm value compared to the short-term debt. For example, high-quality firms defined as firms with positive abnormal earnings² tend to issue more short-term debt compared to low-quality firms defined as firms with negative abnormal earnings due to lower refinancing and mispricing³ costs (Barclay & Smith, 1995). Richardson and Sloan (2003) as well as Antonenko et al. (2006) find empirical evidence for low-quality firms obtaining overpriced long-term debt (higher interest rate than usual put on long-term debt). Richardson and Sloan (2003) further find that long-term debt follows a decreasing stock return period. On the other hand, Ozkan (2002) and Antoniou et al. (2002) find no empirical support for the signaling hypothesis. The volatility of earnings is found not to have a significant impact on the capital structure among the studied firms. Although not confirmed by all empirical studies, it is expected that high-quality firms (firms with positive abnormal earnings) issue short-term debt. Consequently, there is a negative relationship between the corporate debt maturity and the quality level of the firm (Barclay & Smith, 1995).

According to Baker et al. (2003) debt maturity is also related to macroeconomic variables such as inflation, interest rates, term spread, and excess bond returns, although the impact of macroeconomic variables on debt maturity has not been examined thoroughly in the literature. As predicted by other finance articles, the macroeconomics variables should be

² **Abnormal Earnings** - measured as the difference between next year's and this year's earnings per share scaled down by this year's share price (Barclay and Smith, 1995).

³ **Mispricing** - investor's overestimation of the persistence of accruals and underestimation of the persistence of cash flow (Barclay and Smith, 1995).

negatively related to the maturity of debt. For example, firms issue long-term debt when the excess bond returns are low (Baker et al., 2003). Furthermore, Stohs and Mauer (1996) find debt maturity to be negatively related to the term spread. Baker et al. (2006) additionally uncover that the term spread is positively related to future excess bond returns, which further implies that short-term debt is preferred when short-term rates are lower compared to long-term. Marsh (1982) as well as Graham and Harvey (2001), who also studied the impact of macroeconomics variables on debt maturity, find the amount of debt to vary with interest rates. The long-term debt is issued when interest rates are particularly low (Graham & Harvey, 2001).

The fact that debt maturity is responsive to the changes in macroeconomic variables is called the debt market-timing. Market timing implies the opportunity to obtain higher return on investment by simply observing and responding to the changes in macroeconomic variables. Baker et al. (2003), Baker et al. (2003), and Baker et al. (2006) find evidence for managers timing the debt market by utilizing publicly available information on market conditions as a guide to their debt maturity decisions. For example, a large fraction of chief financial officers admit to following general debt market conditions while deciding on debt issuance decisions (Baker et al., 2006).

The phenomenon of market timing is, however, viewed as a short-run model. As presented in the Efficient Market Hypothesis section, in the long-run, it is not possible to profit from market timing as all investments are traded at their fair market value (Fama, 1970). In accordance with the hypothesis, Berlin (2006) believes that managers cannot time the market, because they do not have any information on future interest rate movements and therefore are not able to forecast the interest rates accurately. As a result, if the managers do not have accurate forecasts, the short- and long-term borrowing should lead to exactly the same borrowing costs (Berlin, 2006).

3. Methodology

3.1 Empirical model description

The debt-maturity decision is modeled based on the Principal – Agent Theory and the Efficient Market Hypothesis. The lender maximizes its expected returns from providing the investment loans to the borrowers subject to the borrowers' expected utility based on the chosen loan offer. The borrowers maximize their own expected level of utility provided by the chosen risk-level of the investment, the end-of-period wealth level, as well as the associated loan requirements set by the lender: interest rates and loan collateral. Consequently, the theoretical model guiding this empirical analysis is as follows:

$$\text{Lender: } \text{Max } v = \sum [p^m(1 + r^m_l) + (1 - p^m)C_l] \quad (1)$$

$$\text{Borrower: } \text{Subject to } \sum EU_l = U_1(W + R - (1 + r^m_l)) p^m + U_0(W - C_l)(1 - p^m) \quad (2)$$

where v represent lender's expected returns from providing a loan offer, p^m is the of the borrower's probability of project success based on the chosen investment technique (risky or safe), r^m_l represents the loan interest rate variable based on the firms wealth and risk level, C_l is the loan collateral variable based on firms initial wealth, U represents the borrower's utility level, W is the firm's wealth level, R is the firm's investment return on the project.

The optimal condition for deciding on the amount and maturity of debt depends on the probability of project success as well as the borrower's expected utility obtained from the project success:

$$p^m/(1 - p^m) = [U_0'(1 - p^m)]/[U_1'p^m]^4 \quad (3)$$

Based on the Efficient Market Hypothesis, the borrower decides on the optimal investment decisions based on the results of the profit and utility maximization. The firm profit maximization is defined as:

$$\text{Max } \Pi = R - TC = f(I_0) - (1 + r^m_l) I_0 \quad (4)$$

where R is the firm's investment return on the project, I_0 is the investment level, TC is the total cost of investing in the project, and r^m_l represents the loan interest rate. The manager's utility maximization problem is defined as:

$$\text{Max } U(Y_0, Y_1) = U_0(W_0 - I_0) + U_1((1 + r^m_l)I_0)/(1 + \rho) \quad (5)$$

where W_0 is the initial wealth and ρ is the subjective rate of time preference. The first order condition derived by taking the first derivative of both the profit and utility maximization problems with respect to I_0 results in the following condition:

$$f'(I_0) = U'_0(1 + \rho)/U'_1 = r^m_l \quad (6)$$

Thus, in the Efficient Market Equilibrium the market interest rate offered for the loan (r^m_l) is equal to the marginal inter-temporal utility as well as it equals the marginal rate of return on investment.

Based on the maximization problems description, the debt-maturity decision is defined as a series of simultaneous decisions made by the firm and the lender. Equations (1) and (2) present that probability of investment success as well as the prevailing interest rate impact on the investment decision of the firms. As it is difficult to directly predict the firm's probability of project success, the lenders approximate the success probability by observing the firm specific characteristics and based on the information issue a loan contract geared towards the firms' needs. The loan conditions include cost of capital borrowing and debt maturity period. On the other hand, the firms might actively take into account changes in macroeconomics variables such as the interest and inflation rates when making their financing decisions.

As presented above, only a system of simultaneous equations can represent these joint decisions as banks offer a number of loans from which the borrowers choose their desired contract features based on the loans' characteristics as well as their own ability to pay off the debt in the future (Dennis et al., 2000). Financial theory does not provide the appropriate restrictions allowing for such analysis although several studies have attempted to estimate this simultaneous equation framework (Dennis et al., 2000). As a result, the debt-maturity model is a reduced-form regression based on the simultaneous equations system (Baker et al., 2003; Barclay & Smith, 1995).

⁴ The first order conditions with respect to interest rate and collateral are:

$$d/d r^m_l = pm - \lambda[U_1'p^m] = 0$$

$$d/d C = 1 - p^m + \lambda[U_0'(1 - p^m)] = 0$$

$$p^m/[U_1'p^m] = 1 - p^m/[U_0'(1 - p^m)]$$

The corporate debt-maturity model utilized in this article follows the model described by Barclay and Smith (1995) and Baker et al. (2003). As a result, the theoretical debt-maturity model is presented as follows:

$$LTD_{it} = f(MB_{it}, LMV_{it}, AE_{it}, EBR_{it}, TS_{it}, INF_{it}, STR_{it}, RD_i) \quad (7)$$

where LTD_{it} is the share of long-term debt to total debt, MB_{it} denotes the market-to-book ratio, LMV_{it} is the natural logarithm of market value of the firm, AE_{it} is the abnormal earnings, EBR_{it} is the excess bond returns, TS_{it} is the term spread, INF_{it} denotes the inflation, and STR_{it} is the short-term interest rate. The subscript i denotes the i th firm ($i = 1, \dots, 652$), and the subscript t represents the t th year ($t = 1991, \dots, 2000$). RD_i is the firm regulation dummy variable, which does not vary over time.

3.2 Empirical data tests

Following the model specifications used by Barclay and Smith (1995) as well as Baker et. al (2003), the debt-maturity model estimated in this analysis is as follows:

$$LTD_{it} = \alpha_i + \beta_1 MB_{it} + \beta_2 RD_i + \beta_3 LMV_{it} + \beta_4 AFE_{it} + \beta_5 EBR_{it} + \beta_6 TS_{it} + \beta_7 INF_{it} + \beta_8 STR_{it} + D'\lambda_i + v_{it} \quad (8)$$

where D' is a row vector of dummy variables created for each firm's month when the fiscal year ends, excluding the month of December and λ_i is a column vector of associated weights. The variable was added to control for the possibility of seasonal time heterogeneity in the model. Furthermore, it is assumed that the disturbance term in equation (2) is specified as a one-way error component model:

$$u_{it} = a_i + v_{it} \quad (9)$$

where $v_{it} \sim NIID(0, \delta_v^2)$; $i = 1, \dots, 652$; $t = 1991, \dots, 2000$; α_i denotes a firm-specific effect, and v_{it} is the idiosyncratic error term (Hsiao, 2002).

In order to adequately specify the equation to be estimated, the debt-maturity model is tested for violation of assumptions such as: normality, heteroskedasticity, autocorrelation, and multicollinearity. The software utilized in this analysis is Stata 8. In order to test the normality assumption, the Bera and Jarque's LM skewness-kurtosis test for normality is used. The test is, however, sensitive to outliers and rejection of the null hypothesis provides no information about the alternative distribution to be used (Wooldridge, 2002). The problem of heteroskedasticity is examined utilizing the Breusch-Pagan test with the null hypothesis being that the u_{it} are serially uncorrelated. The null hypothesis is rejected for negative values of δ_u^2 (Wooldridge, 2002). Finally, testing the idiosyncratic errors v_{it} for serial correlation identifies autocorrelation. Testing autocorrelation in panel data uses the time-series errors (v_{it}), which are found to be negatively correlated when the v_{it} 's are uncorrelated. The null hypothesis for this test is that the time-demeaned⁵ errors are serially correlated. If serial correlation is found, the asymptotic variance matrix estimator and test statistics can be adjusted (Wooldridge, 2002).

⁵ **Time-demeaned Data** - panel data where, for each cross-sectional unit, the average over time is subtracted from the data in each time period (Wooldridge, 2002).

3.3 Model specifications

3.3.1 Ordinary least square estimation

There are several ways of estimating the debt maturity model. The Ordinary Least Square (OLS) regression is usually employed as it utilizes the actual values of the dependent variable. In order to allow for panel data estimation, OLS is often employed with either fixed or random-effects models (Berger et al., 2004; Hackethal & Jansen, 2006). The fixed- and random-effects models are discussed in the upcoming sections. On the other hand, other articles employ Tobit regression to estimate the debt maturity. As often the debt variable ranges between values of 0 and 1 (some firms might not have any long term debt), the data is truncated at the 0 point and exclude observations below this threshold from the analysis. Truncation might also occur when the observations are missing from the sample due to other sensitivity limits put on the variable of interest in the data set (Antoniou et al. 2002; Magri, 2006).

Although the Tobit model might seem like an appropriate method to estimate debt maturity data, several studies including Margi (2006) have criticized the utilization of Tobit model for panel data estimation. When Tobit model is employed in combination with random-effects, it may suffer from inconsistent estimates. The estimate inconsistency results from the absence of correlation between regressors and unobserved individual effects being not satisfied. Although several fixed-effects methods have been proposed to resolve this problem, the estimation process still yields inconsistent results or introduces complicated estimation processes not easily handled by current statistical software (Magri, 2006). Due to the several estimation limitations of different model specifications, different panel data forms of the OLS regression are employed in this article (Antoniou et al. 2002; Magri, 2006).

3.3.2 Panel OLS regression types

According to Dennis et al. (2000), the employment of the reduced form of debt-maturity model estimated using OLS estimation yields unbiased results. There are several OLS estimation methods employed to estimate the relationship between debt maturity and its determinants. First, the pooled OLS estimation is utilized; however, there is a problem of unobserved error term dependence, which results in biased and inconsistent findings (Wooldridge, 2002). In order to correct for this issue, a cross-sectional OLS regression method is utilized in combination with the time-series mean of each variable for an individual firm. However, this method only accounts for the variation across firms without analyzing the time-variation (Barclay & Smith, 1995).

In order to investigate the time-series dispersion, both fixed and random effects regression models are employed. In the fixed effects regression, the cross-sectional variation is arbitrarily correlated with the explanatory variables. In the random effects regression model, it is assumed, on the other hand, that the cross-sectional variation is random and it is a part of the unobserved variation included in the error term. The Hausman specification test is used to test for the sufficiency of random effects estimation. Finally, in order to correct for the existing heteroskedasticity and serial correlation across panels, the generalized least squares estimation is used to obtain efficient estimators (Wooldridge, 2002).

3.3.2.1 Ordinary least square regression

The basic technique for estimating the debt-maturity model is pooled OLS estimation. To perform this procedure, the model is rewritten as follows:

$$LTD_{it} = \beta_0 + \beta_1 MB_{it} + \beta_2 RD_i + \beta_3 LMV_{it} + \beta_4 AFE_{it} + \beta_5 EBR_{it} + \beta_6 TS_{it} + \beta_7 INF_{it} + \beta_8 STR_{it} + D'\lambda_i + u_{it} \quad (10)$$

where $u_{it} = \alpha_i + v_{it}$; $v_{it} \sim NIID(0, \delta_v^2)$; $i = 1, \dots, 652$; $t = 1991, \dots, 2000$. The underlying assumptions of this model are: 1) the explanatory variables (x_{it}) in each time period are uncorrelated with the idiosyncratic error in each time period: $E(x_{it}'v_{it}) = 0$, $i = 1, \dots, 652$, $t = 1991, \dots, 2000$; and 2) the explanatory variables are uncorrelated with the unobserved effect in each time period: $E(x_{it}'a_i) = 0$, $i = 1, \dots, 652$, $t = 1991, \dots, 2000$. The regression estimation provides consistent estimators as long as the underlying assumptions are satisfied (Barclay & Smith, 1995; Wooldridge, 2002).

3.3.2.2 Cross-sectional regression with time-series mean

Since the OLS assumption of serially uncorrelated composite errors is not satisfied in the pooled OLS specifications, the t-statistics are overstated. To account for the potential error-dependence problem, a single cross-sectional regression with the time-series mean of each variable by firm is used to perform the regression analysis. Running the OLS cross-sectional equations eliminates the problem of serially correlated composite errors. The estimated model is re-specified as follows:

$$LTD_i = \alpha_i + \beta_1 MB_i + \beta_2 RD_i + \beta_3 LMV_i + \beta_4 AFE_i + \beta_5 EBR_i + \beta_6 TS_i + \beta_7 INF_i + \beta_8 STR_i + D'\lambda_i + v_i \quad (11)$$

where $v_i \sim NIID(0, \delta_v^2)$; $i = 1, \dots, 652$; $t = 1991, \dots, 2000$ (Barclay and Smith, 1995; Wooldridge, 2002).

3.3.2.3 Fixed and random effects models

Estimating the model by the cross-sectional regressions preserves the dispersion across firms; however, it does not exploit the time-series variation in the observations (Barclay and Smith, 1995). To correct for the serially correlated errors, a random or fixed effects regression model can be utilized. In a random effects model, the α_i is included in the error term, and the model takes the following specification:

$$LTD_{it} = \beta_0 + \beta_1 MB_{it} + \beta_2 RD_i + \beta_3 LMV_{it} + \beta_4 AFE_{it} + \beta_5 EBR_{it} + \beta_6 TS_{it} + \beta_7 INF_{it} + \beta_8 STR_{it} + D'\lambda_i + u_{it} \quad (12)$$

where $u_{it} = \alpha_i + v_{it}$; $\alpha_i \sim NIID(0, \delta_\alpha^2)$; $v_{it} \sim NIID(0, \delta_v^2)$; $i = 1, \dots, 652$; $t = 1991, \dots, 2000$. In the random effects approach, α_i is incorporated in the composite error term under the assumption that it is orthogonal to the explanatory variables, (x_{it}) , $E(x_{it}'a_i) = 0$, $i = 1, \dots, 652$, $t = 1991, \dots, 2000$. Furthermore, the method accounts for the implied serial correlation in the composite error, $u_{it} = \alpha_i + v_{it}$, identical to the generalized least squares (GLS) estimation (Wooldridge, 2002).

In the fixed effects model, the model specification is as follows:

$$LTD_{it} = \alpha_i + \beta_1 MB_{it} + \beta_2 RD_i + \beta_3 LMV_{it} + \beta_4 AFE_{it} + \beta_5 EBR_{it} + \beta_6 TS_{it} + \beta_7 INF_{it} + \beta_8 STR_{it} + D'\lambda_i + v_{it} \quad (13)$$

where $v_{it} \sim NIID(0, \delta_v^2)$; $i = 1, \dots, 652$; $t = 1991, \dots, 2000$. In the fixed effects analysis, α_i is arbitrarily correlated with x_{it} , $E(x_{it}'\alpha_i) \neq 0$, $i = 1, \dots, 652$, $t = 1991, \dots, 2000$ (Wooldridge, 2002).

In order to identify whether fixed or a random effects estimation technique is appropriate for the analysis, the Hausman test is performed to examine the appropriateness of the random effects estimator. A Hausman test compares two estimators. Under the null hypothesis, the fixed and random effects estimators are consistent, but one is more efficient; under the alternative hypothesis, the more efficient of the two becomes inconsistent but the less efficient remains consistent. Thus, if the null is not rejected, the two estimators should be similar; divergence indicates rejection of the null. Rejection of the null further implies the effects are correlated with the individual variances, and the fixed effects should be used for estimation. The Hausman test statistic is as follows:

$$W = (\beta^{\wedge F} - \beta^{\wedge R})' \Sigma^{-1} (\beta^{\wedge F} - \beta^{\wedge R}), W \sim \chi^2(k) \quad (14)$$

where k is the number of estimated coefficients and Σ^{-1} is the difference of the estimated covariance matrices from the two estimators. Based on the test results, one of the methods is chosen to perform the econometric analysis (Wooldridge, 2002).

As noted earlier, the problem of heteroskedasticity and autocorrelation is a common issue associated with panel data; GLS estimation can correct for violations of the underlying assumptions. On the other hand, the random effects model accounts for the serial correlation in the composite error term and, therefore, corrects for the serial correlation of errors (Wooldridge, 2002).

3.3.3 GLS model corrected for panel heteroskedasticity and AR(1)

Finally, the last problem associated with panel data is the problem of heteroskedasticity and serial correlation across panels. The fixed and random effects models overlook these correlations and, therefore, yield inefficient estimators. The heteroskedasticity test compares the maximum likelihood of the model with panel-level heteroskedasticity to the model with homoskedasticity across panels. The autocorrelation across panels is tested based on the assumption that the idiosyncratic errors, v_{it} , are serially uncorrelated in the random and fixed effects model specifications (Stata 8 Manual, 2005; Wooldridge, 2002). By correcting for heteroskedasticity and autocorrelation across panels, the estimation procedure yields an error variance-covariance estimator, which is robust to the common problems associated with panel data (Stata 8 Manual, 2005).

4. Data

In order to investigate the relationship between debt maturity and its determinants, a large sample is constructed, following Barclay and Smith's (1995) and Baker and colleague's (2003) sampling method. The time- and cross-sectional data set merges the COMPUSTAT industrial annual file of debt determinants and the Federal Reserve's file of macroeconomic variables. The sample is restricted to firms with Standard Classification codes from 2000 to 5999 to focus on the industrial corporate sector. Furthermore, firms utilized in the study are present in the sample over the specified time period and have complete data for the explanatory variables. Consequently, the total number of firms included in the empirical analysis is 652. The data span is 1991 through 2000.

The construction method of the sample might cause a survivorship bias, which represents a tendency for some companies to be excluded from performance studies due to the fact that they no longer exist (Investorwords.com, 2005). In the present investigation, only firms with complete data for 1991-2000 are included in the analysis. The bias affects the results towards finding the predicted relationship between the debt maturity and debt determinants, because most of the surviving firms are larger and older with less investment opportunities and, therefore, issue more long-term debt. On the other hand, the bias prevents the analysis from finding the results predicted for the macroeconomic variables due to their high volatility over the time period of the study.

The time- and cross-sectional data series are debt determinants: 1) total assets, common shares outstanding, debt due in one, two, three, four and five years, earnings per share, total equity, and stock price; and 2) macroeconomic variables: twenty-year government bond and commercial paper return, six-month treasury bill yield, inflation, and term spread.

COMPUSTAT reports the amount of long-term debt payable in years one through five from the firm's fiscal year end. Following Barclay and Smith (1995), the maturity structure of a firm's debt is defined as the percentage of the firm's total debt that has a maturity of more than three years. Several firms have less than zero percent or more than 100 percent of their total debt maturing in more than three years. Since these observations reflect data-coding errors, they are deleted.

Excess bond returns are measured by an index of investment-grade corporate bonds over commercial paper. The corporate bond indices track portfolios that are continually redefined to a constant 20-year maturity. Excess government and corporate bond returns are the difference between the long-term corporate bond and commercial paper returns, respectively (Baker et al., 2003).

There are four debt determinant variables used in this study: market-to-book ratio, a regulatory dummy variable, firm size, and abnormal earnings. Consistent with the Agency Cost Hypothesis, the market-to-book ratio is a proxy for the firm's investment opportunity set. The market value of the firm's assets is estimated as the book value of assets minus the book value of equity plus the market value of equity (the price of shares multiplied by the total number of shares outstanding). The market-to-book ratio is the estimated market value of assets divided by the book value of assets (Barclay & Smith, 1995). In accordance with Baker et al. (2006), the variable is hypothesized to carry a negative sign.

To estimate the effect of regulation on debt maturity, a dummy variable is constructed. It takes a value of one for regulated firms, and zero otherwise. Regulated industries include airlines, telecommunications, as well as gas and electric utilities. The firm size is the estimated natural logarithm of the market value of the firm (Barclay & Smith, 1995). As found in the studies by Chen et al. (1999) and Antonenko et al. (2006), the log of firm value is expected to be positively related to the share of long-term debt as a proportion of total debt.

Signaling models assume that managers have better information about the firm's value (or quality) than investors. To estimate the firm's quality empirically, the firm's abnormal earnings are defined as a proxy. The variable is measured as the difference between next year's and this year's earnings per share divided by this year's share price. It is assumed that high-quality firms have positive abnormal earnings, and low-quality firms have negative

abnormal earnings (Barclay and Smith, 1995). Following Barclay and Smith (1995), observations with the absolute value of abnormal earnings greater than five were disregarded. The exclusion of the extreme values might affect the coefficient for the abnormal earnings, but should not influence the other variables in the analysis.

Debt market conditions are represented by three variables: inflation, the real short-term rate, and the term spread. Inflation is the annual percentage change in the Consumer Price Index. The real short-term rate is estimated as the annualized Treasury bill return minus inflation. The term spread is the difference between the Treasury bond yield and the annualized Treasury bill return. In order to account for the cross-sectional variation of the debt determinants data, the market variables ending dates are matched with the firm's fiscal year end (Baker et al., 2003). The descriptive statistics for each variable used in the analysis are presented in Table 2.

Variable		Mean	Standard Deviation	Min Value	Max Value
Share of Long-Term Debt to Total Debt	Overall	0.587608	0.2489763	0	1
	Between ^a		0.1307427	0.085569	0.938587
	Within ^b		0.2119414	-0.23633	1.29564
Market-to-Book Ratio	Overall	1.549547	0.9116479	0.360198	22.81232
	Between ^a		0.707687	0.639052	7.222132
	Within ^b		0.575302	-1.81968	21.19958
Regulatory Dummy Variable ^c	Overall	0.21319	0.4095923	0	1
	Between ^a		0.4098753	0	1
	Within ^b		0	0.21319	0.21319
Log of Market Value	Overall	2.698775	0.9371075	0.152839	5.435521
	Between ^a		0.9146363	0.550687	5.332079
	Within ^b		0.2067988	0.473086	4.102186
Abnormal Earnings	Overall	0.030876	0.4310666	-5	5
	Between ^a		0.1028505	-0.35749	0.820588
	Within ^b		0.4186344	-5.67963	4.901274
Excess Bond Returns	Overall	0.010944	0.022473	-0.052	0.079
	Between ^a		0.004737	-0.00534	0.01641
	Within ^b		0.021968	-0.03572	0.080104
Term Spread	Overall	0.012496	0.0120939	-0.0068	0.0351
	Between ^a		0.0017139	0.01113	0.01565
	Within ^b		0.011972	-0.00967	0.034366
Inflation	Overall	0.027276	0.0068753	0.0137	0.0565
	Between ^a		0.0009295	0.02662	0.029
	Within ^b		0.0068123	0.011976	0.055196
Short-Term Rate	Overall	0.021536	0.0127056	-0.0549	0.0501
	Between ^a		0.0066697	-0.01892	0.02339
	Within ^b		0.0108171	-0.01444	0.090556

Variable		Mean	Standard Deviation	Min Value	Max Value
January Dummy	Overall	0.062883	0.2427718	0	1
	Between ^a		0.2429396	0	1
	Within ^b		0	0.062883	0.062883
February Dummy	Overall	0.019939	0.1398002	0	1
	Between ^a		0.1398968	0	1
	Within ^b		0	0.019939	0.019939
March Dummy	Overall	0.055215	0.2284164	0	1
	Between ^a		0.2285743	0	1
	Within ^b		0	0.055215	0.055215
April Dummy	Overall	0.015337	0.1229004	0	1
	Between ^a		0.1229853	0	1
	Within ^b		0	0.015337	0.015337
May Dummy	Overall	0.026074	0.1593665	0	1
	Between ^a		0.1594766	0	1
	Within ^b		0	0.026074	0.026074
June Dummy	Overall	0.07362	0.2611709	0	1
	Between ^a		0.2613514	0	1
	Within ^b		0	0.07362	0.07362
July Dummy	Overall	0.016871	0.1287986	0	1
	Between ^a		0.1288876	0	1
	Within ^b		0	0.016871	0.016871
August Dummy	Overall	0.019939	0.1398002	0	1
	Between ^a		0.1398968	0	1
	Within ^b		0	0.019939	0.019939
September Dummy	Overall	0.075153	0.2636589	0	1
	Between ^a		0.2638411	0	1
	Within ^b		0	0.075153	0.075153
October Dummy	Overall	0.049233	0.216371	0	1
	Between ^a		0.216201	0	1
	Within ^b		0.0117498	-0.05077	0.949233
November Dummy	Overall	0.016871	0.1287986	0	1
	Between ^a		0.1288876	0	1
	Within ^b		0	0.016871	0.016871

^a Between Group Estimates – variation between mean groups.

^b Within Group Estimates - deviations from a group mean.

^c Mean derived based on a dummy variable (i.e. Regulatory Dummy Variable) present the percent of the data falling into the '1' category.

Table 2. Data Descriptive Statistics Employed in Corporate Debt Estimation Process

5. Discussion of the results

5.1 Comparison of alternative OLS models

Results of tests of the debt-maturity model for violation of assumptions of normality, heteroskedasticity, and autocorrelation are presented in Table 3. These results revealed significant heteroskedasticity and serial correlation issues. In order to account for misspecification problems, different model specifications were estimated including pooled and cross-sectional OLS, as well as GLS regressions. The precision and efficiency of the parameter coefficients were found to be sensitive to the chosen form. Finally, the Hausman specification test was utilized to examine the appropriateness of random effects estimation. As presented in Table 3, fixed effects estimation appears to be the appropriate model choice as the null hypothesis representing the difference in coefficients not being systematic is rejected ($X^2(8) = 22.24$). For the purpose of proving the debt theory, however, both random and fixed effects are presented for comparison purposes.

Test	Null Hypothesis	Test Statistic	Probability > Test Statistic
Ordinary Least Square Regression			
Bera and Jarque's LM Skewness-Kurtosis Test for Normality	No Skewness and Kurtosis	$X^2(2) = 1.76$	0.414
Breusch-Pagan Test for Heteroskedasticity	Constant Variance	$X^2(1) = 91.47$	0
Test of Residuals	Serial Correlation	$t = 20.45$	0.006
Fixed and Random Effects Regression			
Breusch and Pagan Lagrange Multiplier Test for Random Effects	Constant Variance	$X^2(1) = 844.55$	0
	Difference in Coefficients		
Hausman Specification Test	Not Systematic	$X^2(8) = 22.24$	0.0045
GLS Model Corrected for Panel Heteroskedasticity and AR(1)			
Likelihood-Ratio Test for Heteroskedasticity Across Panels	No Panel Heteroskedasticity	$X^2(651) = 2024.73$	0
Wooldridge Test For Autocorrelation Across Panels	No First-Order Autocorrelation	$F(1, 651) = 78.425$	0

Table 3. Specification Test of the Corporate Debt Maturity Model Specifications

Overall, the test-statistic and log likelihood values of each model specification indicate that each regression in Table 4 is significant at conventional levels. Comparing the models' R-square values suggests that variation in debt maturity structure across firms provides some of the explanatory power in these regressions. The R-square value for the different specifications ranges from 0.0101 to 0.1218, which implies that from 1 percent to 12 percent

Variables	Pooled OLS	Cross- Sectional OLS	Fixed Effects	Random Effects	GLS Model Corrected for Panel Heteroskedasticity and AR(1)
Dependent Variable	Share of Long-Term Debt to Total Debt				
Intercept (b ₁)	0.43717*** (17.22)	0.08306 (0.08)	0.27612*** (5.06)	0.47550*** (15.93)	0.59842*** (39.03)
Market-to- Book Ratio (b ₂)	-0.00951*** (-2.79)	-0.13057* (1.80)	-0.00474 (-0.99)	-0.00796** (-1.99)	-0.00674** (-2.16)
Regulatory Dummy Variable (b ₃)	0.01040 (1.29)	0.01082 (0.83)	Dropped	0.00809 (0.63)	0.00656 (0.99)
Log of Market Value (b ₄)	0.04724*** (13.42)	0.04365*** (7.40)	0.11800*** (7.37)	0.05250*** (9.71)	0.01366*** (4.48)
Abnormal Earnings (b ₅)	-0.01543** (-2.19)	-0.08694* (-1.79)	-0.00955 (-1.44)	-0.01269* (-1.94)	-0.01212** (-2.18)
Excess Bond Returns (b ₆)	-0.23884* (-1.87)	-0.12034*** (-2.34)	-0.23886* (-1.70)	-0.25854** (-2.03)	-0.06003*** (-2.42)
Term Spread (b ₇)	-0.02786 (-0.08)	0.02743 (0.34)	0.70750* (1.89)	0.029691 (0.09)	-0.29725* (-1.67)
Inflation (b ₈)	-0.34899 (-0.54)	-0.46010 (-0.04)	-0.26200 (-0.44)	-0.34895 (-0.59)	-0.57826** (-2.16)
Short-Term Rate (b ₉)	-0.27210 (-0.72)	-0.19125 (-0.98)	-0.09694 (-0.28)	-0.25854 (-0.75)	-0.11847 (-0.85)
January Dummy (b ₁₀)	0.01737 (1.29)	-0.04619 (-0.34)	Dropped	0.01713 (0.8)	0.03400*** (2.54)
February Dummy (b ₁₁)	-0.00884 (-0.40)	0.11801 (0.22)	Dropped	-0.00758 (-0.21)	0.00954 (0.04)
March Dummy (b ₁₂)	-0.0646*** (-4.55)	0.04413 (0.09)	Dropped	-0.06550*** (-2.96)	-0.05803*** (-5.91)
April Dummy	-0.00073	0.00564	Dropped	0.00377	-0.02318

Variables	Pooled OLS	Cross- Sectional OLS	Fixed Effects	Random Effects	GLS Model Corrected for Panel Heteroskedasticity and AR(1)
Dependent Variable	Share of Long-Term Debt to Total Debt				
(b ₁₃)	(-0.03)	(0.03)		(0.01)	(-1.06)
May Dummy	0.00897	-0.04860	Dropped	0.00953	0.44310*
(b ₁₄)	(0.37)	(-0.36)		(0.28)	(1.65)
June Dummy	0.00786	-0.09589	Dropped	0.01010	0.07890***
(b ₁₅)	(0.64)	(-0.38)		(0.52)	(9.54)
July Dummy	0.00369	-0.12577	Dropped	0.00524	0.02657
(b ₁₆)	(0.15)	(-0.38)		(0.36)	(1.01)
August Dummy	0.00967	0.00738	Dropped	0.01286	-0.00612
(b ₁₇)	(0.44)	(0.08)		(0.14)	(-0.33)
September Dummy	-0.00963	-0.06278	Dropped	-0.00701	0.01354
(b ₁₈)	(-0.12)	(-0.52)		(-0.37)	(1.16)
October Dummy	-0.00170	-0.00627	0.07469	0.00102	0.00293
(b ₁₉)	(-0.81)	(-0.14)	(0.32)	(0.04)	(0.24)
November Dummy	0.06158***	-0.00320	Dropped	0.06315*	0.11411***
(b ₂₀)	(2.6)	(-0.02)		(1.66)	(16.49)

Note: The coefficient estimates are represented as the first number for each independent variable. Numbers in parenthesis represent the standard error of each parameter coefficient. An * (**) (***) indicates significance at 10% level (5% level and 1% level). Pooled OLS regression: R-Square = 0.0388; F-stat = F(19, 6500) = 13.79. Cross-sectional OLS regression: R-Square = 0.1218; F-stat = F(19, 632) = 5.17. Fixed effects regression: R-Square = 0.0122; Wald $\chi^2(19) = 137.54$. Random effects regression: R-Square = 0.0101; Wald $\chi^2(19) = 596.82$. GLS Regression Corrected for Panel Heteroskedasticity and AR(1): Log Likelihood = 1601.881; Wald $\chi^2(19) = 596.82$.

Table 4. Estimation Results for the Corporate Debt Maturity Model

of the variation in the debt maturity variable, is explained by the explanatory variables in the model specifications.

5.2 Report of empirical results for different model specifications

5.2.1 Ordinary least square regression

Results presented in Table 4 suggest that debt maturity decisions are related to excess bond returns, debt determinants, and macroeconomic variables. The pooled OLS model

specification indicates that excess bond returns are negatively related to debt maturity ($b_6 = -0.23884$) at the 10% significance level. Furthermore, market-to-book ratio and abnormal earnings are inversely associated with the debt maturity variable at the 1% and 5% levels, respectively. Log market value is positively correlated to the dependent variable at a 1% level of significance. There is no regulatory effect found on the debt maturity decisions, although the coefficient on the dummy variable is positive, as predicted. Furthermore, none of the macroeconomic variables is statistically significant, yet all of them are negatively related to the dependent variable, which is in agreement with theoretical predictions. Finally, there is a statistically significant difference for the firms with fiscal year ending in March and November and the amount of long-term debt issued compared to the firms with fiscal year ending in December. For example, firms with fiscal year end in March tend to issue more short-term debt.

5.2.2 Cross-sectional regression with time-series mean

To account for the error-dependence problem in pooled OLS estimation, a single cross-sectional regression with the time-series mean of each variable by firm was used to estimate the model. The excess bond returns are statistically significant at the 5% level of significance and have a coefficient of $b_6 = -0.12034$. The debt determinants: the market-to-book ratio and abnormal earnings negatively relate to the long-term debt decisions and have higher magnitudes compared to those obtained in the pooled OLS estimation ($b_1 = -0.01305$ vs. $b_1 = -0.00613$; $b_4 = -0.08694$ vs. $b_4 = -0.01413$). Log market value is positively associated with debt decisions and is higher compared to the pooled OLS estimate. Again, no market variables are statistically significant and term spread carries a positive sign. Finally, there is no statistical difference for long-term debt in capital structure for firms with fiscal year end in December and other months.

5.2.3 Fixed and random effects models

The cross-sectional regressions preserve dispersion across firms, but do not exploit time-series variation in the observations (Barclay & Smith, 1995). The fixed effects regression model was estimated to correct for this problem. Both fixed and random effects results are reported and discussed. For the random and fixed effects regressions, there is a difference between the parameter coefficients and their efficiency levels. In the fixed effects estimation, the excess bond returns are negatively related to debt maturity ($b_6 = -0.23886$). The coefficient is smaller in absolute value than the random effects coefficient by 0.02, yet it is less efficient (the t-statistic associated with the independent variable in fixed effects model is lower compared to the t-statistic in the random effects model specification). Furthermore, the log of firm market value is positively associated with the debt maturity ($b_3 = 0.11800$), and it is the only debt determinant statistically significant in the model. The coefficient is larger than the random effect estimate coefficient ($b_3 = 0.05250$) and has a larger standard error. Parameter estimates for market-to-book ratio and abnormal earnings diverge under the two models; in the random effects equation both variables are statistically significant and inversely correlated with the dependent variable, while in fixed effects equation both variables are statistically insignificant. In the fixed effects model, only term spread is statistically significant among the macroeconomic variables; the positive coefficient contradicts theoretical predictions. Finally, in the case of random

effects regression, there is a statistically significant difference between the firms with fiscal year ending in March and November in the level of long-term debt issued compared to the firms with fiscal year end in December. Due to multicollinearity observed in the case of fixed effects, most of the seasonal dummy variables were dropped from the estimation by Stata 8.

5.2.4 GLS model corrected for panel heteroskedasticity and AR(1)

Heteroskedasticity and autocorrelation across panels are corrected by generalized least square estimation applying the correction for heteroskedasticity and first-order autocorrelation across panels with autocorrelation coefficient of $\rho = 0.4070$. The modification improved the precision and efficiency of the parameter coefficients in the regression compared to the previous specifications. The excess bond returns are statistically significant at the 1% level, and negatively correlated to debt maturity decision ($b_6 = -0.06003$). The parameter coefficient is the lowest among all specifications. As before, market-to-book ratio and abnormal earnings are negatively related to the debt maturity decision. Log firm market value is positively related to debt maturity ($b_3 = 0.01366$) at the 1% significance level. In the case of macroeconomic variables, term spread and inflation are negatively associated with debt maturity at the 10% and 5% levels, respectively. These coefficients have the largest magnitudes among all the regression specifications. Finally, there is a statistically significant difference in the debt-maturity decisions for firms with fiscal year ending in January, March, May, June, and November compared to those with fiscal year-ending in December. For example, firms with fiscal year end in January, May, June, and November have a higher share of long-term debt compared to those in December.

5.3 Results summary

The fixed effects model as well as model corrected for heteroskedasticity and autocorrelation across panels are the specifications that should be given more weight when interpreting the regression results. The pooled OLS and cross-sectional model with time-series mean display issues with the estimation of panel data. The pooled OLS model does not account for the error-dependence problem while a single cross-sectional regression with the time-series mean of each variable by firm does not employ the time-series variation within each panel. To correct for these estimation issues the fixed effects model is utilized. The model specification corrected for heteroskedasticity and autocorrelation across panels also should carry a higher weight in results comparisons as it improves the precision and efficiency of the parameter coefficients when compared to the other specifications.

Based on the results presented in Table 4, there is a negative relationship between debt maturity and excess bond returns in all specifications. Furthermore, market-to-book ratio, abnormal earnings, as well as term spread and inflation are negatively related to the share of long-term debt. The firm size is positively related to debt maturity. Finally, there is a difference in long-term debt issues for firms with fiscal year ending in January, March, May, June, and November. However, no statistically significant relationships were found for the regulatory dummy and short-term interest rate, although the signs for these coefficients are consistent with theoretical predictions. Results here indicate the precision and efficiency of the model were sensitive to the model specification; corrections for violations of underlying assumptions are responsible for the magnitudes of these differences.

6. Discussion and conclusions

The debt financing decisions are a set of simultaneous decisions made by lenders and borrowers. Since lenders are unable to observe directly the firms' investment decisions, the banks offer contracts based upon the observable firm characteristics such as wealth and size. The contracts offered to each firm differ with respect to the cost of capital borrowing as well as its maturity. When deciding on the financing decisions, firms might also take into account the changes in macroeconomics variables in order to lower the cost of borrowing. As a result, the goal for this article was to examine the hypothesis of the effect of the debt determinant as well as the macroeconomics variables on the debt maturity structure at the individual firm level data. The research objective was achieved by investigating the relationship between these variables and the corporate debt maturity structure. A reduced form of the simultaneous debt decision model was estimated by employing several OLS estimation methods to analyze the relationship between debt maturity and its determinants.

The examination of the excess bond returns as well as the debt and market determinants of corporate debt maturity supports the hypothesis that excess bond returns are negatively associated with debt maturity. For example, firms tend to issue long-term debt when excess bond returns are low. Furthermore, results here are consistent with Barclay and Smith's (1995) and Antoniou et al. (2002) findings that firms with more growth options in their investment opportunity set issue more short-term debt. As a result, reducing debt maturity helps control the underinvestment problems as presented by Myers (1977). For example, underinvestment occurs when the debt maturity is not appropriately timed and debt refinancing occurs after investment options expire so the gains from new investments accrue to the debt holder (Johnson, 2003).

As discussed by FEMA (2005), there is also evidence for a strong positive association between firm size and debt maturity in which large firms issue a significantly higher share of long-term debt. Finally, there is support for the hypothesis that firms use the maturity of debt to signal information to the market. In accordance with Barclay and Smith's (1995) and Richardson and Sloan's (2003) findings, high-quality firms issue short-term debt, while low-quality firms issue long-term debt. There is no statistically significant evidence found supporting the impact of firms' regulatory status on debt maturity, although the variable does carry the predicted sign, implying that regulated firms issue more long-term debt.

The results obtained for the market variables are consistent with the hypothesis of macroeconomic variables impacting the debt maturity. The evidence is supported by the inverse relationship between the corporate debt maturity and the macroeconomic variables: inflation and term spread. Firms borrow long term when debt market conditions suggest that the relative cost of long-term debt is low. Although there is no evidence found in support of impact of short-term interest rates on debt maturity, the variable carries the predicted negative sign.

The sign and the magnitude of impact of the term spread changes depending on the model specification. These differences can be explained by linking the variable to the impact of taxes on the debt maturity decisions. Due to a firm's default on debt payments, the expected value of the firm's tax liabilities depends on the debt maturity structure as long as it is not flat. For example, if the term structure is upward sloping, issuing long-term debt reduces the

firm's expected tax liability and, therefore, increases the firm's market value. As a result, there is a positive relationship between long-term debt and a slope of the term structure (Brick & Ravid, 1985).

The limited impact of the term spread is explained by Lewis (1990) and Terra (2005) as taxes having no effect on the optimal debt maturity when the optimal debt-asset ratios and debt maturity structure are chosen simultaneously. Terra (2005), however, finds that taxes do have a negative relationship with debt maturity in the case of Latin American firms. As many researchers, he struggles to explain why taxes have no impact on debt maturity although the average effective tax rate for the U.S. companies is greater than those of other countries so the negative impact of the term spread should be statistically influential (Terra, 2005).

The finding of the negative relationship between the macroeconomic variables and debt maturity confirms the fact of the chief financial officers timing the market by issuing short-term debt when short-term rates are low or when long-term rates are expected to decline. The finding is especially significant in the case of large firms, which have easy access to financial markets (Berlin, 2006). The findings confirm also the belief that managers watch the debt and therefore lower the borrowing cost. For example, Faulkender (2005) finds that managers believing in market timing purchase a swap, amplifying the firm's exposure to rising interest rates while undertaking new borrowings instead of hedging against the increase in interest rate risk. This implies that managers are likely to swap fixed interest rate payments for floating interest rates payments at the same time of the debt offering when the term premium is high (Faulkender, 2005).

On the other hand, not finding the short-term interest rate statistically significant is in agreement with the view shared by Berlin (2006) which states that chief financial officers cannot time the market due to limited information on interest rate movements (Berlin, 2006). As a result, managers might simply be wrong in their beliefs that market timing helps to decrease the cost of borrowing. Even if the cost of borrowing is lowered, it might not be a result of market-timing. Although Baker et al. (2003) find managers to exploit inefficiencies in debt markets and therefore, find lower borrowing cost, Butler et al. (2004) criticizes their econometric techniques and remains unconvinced of the market-timing phenomenon. His opinion as well as Berlin's (2006) opinion is in agreement with the Efficient Market Hypothesis, which states that it is impossible to "beat the market" because market efficiency causes existing investment prices to always incorporate and reflect all relevant information with regard to the market conditions (Fama, 1970).

The analysis here has some potential limitations. First, results obtained in this study are affected by a survivorship bias due to the sample generating process, which only included firms with complete data for the entire 10 years of study. As a result, the firms that are included in the sample as a result are more likely to be larger and older with less investment opportunities. These firm characteristics bias the sample towards finding issuance of long-term debt. On the other hand, the bias works against finding the inverse relationship between debt maturity and excess bond returns as well as macroeconomic variables. High volatility of the explanatory variables over the time of the analysis makes it harder to obtain the predicted results due to lack of persisting trend in the variables. Consequently, based on the bias possibility, the results for firm characteristics have to be taken lightly.

Second, as discussed by Barclay and Smith (1995), the debt-maturity analysis could be better executed if more disaggregated data were used in the study. For example, firms with more growth options in their investment opportunity set issue more short-term debt; however, it is questionable whether the total variation might result in variation among instruments with different maturities such as short-term bank debt or long-term public debt. A more detailed examination of the mix of debt instruments issued by different companies would add to the depth and understanding of firms obtaining the observed debt structure (Barclay & Smith, 1995).

Further research on the debt maturity structure should not only include the mix of debt instruments, but also one, two, and three-year cumulative excess bond returns. By including the cumulative returns in the model, debt maturity sensitivity to the impact of long- and short-term returns could be estimated. Such analysis would provide further information on the cost of debt borrowing at different maturities. Additionally, the sample used in the analysis should include information for as many firms and years as are available, in order to increase the precision and efficiency of the results. Furthermore, a large number of firms included in the sample will decrease the possibility of a survivorship bias and offer a more representative sample of firms, so obtained results could be extrapolated and interpreted for all firms in general. In order to investigate in more detail the relevance of the Market Timing Hypothesis in capital borrowing process, the weekly/monthly data points instead of yearly values should be employed in the model. As mentioned earlier, the market-timing phenomenon is a short-run process, so with more frequent data points finding support for the hypothesis is more likely to be achieved.

Finally, several changes should be made to the functional form of debt maturity and the empirical estimation framework. Since the functional form of the debt maturity function has not been defined by the finance literature at this point, the estimation process of the OLS models should include the specification tests for higher orders and interaction effects between the independent variables. Finding the right functional form of the debt maturity will improve the precision and efficiency of the model estimates and identify the debt maturity drivers. In addition, the empirical analysis framework should be extended to a mixing (averaging) estimator model to improve the efficiency of the estimation process. The idea behind the mixing estimator model is to average the estimators obtained from different OLS models to attain more efficient results compared to those derived from estimating each model individually while controlling for the omitted variable bias. The employment of the mixing estimator model results in fitted estimates that are asymptotically efficient with a minimum value of squared error in the class of discrete model average estimators (Hansen, 2006).

In conclusion, the analysis found evidence in support of impact of debt determinants and macroeconomic variables on the structure of debt maturity. Furthermore, as suggested by Backer et al. (2003), empirical studies of debt maturity need to incorporate the market conditions and the excess bond returns in order to adequately explain patterns in debt maturity data.

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The Brazilian Stock Market – Dimension, Structure, and Main Features

Ademir Clemente¹, Marinês Taffarel² and Robert A. Espejo³

¹*Universidade Federal do Parana*

²*Universidade Estadual do Centro-Oeste*

³*Faculdade de Ciencias Sociais e Aplicadas do Parana
Brazil*

1. Introduction

Brazil has attracted the attention of investors around the world as it went through the 2008 financial crisis with relative ease, perhaps due to its history of successive internal economic crises that forced authorities to develop a specific know-how to manage them.

The objective of this chapter is to condense some basic information on the Brazilian stock market so as to enable investors to make a first decision in considering such a market, and to offer to other readers a consistent introduction.

First, a few lines are dedicated to positioning the Brazilian economy after the stabilization in 1994. Following this, a section presents the main institutions of the Brazilian stock market. The next 2 sections present its dimension and structure, respectively. In sequence, a brief discussion of the role of accounting information in determining prices and returns is inserted. The next section deals with corporate governance and highlights the *Novo Mercado*. Then, some final remarks are added.

2. The Brazilian economic scenario

Brazil, Russia, India, and China are emerging countries that constitute the group named BRICs, the world's fastest growing economies. By the 1970s, Brazil became the leading economy in Latin America due to its industrialization of natural resources and large labour pool. Brazil is the eighth largest economy in the world, the fifth largest country in terms of size, with an area of 8.5 million km² distributed into 5 regions (Table 1).

The Northern region, which contains the State of Amazon, is the largest. Southern and Southeast regions are the least extensive and the most developed.

According to the Brazilian Institute of Geography and Statistics (IBGE), Brazil's population reached 190.8 million in 2010, representing a growth of 30% over 1991. Table 2 shows that population growth was much stronger in the less populous regions.

Region	Area (1,000 Km ²)	%
Northern	3,853.6	45
Central-west	1,606.4	19
Northeast	1,554.4	18
Southeast	924.6	11
Southern	563.8	7
Total	8,502.7	100

Source: IBGE (2011)

Table 1. Geographic Area by Region

STATE/REGION	1991	2000	2010	10/91(%)
Parana	8,448.7	9,563.5	10,444.5	24
Rio Grande do Sul	9,138.7	10,187.8	10,693.9	17
Santa Catarina	4,542.0	5,356.4	6,248.4	38
SOUTHERN	22,129.4	25,107.6	27,386.8	24
Espirito Santo	2,600.6	3,097.2	3,515.0	35
Minas Gerais	15,743.2	17,891.5	19,597.3	24
Sao Paulo	31,588.9	37,032.4	41,262.2	31
Rio de Janeiro	12,807.7	14,391.3	15,989.9	25
SOUTHEAST	62,740.4	72,412.4	80,364.4	28
Distrito Federal	1,601.1	2,051.1	2,570.2	61
Goiás	4,018.9	5,003.2	6,003.8	49
Mato Grosso	2,027.2	2,504.4	3,035.1	50
Mato Grosso do Sul	1,780.4	2,078.0	2,449.0	38
CENTRAL-WEST	9,427.6	11,636.7	14,058.1	49
Alagoas	2,514.1	2,822.6	3,120.5	24
Bahia	11,868.0	13,070.2	14,017.0	18
Ceara	6,366.6	7,430.7	8,452.4	33
Maranhao	4,930.3	5,651.5	6,574.8	33
Paraiba	3,201.1	3,443.8	3,766.5	18
Pernambuco	7,127.9	7,918.3	8,796.4	23
Piaui	2,582.1	2,843.3	3,118.4	21
Rio Grande do Norte	2,415.6	2,776.8	3,168.0	31
Sergipe	1,491.9	1,784.5	2,068.0	39
NORTHEAST	42,497.5	47,741.7	53,081.9	25
Acre	418.8	557.5	733.6	76
Amazonas	2,103.2	2,812.6	3,484.0	66
Amapa	289.4	477.0	670.0	131
Para	4,950.1	6,192.3	7,581.1	53
Rondonia	1,132.7	1,379.8	1,562.4	38
Roraima	217.6	324.4	450.5	107
Tocantins	919.9	1,157.1	1,383.4	50
NORTHERN	10,030.5	12,900.7	15,865.0	58

Source: IPEADATA (2011)

Table 2. Brazilian Population by State (1,000)

Besides the population increase, life expectancy in Brazil rose from 62.6 years in 1980 to 73.4 years in 2010 (Table 3).

Year	Life expectation
1980	62.6
1985	64.7
1990	66.6
1995	68.5
2000	70.4
2005	71.9
2010	73.4

Source: IPEADATA (2011)

Table 3. Life Expectancy

Brazil's GNI per capita was 9,390 US Dollar in 2010 (World Bank, 2011). Table 4 shows the evolution of the purchasing power of the minimum wage in Brazil. Major changes occurred since it was established in 1940; however, there is a clear pattern of growth in the last 20 years.

Year	Minimum wage	Index
1940	18.30	100
1950	13.82	76
1960	63.59	460
1970	44.44	70
1980	110.38	248
1990	81.24	74
2000	129.79	160
2010	280.02	216

Source: IPEADATA (2011)

Table 4. Purchasing Power of the Minimum Wage (USD)

The regions and states present very different contributions to GDP and also very different levels of GDP per capita, as shown in Table 5.

The Northern region has the largest land area and also the lowest share of GDP. The Northeast is the one with the lowest GDP per capita. In reality, the country faces serious internal disparities within its five regions. The Southeast region is in the upper range of human development, followed by the Southern and Central-west regions; however the 9 states located in the Northeast region present the lowest socioeconomic indexes. Disparities are also important in relation to gender and ethnics countrywide (Tulane, 2011).

After various unsuccessful plans, inflation was finally brought under control in 1994, but the stabilization process only ended in 1998. Therefore, the more significant available economic

Regions and States	GDP	%	GDP per capita
BRAZIL	3,031,864.5	100	15,989.8
NORTHERN	154,704.2	5	10,216.4
NORTHEAST	397,502.6	13	7,487.5
SOUTHEAST	1,698,590.4	56	21,182.68
Minas Gerais	282,522.3	9	14,232.8
Espirito Santo	69,870.2	2	20,230.8
Rio de Janeiro	343,182.1	11	21,621.4
Sao Paulo	1,003,015.8	33	24,456.9
SOUTHERN	502,052.2	17	18,257.8
CENTRAL-WEST	279,015.1	9	20,372.1

Source: IBGE (2011)

Table 5. Brazil's GDP (R\$1,000) and GDP Per Capita (R\$) in 2008

data refer to the period beginning in 1999. Table 6 shows the Brazilian GDP growth rate and the inflation rate (consumer prices) over the last 12 years.

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GDP%	0.8	4.2	1.9	1.0	-0.2	5.1	2.3	3.7	5.4	5.1	-0.2	7.5
INFL%	4.9	7.1	6.8	8.4	14.8	6.6	6.9	4.2	3.6	5.7	5.0	5.0

Source: IndexMundi (2011)

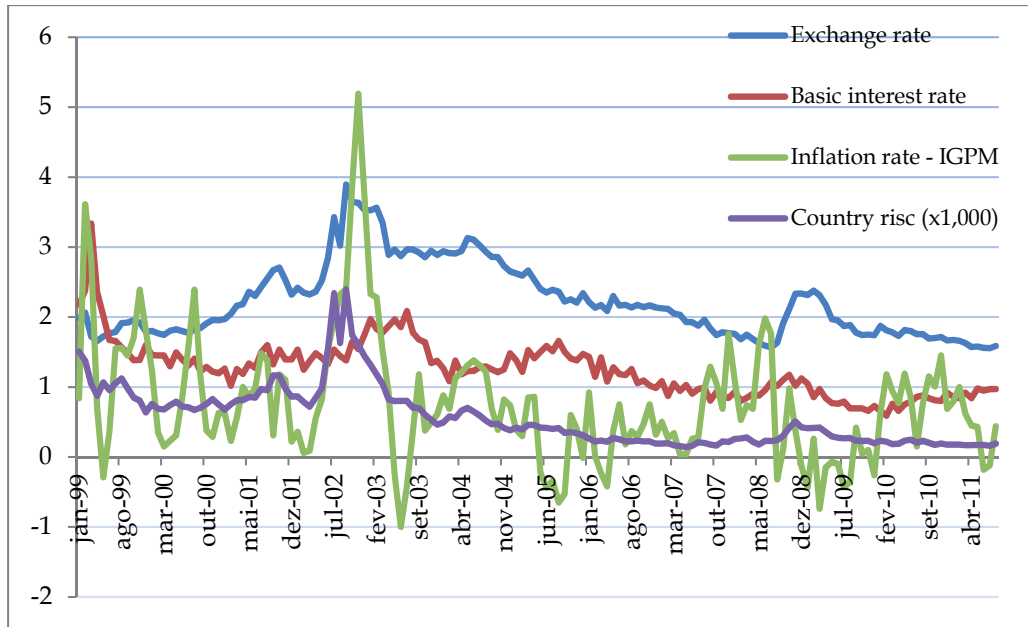
Table 6. Brazilian GDP Growth Rate and Inflation Rate

Figure 1 illustrates selected economic series for the mentioned time period. The electoral year of 2002 was clearly atypical. All the rest shows a very reasonable scenario of increasing stability.

The Brazilian auto industry became the fifth largest in the world in 2011, positioning itself after China, the United States, Japan, and Germany (O Globo, 2011). The strong growth in recent years in mining industry and construction is also noteworthy. Civil construction, in particular, has been encouraged by the federal government by means of easy credit and the Growth Acceleration Plan (PAC).

Brazilian exports have shown strong growth in recent years. According to the Ministry of Development, Industry, and Foreign Trade - MDIC (2011), in 2001 average daily exports totalled US \$ 233 million; while in 2011 already exceed US \$ 1 billion. However, a large space for growth is still perceivable in comparison with China (6.5 billion per day) and USA (5.3 billion per day).

A great variety and abundance of natural resources, including land for agriculture, water, and the tropical climate, as well as a domestic consumption presenting a clear pattern of growth, are frequently highlighted as an optimistic indication for business in the immediate future.



Source: The Central Bank of Brazil (2011)

Fig. 1. Selected Economic Series

3. The Brazilian stock market, Bovespa, and CVM

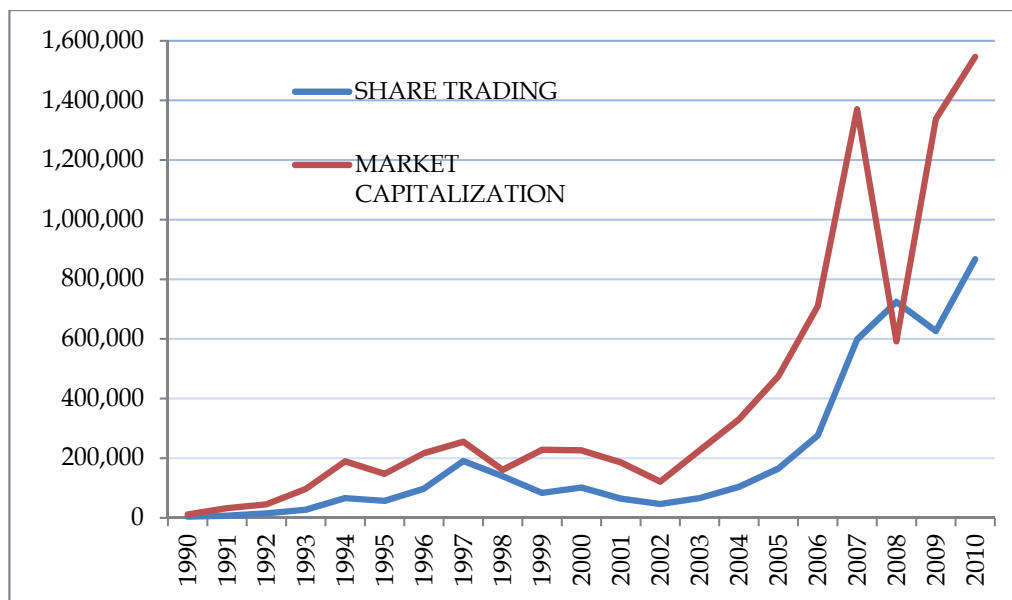
The capital market plays a key role in a country's economic development because it constitutes an efficient mechanism for allocating resources (Assaf Neto, 2008; Damodaran, 2002). Unfortunately, Brazil was not able to take advantage of this until recent years.

A long period of high inflation rate and general economic instability historically exerted serious negative effects on the Brazilian stock market until the mid 1990s. According to Lameira (2004), the Plano Real was a milestone for the Brazilian stock market. Indeed, the stock market, fostered by economic and political stability, initiated a vigorous pattern of growth since 2003, as demonstrated in Figure 2.

An intense inflow of capital from abroad is in the core of this growth process and due to this Bovespa is now the fifth bourse in the world in foreign investors' participation. The high internal interest rate and the privatization program started in 1997 have attracted considerable amounts of foreign capital except in 2002 (electoral year) (Lameira, 2004, p.104). Since then Brazil has come to be regarded as an important option for foreign investors. In July, August, and September 2011 foreign investors were responsible for 33%, 34%, and 36% of the Bovespa's trade volume, respectively (BM&FBovespa, 2011).

Foreign investments bring many benefits to the country that receives them but also cause negative effects, as shown in Table 7.

Some analysts emphasize that the Brazilian government should exercise tighter control over the flow of foreign capital, but others insist that the maintenance of good economic fundamentals, such as balance of public accounts and keeping inflation under control, along



Source: World Federation of Exchanges (2011)

Fig. 2. The Evolution of Bovespa's Share Trade and Market Capitalization

Positive effects	Negative effects
Improve the country's international image;	May cause imbalance in the country;
Government can finance its deficit for longer terms and lower interest rates;	Possibility of fast reflux of external resources in the presence of negative indicators;
Greater opportunities for capital expenditures and costs reduction.	Struggle to prevent flights of capital in the presence of any international instability.

Source: Adapted from Pinheiro (2008, p. 39)

Table 7. Effects of Foreign Investments

with good growth prospects, are the best tools to maintain and expand the participation of foreign capital in the growth process of the country.

Founded in 1890, Bovespa assumed institutional characteristics in the 1960s and in 1967 became the Bolsa de Valores de Sao Paulo. In the 1990's all the regional stock exchanges in Brazil merged their trading activities under the leadership of Bovespa to create a unique nationwide stock market. In May 2008, after integration with the Commodities and Futures Exchange (BM&F), it was renamed BM&FBOVESPA.

Together, BM&F and Bovespa include trading of equities and fixed income securities, both stock markets and over the counter. However, the Bovespa basically involves share trading, options, debentures and a few other securities, while BM&F is devoted to commodities and futures, and also commodities and financial derivatives.

Share trading is the main activity of the Bovespa and follows specific rules. There are three trading channels in the Bovespa: *mega bolsa*, open-outcry sessions, and aftermarket trading sessions. Regardless of the channel used, only authorized brokers operate share trading.

Primary equities are issued through the Bovespa. Private and public sector corporations that meet the registration requirements of the Brazilian Securities Commission (CVM) become eligible to issue equity shares through the Bovespa. Such corporations can count on the market expertise and financial leverage of underwriters to launch stocks on the market. An underwriter may guarantee that the issuer will receive a certain price on the stocks sold.

In 1999 a home broker system was installed to allow investors to easily communicate with the brokerage firm by using the Internet, and its use has been growing ever since.

The Brazilian stock market is ruled by the CVM, an agency of the Brazilian government that serves as the primary regulator of the securities trade. It attempts to ensure that all trades are fair, and that no price manipulation or insider trading occurs.

CVM was established in 1976 with the objective of regulating and disciplining the operation of the Brazilian capital market. By offering institutional guarantees to investors and the desired operational flexibility, CVM fosters companies' capitalization and economic growth by means of a better allocation of resources.

In order to achieve its objectives, CVM:

- Ensures the efficient, reliable, and equitable functioning of the securities market, and foments its expansion;
- Protects investors and securities holders by avoiding or preventing irregularities, frauds and manipulative practices;
- Guarantees ample and fair disclosure of relevant information concerning securities traded and issuer companies (CVM, 2011).

Figure 3 shows the participation in the volume of the *Fundos de Índices* (ETFs) in October 2010. These funds are known as offering efficiency, transparency and flexibility in a single investment. The major participants are institutional investors (45.3%), followed by financial institutions (26.6%), and foreign investors (16.2%).

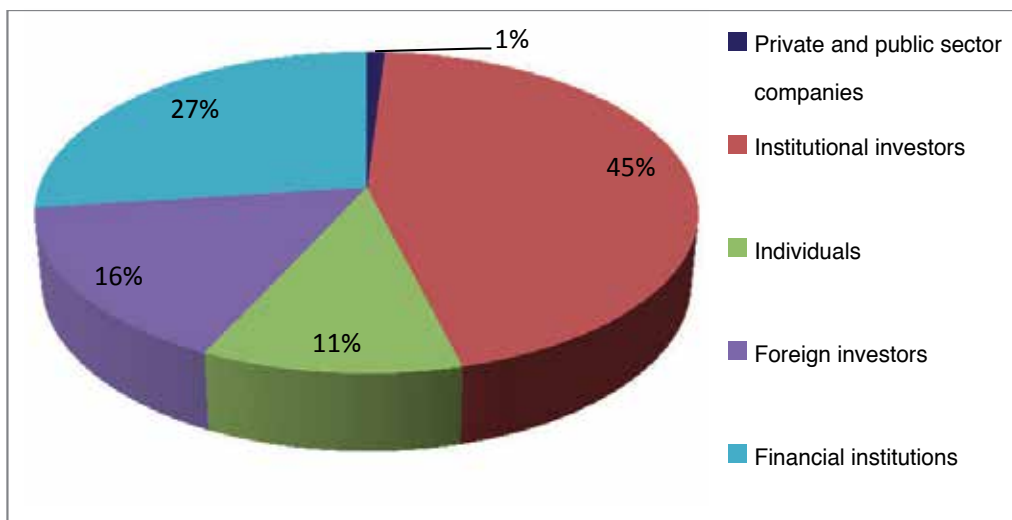
4. The Brazilian stock market dimension

In order to grasp a better estimate of the Brazilian stock market dimension, Table 8 shows a comparison between the main burse in each country of the BRICs.

Country	Market Capitalization (USD Billions)	Number Of Listed Companies	Total Value Of Share Trading (USD Billions)
Brazil (Bovespa)	1 545	381	867
Russia (MICEX)	949	245	407
India (Bombay)	1 631	5 034	258
China (Shanghai)	2 716	894	4 486

Source: World Federation of Exchanges (2011)

Table 8. BRICs' Main Stock Exchanges by the End of 2010

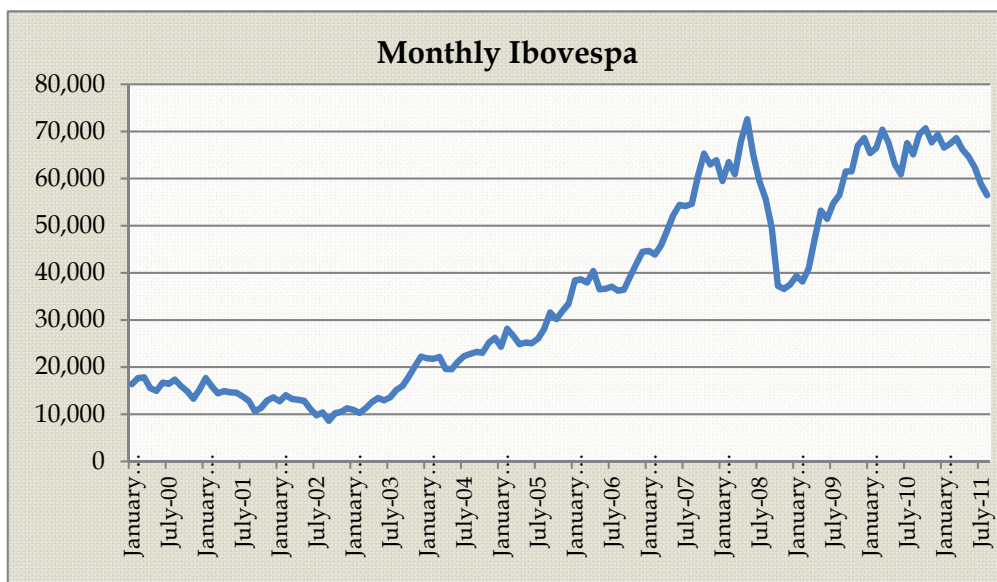


Source: BM&FBOVESPA (2010b)

Fig. 3. Percentual Participation in the ETFs, Oct 2010

Bovespa is the largest stock exchange in Latin America, and is also one of the largest in the world.

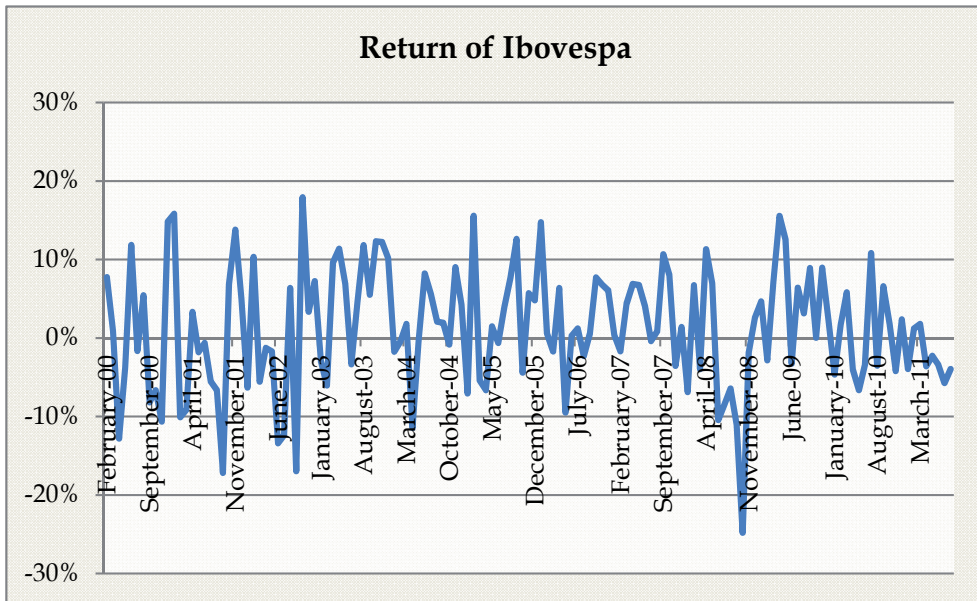
Bovespa's most important index is Ibovespa, whose primary purpose is to indicate the general behaviour of the Brazilian stock market. Ibovespa represents more than 80% of either the number of operations or the value of share trade. Figure 4 shows the monthly evolution of Ibovespa since January 2000.



Source: Bovespa (2011)

Fig. 4. Ibovespa's Monthly Evolution Since Jan 2000

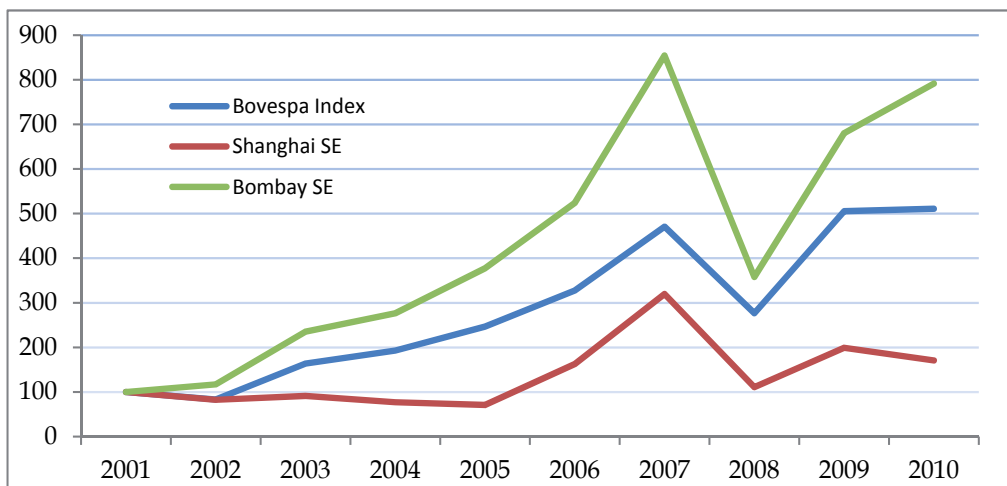
Figure 5 presents the monthly return of Ibovespa in the same time period.



Source: BM&FBovespa (2011)

Fig. 5. Ibovespa's Monthly Return Since Feb 2000

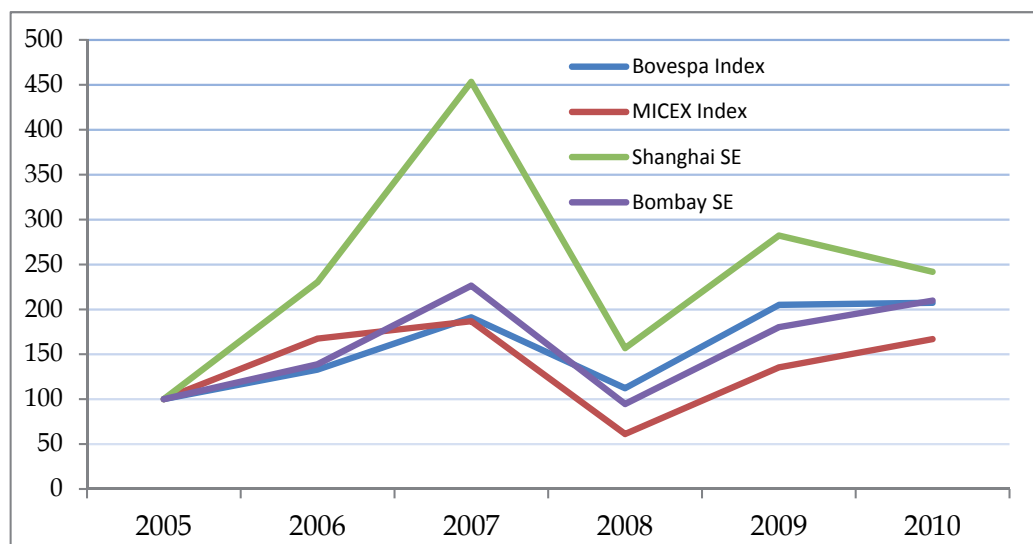
The Bovespa's performance in recent years looks impressive both in respect of accumulated earnings and in relation to daily returns, but it is better to make this assessment by comparing its evolution with stock exchanges in other countries, especially the BRICs.



Source: World Federation of Exchanges (2011)

Fig. 6. Comparative Evolution of the BRICs' Main Stock Exchanges (2000 = 100)

The index of the MICEX (Russia) is only available from 2005, so the comparison based on 2000 does not include it. Figure 6 shows that Bovespa's performance is lower than that of Bombay (India) and exceeds that of Shanghai (China).



Source: World Federation of Exchanges (2011)

Fig. 7. Comparative Evolution of the BRICS' Stock Exchanges (2005 = 100)

When considering the most recent period starting in 2005 (Figure 7), there is a quite different relationship between the indexes. In this case, Shanghai (China) stands out while the other three show very similar behaviour.

5. The Brazilian stock market structure

The Brazilian stock market is highly concentrated in a reduced number of companies in comparison to developed countries, as shown in Table 9.

STOCK EXCHANGE	2010		2009	
	NUMBER OF COMPANIES	MARKET CONCENTRATION	NUMBER OF COMPANIES	MARKET CONCENTRATION
BOVESPA	19	64.2%	19	64.8%
NYSE	104	57.0%	92	48.8%
TOKYO	114	60.1%	115	60.1%
LONDON	118	82.3%	109	86.4%

Source: World Federation of Exchanges (2011)

Table 9. Stock Market Concentration - Value of Share Trade

In Bovespa just 8 sectors represent 85.0% of the share trading volume and the major 24 companies account for 72.3% of that volume. Petrobras (Oil and gas) accounts for 16.1%; Vale do Rio Doce (Mining), for 13.1%; Bradesco, Itau and Banco do Brasil (banks), for 8.5%; totalling 37.7% of the value of share trading (BM&FBovespa, 2011).

Not only is the market concentrated, but so is the equity. Okimura (2003) affirms that there is a predominance of controlling shareholders in the Brazilian stock market, concentrating approximately 76% of vote-entitled shares, and Cavalhal da Silva (2004) states that, on average, the three largest shareholders control Brazilian companies. Table 10 indicates that among the 24 companies representing 1% or above of the Ibovespa, 15 are controlled by the major shareholder and another 3 by the two biggest shareholders. That is to say: 75% of those companies are controlled by one or two shareholders.

	Companies ^a	Shareholder 1	Shareholder 2	Total
1	ALL	12.18	7.58	19.76
2	AMBEV	65.30	17.10	82.40
3	BANCO DO BRASIL	65.30	11.10	76.40
4	BRADESCO	48.38	17.04	65.42
5	BRASIL TELECOM	79.63		79.63
6	BRASIL TEL PART	79.63		79.63
7	CEMIG	50.96	32.96	83.92
8	CESP	94.08		94.08
9	COPEL	58.63	26.41	85.04
10	COSAN	62.33	10.88	73.21
11	CSN	46.20		46.20
12	ELETROBRAS	52.00	5.15	57.15
13	GERDAU	74.80	7.10	81.90
14	GOL	100.00		100.00
15	ITAU	38.66	51.00	89.66
16	NATURA	22.27	21.25	43.52
17	PERDIGAO	14.16	12.04	26.20
18	PETROBRAS	53.63	5.18	58.81
19	TAM	80.40	9.84	90.24
20	TELEMAR PART	19.33	16.89	36.22
21	TIM	77.14	5.14	82.28
22	USIMINAS	23.74	10.13	33.87
23	VALE DO RIO DOCE	52.70	6.70	59.40
24	VIVO	37.97	38.41	76.38

Source: BM&FBovespa (2011)

^a Companies whose weight is 1% or above in the IBOVESPA

Table 10. Shareholders' Concentration in the Main Brazilian Companies

6. Studies on the Brazilian stock market reaction to accounting information disclosure

The seminal study on the reaction of stock markets to statement disclosure by Ball and Brown (1968) indicates that stock prices show variation in the same direction of profit. The same study also concludes that most of the information contained in financial statements is anticipated by the market or is perceived before their publication. In fact, disclosure of financial statements is just one among other information sources used by investors.

The Brazilian stock market remained undersized and lifeless until 1990s due to lack of monetary and political stability. Its strong growth in recent years presents as a consequence an increasing demand for research work and studies to provide guidance to agents, especially domestic and foreign investors. This difficulty is further increased because the few available studies do not always show convergence. Table 11 summarizes the recent literature on the influence of accounting information in the Brazilian stock market.

AUTHOR(S)	PERIOD	FINDINGS
Lopes (2002)	1995-9	Accounting numbers are relevant to explain stock prices and explanatory power is concentrated in companies' net equity.
Sarlo Neto <i>et al.</i> (2003)	1990-02	Changes in preferred share prices follow the direction of accounting results. In respect to common shares, only portfolios with negative returns follow the direction of reported results.
Lima and Terra (2004)	1995-02	Abnormal returns on disclosure of financial statements are not statistically significant. Abnormal returns on yearly results are significant, indicating that information is relevant in confirming expectations.
Sarlo Neto (2004)	1995-02	Disclosed results represent an important source of information for investors. Accounting reduces the informational asymmetry in the Brazilian stock market.
Lopes <i>et al.</i> (2005)	1990-02	Evidence that changes in preferred share prices follow the direction of reported results.
Dantas <i>et al.</i> (2006)	2001-04	Operating leverage presents a positive influence upon returns on stocks.
Loriato and Gomes (2006)	2000-04	Annual financial disclosures provide relevant information to the market and cause an increase in trade volume.
Silva and Favero (2007)	2005-06	The market believes that the higher the cost of debt, the greater the financial leverage and therefore the better the result of the company.
Scarpin <i>et al.</i> (2007)	2005	The date of publication of financial statements has consequence on stock prices and trade volume.
Costa Jr. <i>et al.</i> (2007)	1995-07	Existence of causality of accounting return on market return at a marginal level of 10%.
Santos (2008)	2000-07	Changes in revenue do not influence return on shares, rather changes in costs are statistically significant.

Source: Taffarel (2009)

Table 11. Recent Studies on the Reaction of the Brazilian Stock Market to Accounting Information Disclosure

These studies suggest that, in general, accounting information can be considered significant in explaining stock prices and returns in Brazil.

Taffarel (2009) sought to evaluate the importance of accounting information in the Brazilian stock market. The sample encompassed 34 companies chosen according to their participation in the theoretical Ibovespa. The dependent variable was defined as the daily stock closing price of the common or preferred stocks at different dates and the independent

variables were defined as 16 accounting and financial indicators. The analyzed time period was Jan/1st/ 1998 to Mar/31st/2008.

The results indicated that the information embodied in the accounting exhibits impact differently common and preferred stock prices. For common stocks, current ratio, net working capital by sales, return on net equity, return on asset, sales by total assets, and sales by fixed assets, represented by their principal components, explained 29% of the return of stock price referred to 30 days after the accounting exhibits' publication on the trimester closing price.

In respect to preferred stocks, the model that better explains the relationship is based on the return of the stock price referred to 5 days after the exhibits' publication on the trimester closing price. Operational margin, net margin and return on net equity, in combination with total assets by sales, fixed assets by sales, and net equity by sales, represented by their principal components, explained 57% of the stock price variation.

7. Corporate governance and the Brazilian stock market

The stock market at Bovespa is divided into four segments: Traditional, Level 1, Level 2, and Novo Mercado (New Market). This is the ranking of the four segments according to specific sets of regulatory and additional requirements of corporate governance.

Companies in the Novo Mercado may only issue voting (common) shares and voluntarily undertake corporate rules and disclosure requirements which are much more stringent than those already established by Brazilian laws, known as "good practices of corporate governance". These rules are designed to increase shareholders' rights and enhance the quality of information provided by companies. Additionally, a Market Arbitration Panel is offered to resolve conflicts between investors and issuers (World Bank, Brazil Report September 2004).

CVM, Bovespa, the Brazilian Institute of Corporate Governance (IBGC), and the Brazilian Bank for Economic and Social Development (BNDES) have acted together and created a positive climate in which companies pursue the accomplishment of the established standards of corporate governance by themselves in order to obtain a differentiation in the market and a higher value. The BNDES requires companies to promote the opening of capital and improve their corporate governance practices in exchange for the funding (Lameira, 2004, p.108-109).

This important change in the Brazilian stock market, initiated in December 2000, is based on the idea that reduction in investor perceptions of risk presents a positive effect on share values and liquidity. As pointed out by the World Bank: "Bovespa believed that investors would perceive their risks to be lower if two things occurred: they were granted additional rights and guarantees as shareholders; and, if the asymmetry of access to information between controlling shareholders/company management and market participants was narrowed (if not eliminated)." (World Bank, 2004).

According to Santana *et al.* (2008) "Brazil is at an advanced stage in the corporate governance debate, and demand for voting shares, transparency, tag along rights, and other corporate governance rights has increased significantly."

In comparison with other countries, experts recognise that the Brazilian experience in respect to corporate governance and stock market is successful. Petra Alexandru compared the *Novo Mercado* to Romania's Transparency Plus Tier and highlighted that in the latter the

Romanian Corporate Governance Codes and Principles and the T+Tier were imposed upon listed companies as mandatory requirements. As a result, only one company had applied to be listed on the T+ Tier until 2006. "The positive attitude of the local issuers towards such standards was overestimated." (IFC, 2008).

Melsa Ararat and B. Burcin Yurtoglu compared the Istanbul Stock Exchange's initiative to promote higher corporate governance among its listed companies to the *Novo Mercado's* experience. They pointed out that Turkey's plan failed and that the small diversification in comparison to Brazil is likely to be a main explanatory factor (IFC, 2008).

8. Final remarks

Brazil presents good economic and social indicators, mainly originating from mid-1990. Once the *Plano Real* was established in 1994, the economy went through a period of accommodation that would have ended in 1998 were it not for the instability that plagued the world economy and the proximity of the 2002 elections. Thus, the beneficial effects of stabilization were only made present in a clear and lasting way from 2003. This is very noticeable in the behaviour of the Bovespa.

Data on the Brazilian economy, especially since the *Plano Real*, has led to a growing number of supporters of the government's policy of maintaining a political and economic environment favourable to increasing participation of foreign capital in the country's development, including absence of control.

Bovespa concentrates practically the whole stock market in Brazil, and receives a significant flow of capital resources from abroad, but it is not well known yet. Indeed, there are few studies on the Brazilian stock market, and the fast growth process imposes changes that make it still more difficult to properly understand its functioning.

Bovespa is comparable in size to the main stock exchanges in the BRICs, the Brazilian stock market is markedly concentrated, and equity control is concentrated in hands of a few shareholders.

Studies on the influence of accounting indicators on prices and stock returns in the Brazilian market are still scarce and inconclusive. A recent study (Taffarel, 2009), however, shows that the preferred and common shares react differently to the publication of financial statements in the short term.

The Brazilian experience on the classification of stocks as to the standards of management and information made available to the market by issuer companies can be considered a success, especially when compared to other developing countries. In Brazil, companies are encouraged to adhere to different levels of governance, but they do so freely.

The introductory remarks in this chapter may serve as a starting point for the persons concerned with deepening their knowledge of the Brazilian stock market, but they are obviously insufficient for making an investment decision. The general characteristics presented here constitute only an overview of the current situation and prospects.

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The Case for Monetary Union in East Asia – From Theory to Empirics

Chee-Heong Quah

*Faculty of Business and Accountancy,
University of Malaya
Malaysia*

1. Introduction

In the interwar years, the difficulties of reinstating the gold standard and the disruptive shock of the Great Depression had prompted a wide-ranging debate on the international monetary system in the West. Today, the developments in the West, in particular the birth of euro and the Asian financial crisis were among the drivers which had spurred the proliferation of the intellectual work on monetary arrangement in the context of East Asia.

The theory of optimum currency areas (OCAs) has advanced only minimally since the seminal contributions of Mundell (1961), McKinnon (1963), and Kenen (1963). It remains difficult to move from theory to empirical work and policy analysis.

Bayoumi and Eichengreen (1997, p.762)

Nevertheless, as the above statement vividly points out, it has remained difficult to operationalize the intellectual work to practical grounds given the complexities found in the real world. In spite of this, numerous empirical studies have attempted to demystify the theory in an effort to identify groups of economies which could possibly come together under one common monetary umbrella.

Against this backdrop, the present paper seeks to present the reasons why the idea of Asian monetary union has gained increasing popularity despite of the obstacle highlighted. Along this line, the paper also provides the arguments for two alternative monetary anchors. Finally, the paper reviews a number of empirical works in the field in order to identify countries which have been commonly indicated to be prospective for integration and to comment on some general trends found in the empirical papers.

The remaining of the paper is structured as follows. Section 2 revisits the essence of the classical work which has propagated the intellectual framework. Section 3 explains why flexible exchange rates are most probably not suitable for emerging East Asia. Section 4 details the case for fixed exchange rate and monetary union for the region. Sections 5 and 6 present the case for US dollar and the case for currency basket as the monetary anchor respectively. Section 7 provides the review of 20 empirical studies and section 8 discusses relevant interpretations and concludes.

2. The theory of optimum currency areas

In the classic published in 1961, Robert Mundell proposed that an optimal currency area is characterized by internal factor mobility and external factor immobility. Succinctly, interregional and interindustrial factor mobility can substitute for changes in nominal exchange rates to restore internal and external equilibriums when asymmetric shocks occur between economic regions. The equilibriums pertain to maintenance of full employment, stable price levels, and balanced international payments.

Upon contemplation of Mundell's thesis, Kenen (1969) elucidated the former's definition of optimality and economic region. An economic region was interpreted as a homogeneous collection of producers that use the same technology, face the same demand curve, and suffer or prosper together as circumstances change whilst optimality was taken as a condition linked to the labor market and exchange rate regime. Economic regions do not necessarily coincide with nations. If a prevailing exchange rate regime can maintain external balance without causing unemployment or demand-induced wage inflation, that regime is optimal. Flexible prices, wage rates, and labor markets are the conditions underlying that optimality in which balances can be restored in the event of asymmetric shocks.

Based on the presumption that perfect labor mobility hardly prevails, Kenen provided an alternative to define optimality. In his opinion, diversity in product-mix or economic activity may be more relevant than labor mobility in defining OCAs. He argued that well-diversified economies are more able to cope with asymmetric shocks between members in a monetary union and are therefore more feasible candidates to be part of the union. Another dimension for optimality came from McKinnon (1963) in which he contended that highly open economies are least feasible for flexible exchange rates and hence, exchange rate fixation with a putative currency is highly desirable.

Under fixed exchange rate and free capital mobility, the pursuit of independent monetary policy will likely lead to disequilibrium in the balance of payments, resulting in speculative capital flows (see e.g. Tavlas, 1993). In the presence of liberal capital sector, a sustainable monetary bloc entails irrevocably fixed exchange rates; full and irreversible convertibility of currencies; financial market integration; liberalized movements on current transactions; common monetary policy; and harmonization of national financial regulations and structures of institutions.

3. The case against flexible exchange rate

Even before the literature on OCAs came into the picture, there had always been a school of thought which advocates complete floating exchange rate. The fundamental argument raised by Milton Friedman¹ in his 1953 classic for allowing exchange rate to float lies in the ability of floating rate to ease the process of adjustment to external shocks. Suppose the demand for exports of a country falls, necessitating a fall in relative prices of goods and labor to correct the deficit—it will be easier for the change in terms of trade be accomplished

¹Though Friedman has always been portrayed as a strong advocate for floating rates, he has actually had no objections for hard fixed rates (Hanke, 2008).

through depreciation or devaluation rather than through some combinations of inflation in the foreign country and unemployment in the home country.

Whilst the argument for floating rate is convincing, floating regime has nevertheless been criticized for increasing transaction costs, undermining the roles of money, and promoting speculation (Mundell, 1961); creating excess volatility and uncertainty which may lead to inconvertibility (Krugman, 1991); inflating prices and wages (McKinnon, 1963; Krugman, 1990; Mundell, 2001); deterring international investment and capital allocation (Kenen, 1969; Tower and Willet, 1976; Eichengreen, 2001); facilitating precarious and inflationary monetary policies (McCallum, 1989; Tavlas, 1993; Calvo, 2002); disrupting international strategic management (Cooper, 2000); and also for its ineffectiveness in correcting balance of payments (De Grauwe, 1989; Krugman, 1990).

In a strategic sense, attempts to increase competitiveness by devaluations would only lead to inflation and retaliations (see McKinnon, 1963; Krugman, 1990; Mundell, 2001). In highly open economies, domestic prices and wages are most likely closely linked to exchange rates of significant trading partners, rendering devaluations or depreciations ineffective in restoring external balance; the net result is more inflation. Also, devaluation is useless when a shock comes from the capital account, as when emerging markets are hit by contagion and face sharply higher interest rates; the Latin American and the Indonesian experience had been contractionary irrespective of the degree of devaluation (Calvo, 2002).

In light of the above, for economies which have been integrated in respect of trade and international capital flows, which define most of East Asia today, flexible rates are most probably undesirable. In fact, the sharp fluctuations in the yen-dollar rate, coupled with pseudo-fixed or soft pegs and incompetent monetary policies were the main culprit behind the Asian crisis. Thus, the foregoing of independent monetary policy and hence floating rate is very likely to be beneficial to developing countries (Milton Friedman in Friedman and Mundell, 2001; Calvo and Reinhart, 2002).

This is in light of the fact that even Japan, an advanced economy, is not spared from the devastating effects from floating rates. The Japanese banking system was the casualty of excessive appreciation of the yen between 1985 and 1995 (Mundell, 2003). The tripling of the value of the yen against the dollar had actually weakened the corporate balance sheets and saddled the Japanese banking system with non-performing loans.

4. The case for fixed exchange rate and monetary union

The primary case in favor of exchange rate fixation against a pivotal currency rests upon the desirability of certainty (Krugman, 1990). By fixing participants' currency values against a hard currency (or a basket of hard currencies), the resulted system will confer a degree of stability between the participants and the numéraire country (countries), as well as between the participants. The desirability of fixed exchange rate and monetary union is evidently proven by the ever-expanding EMU; the Euro club contains 16 members since Slovakia adopted the Euro on January 1, 2009. The following discussion highlights the case for an Asian monetary union which most probably underlies the motivation for the empirical studies in the area.

Greater economic integration

Tighter economic integration in East Asia is ever warranted in the face of rising regional integration elsewhere such as NAFTA, EU, Mercosur, CEMAC², OECS³, UEMOA⁴, and CACM⁵. To an extent, these arrangements have brought intra-regional stability but more competition between trade blocs and more volatility between major currencies.

Along these lines, East Asia may need to further enhance its intra-regional trade to insulate against disturbances originating from outside the region. Recent free trade deals have encompassed ASEAN⁶, China, Japan, India, Australia, and New Zealand which cover aspects of goods, services, investments, and intellectual property (Kowsmann and Venkat, 2008). In theory, countries could still achieve greater economic integration through regional free trade arrangements without monetary integration (Ngiam and Yuen, 2001). In practice, however, trade liberalization and economic integration often require stable exchange rates. Otherwise, regional free trade agreements could be undermined by compensatory tariffs demanded by exporters in stable countries against countries that might devalue their currencies. In effect, during the interwar experience, nations had resorted to either exchange rate manipulation or tariff protection to maintain competitiveness (see Simmons, 1994).

On the other hand, a monetary union which encourages trade and economic integration constitutes a virtuous self-reinforcing circle (Bayoumi and Eichengreen, 1997). If a world currency is set as the anchor currency, firms need not incur hedging costs and lose trade from uncertainty, not only with union countries but also with the rest of the world (see Krugman, 1990). Since EMU was established, trade and investment have grown tremendously and the monetary area has expanded to embrace more peripheral countries. The same is true for the case of dollarization, an effective monetary union with the US, which has raised investment and economic growth (Alesina and Barro, 2001) and trade enormously (Rose and van-Wincoop, 2001).

Highly open economies would gain much if exchange rates are fixed. When initial trade is large, the size of required price and wage adjustments to accommodate any given external shock will be small (Krugman, 1990). With initial exports of 20 percent of GNP, a one percent deficit (of GNP) would require less fall in prices and wages than if the initial exports were one percent. Even when initial trade is low, the gains from fixed rates could also be high (Alesina, Barro, and Tenreyro, 2002). Since low initial trade could be due to high trading costs, the trade that did occur must have high marginal values – coupled with lower marginal costs when exchange rates are fixed, higher marginal gains will result.

In view of the above, a monetary bloc would be extremely advantageous to East Asia which has been enjoying increasingly high intra-regional trade and trade integration with the rest of the world, led by the export juggernauts of China, India, and the Asian Tigers.

² Economic and Monetary Community of Central Africa.

³ Organization of Eastern Caribbean States.

⁴ West African Economic and Monetary Union.

⁵ Central American Common Market.

⁶ To date, ASEAN contains Myanmar, Vietnam, Laos, Cambodia, and Brunei in addition to the original members of Thailand, Malaysia, Singapore, Indonesia, and the Philippines.

The benefits are especially important to the highly heterogeneous economic structure of the region (Ngiam and Yuen, 2001). All the while, MNCs operating in the region have to diversify their production processes and stages of production across countries to exploit comparative advantages. Examples are the tourism and electronics industries which are highly concentrated in the growth triangles (GTs) in Southeast Asia. GTs are subregional economic zones which were set up to foster economic complementation (Ramos, 1994). The first triangle was the Singapore-Johor-Riau Triangle (SIJORI) initiated in 1988 where R&D and capital intensive jobs are done in Singapore while labor intensive and manufacturing jobs are located in Johor and Riau. It later became the Indonesia-Malaysia-Singapore Triangle (IMS-GT) in 1994. Other triangles are the East ASEAN Growth Area (EAGA) covering Brunei and parts of Malaysia, Philippines, and Indonesia; a growth zone linking parts of Myanmar, Laos, Thailand, and China; and the southern Chinese Economic Triangle, made up of China, Hong Kong, and Taiwan which began with Deng Xiaoping's vision of substituting economic development for class warfare as the highest order of business in post-Mao China.

A monetary bloc which bolsters economic integration will also preclude any undesirable beggar-thy-neighbor policy. Even the implicit dollar peg (or pseudo-exchange rate union) adopted by the Asian economies prior to the Asian crisis had actually insulated each other from harmful devaluations (McKinnon, 2005). In spite of this, past experience has shown that beggar-thy-neighbor policies could still be a concern. For instance, even though there was no speculative attack against the Singapore dollar during the Asian crisis, the Singapore government had nevertheless allowed its currency to fall against the dollar in line with the regional currencies in an attempt to preserve its competitiveness (Ngiam and Yuen, 2001).

Lower costs

A currency area enhances the role of money as unit of account by setting economies of scale into play and reduces transaction costs, including the costs of information, search, exchange, hedging, and calculation (Grubel, 1981). Small economies, including the less developed economies in Indo-China in East Asia, should benefit the most from the unit of account, means of payment, and store of value services provided by a major currency (see Bayoumi and Eichengreen, 1997). In fact, the US dollar has been commonly accepted in Vietnam and its neighboring countries since the Vietnam War.

A credible monetary union anchored on a stable currency will also lead to lower cost of capital (see McKinnon and Pill, 1999; Chang, 2000). Since the uncertainty arisen from currency risk and sudden regime change is removed in this arrangement, the cost of international and hence domestic borrowing becomes lower. In addition, the improved allocational efficiency of financing process in a monetary bloc does provide both borrowers and lenders a broader spectrum of financial instruments, thereby enabling more efficient choices to be made in terms of duration and risk (Robson, 1987).

Lower cost of capital also stems from lower reserve requirement when enlargement of foreign exchange market in a monetary bloc removes volatility of exchange rates and ability of speculators to influence money prices (Grubel, 1970; Fleming, 1971; Tower and Willet, 1976). Moreover, if countries are structurally diverse, as those in East Asia, reserves for intra-area transactions too may be substantially reduced because any payments imbalances may be offsetting (see Kafka, 1969).

Price stability

A monetary standard based on a credible currency also helps in curbing inflation in several ways. First, exchange rate fixation facilitates inflation targeting. As Giovannetti (1992) argued, exchange-rate targeting is better than monetary-growth targeting because exchange rates are highly observable whereas money supply, to the extent that it is endogenous, is difficult to measure and control. Second, any high inflation country which joins a low inflation monetary bloc could 'import' low inflation reputation without loss of output and employment (De Grauwe, 1992). The recent past has seen establishments of currency board intended to import monetary policy credibility from a stable developed country (Oomes and Meissner, 2008).⁷ Third, collusion in the form of fixed exchange rates can remove internal monetary policy from politically dependent domestic authorities and delegate it to a more independent foreign authority (Fратиanni and von Hagen, 1992).

Evidence of fixed exchange rate and inflation reduction can be seen from countries that have implemented rigid rates. Historically, countries with currency boards (e.g., Argentina, Estonia, Lithuania, and Bulgaria) have experienced lower inflation and higher growth than those with other regimes (Guide, Kähkönen, and Keller, 2000). While Chang (2000) has found that dollarization had enhanced the credibility of policies in curbing inflation, Edwards and Magendzo (2001), and Dornbusch (2001) have detected that dollarized countries tend to display significantly lower levels of inflation than their non-dollarized counterparts.

Monetary credibility and inflation reduction are also important to less developed countries in East Asia. In general, the degree of monetary authority independence from the executive branch in these countries is far lower than those in the advanced countries, which partly explains why internal monetary policies in small countries are relatively unstable. Based on IMF data, average CPI inflation in Vietnam, Laos, and Indonesia for 2001-2007 is about 4-6 percent higher than the US level while Myanmar's rate is about 24 percent higher. Since there is no permanent Phillips curve trade-off (see e.g., Tavlas, 1993), high inflation countries have little to lose in the long run and much to gain by adopting monetary policy of a stable country. In this respect, the US would be one of the possible anchor countries since the US internal prices have been very stable since the early 1980s (McKinnon, 2005).

Financial stability

Rigid pegs to a hard currency are particularly advantageous to substantially indebted countries with soft currencies. A stable domestic currency against the denominator of liabilities is utmost crucial in times of distress where speculative capital flows could easily deplete foreign reserves even among neighboring countries that are marginally leveraged. Given that many developing countries in East Asia are still substantially indebted in hard currencies especially in dollars (Calvo, 2002; McKinnon, 2000), any steep depreciations would certainly render them insolvent. This might in turn push the debtor countries into a vicious cycle of capital reversals and further depreciations (Reinhart, Rogoff, and Savastano, 2003). The Thai experience during the Asian crisis is a very good instance.

⁷ New currency boards have been implemented in Argentina, Bosnia and Herzegovina, Bulgaria, Djibouti, Estonia, and Lithuania. Examples of currency blocs in small economies are the Eastern Caribbean Currency Union and the CFA franc zone in Africa.

Though IMF usually advises countries to float their exchange rates in face of domestic crises, emerging middle-income economies are held back by the so-called “fear of floating” dilemma (see e.g., Calvo and Reinhart, 2002). At least two interlocking factors underlie this ‘fear’. First, emerging economies do not have well-developed and diversified financial systems which are able to minimize real sector disruptions resulted from transitory exchange rate variations. Most importantly, they are not able to borrow overseas in their domestic currencies, commonly referred to as “original sin”. Second, policymakers in emerging markets suffer from a chronic lack of credibility. As a result, an emerging economy might experience large and frequent shocks to exchange rate expectations or to interest rate risk premiums. By right, a true floater would allow the spot exchange rate to absorb these shocks. However, due to original sin and the need to maintain credibility, these countries allow for some flexibility in both variables, but by and large it is the interest rate that absorbs most of the shock.

Labor mobility

According to Mundell (1961), the costs of sacrificing the use of exchange rate changes would be minimal if there is mobility or flexibility of the labor markets in geographical and industrial dimensions within a currency area (see also, Lerner, 1944). Alternatively, if labor markets are flexible, real wages can adjust to restore internal and external balances. In considerations for monetary union, this issue plays the center role because it concerns about welfare and employment. The following evidence suggests that labor markets in East Asia may be sufficiently mobile or flexible to withstand asymmetric disturbances that may arise in a monetary union.

Asis and Piper (2008) discovered that much of international migration in Asia is intra-regional and undocumented. Also, the migration industry is well developed and well connected. Since early 2000s, the world's largest net labor exporting country is the Philippines. Other main exporters include Indonesia, India, China, Vietnam, Myanmar, Cambodia, and Laos. The common destinations for them are Middle East, Malaysia, and Thailand. Net labor importing countries include Japan, Hong Kong, Taiwan, Korea, Singapore, Brunei, Malaysia, and Thailand, which draw workers from the less developed countries in the region. Notably, China allowed labor export mostly in connection with state contracted projects overseas since the 1978 market reform but international migration has been eclipsed by the much larger internal rural-to-urban migration.

At the same time, Athukorala (2006) found that the number of migrant workers per 1,000 of labor force has increased significantly from 1980s to early 2000s in Japan, Korea, Taiwan, Hong Kong, Singapore, Malaysia, and Thailand. The number has continued to rise in Malaysia and Korea despite the Asian crisis and in Japan despite its decade-long recession. Remarkably, the stock of foreign workers in Japan has recorded an almost three-fold increase from 1990 to 2003. In particular, Manning (2000) discovered that unskilled, skilled, professional, and business migration in East Asia had intensified in the 1990s and continued even in the face of Asian crisis. Indeed, intra-Asian labor migration had increased approximately from 1 million in the beginning of 1980s to 6.5 million in 2002 (Huang and Guo, 2006). One possible reason would be the establishment of ASEAN Occupational Safety and Health Network in 2001.

Goto and Hamada (1994) and Eichengreen and Bayoumi (1999) have even indicated that labor mobility in East Asia was higher than that in Western Europe during the 1980s and 1990s. In 1999, the year the euro was adopted, ten countries in Western Europe had some kind of minimum wage policy whereas only four East Asian economies had that kind of policy, suggesting that Asian wages could be relatively easily adjusted to clear the labor market (Ngiam and Yuen, 2001). For that year, the unemployment rates in East Asia were also found to be lower than those in Western Europe.

5. The case for US dollar as the anchor

The big news last week was a speech by Zhou Xiaochuan, the governor of China's central bank, calling for a new "super-sovereign reserve currency".

But they are, apparently, worried about the fact that around 70 percent of those (the China's) assets are dollar-denominated, so any future fall in the dollar would mean a big capital loss for China.

(Krugman, 2009)

The above excerpt is from Paul Krugman's New York Times column published in April, 2009. The article responded to China's call to replace the US dollar as the world reserve currency in wake of the 2008 global economic crisis "exported" by the US. Notwithstanding the "flaw" in the US monetary policy and financial sector, the article asserted that the dollar would remain robust in view of the fact that any dollar dumping by China would set downward pressures on the dollar, leading to huge capital loss for the republic.

This is clearly reflected in Table 1 which exhibits the currency composition of official currency reserves in the world and in the emerging and developing economies. Due to confidentiality of data, data for individual countries are not available publicly. Despite its declining share, the US dollar is still the most dominant reserve currency till 2008. One can also notice the decreasing role of the yen and the rising dominance of the euro.

Krugman's argument appears to be consistent with the proposal by the OCA gurus, Robert Mundell and Ronald McKinnon on having a dollar bloc in East Asia (see e.g., Mundell, 2003; McKinnon, 2005). Mundell has explicitly recommended that US dollar be the anchor currency for ASEAN+3 countries as the initial step toward an Asian monetary union. The most devastating threat to an Asian dollar bloc, however, is the floating yen-dollar rate which may be chaotic when it swings sharply. But then again, should Japan is also a part of the dollar bloc, this setback virtually disappears.

Several other factors have also made the choice of the US dollar as the monetary anchor an ideal one. First, as widely recognized, the dollar is the vehicle currency for transaction across the world. Specifically, exports of primary products tend to be invoiced in dollars with worldwide price formation (spot and forward) in centralized exchanges usually in US cities like Chicago and New York, and in dollar-denominated commodity exchanges in London and elsewhere (McKinnon, 2000).

In East Asia, the dollar is also the preferred invoice currency even though Japanese trade is as large as the American one (McKinnon and Schnabl, 2004). Only about half of Japan's overall exports are invoiced in yen, while three quarters of its imports are invoiced in dollars. When the yen-dollar rate fluctuates, Japan will suffer high variation in domestic

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
World														
USD	59	62	65	69	71	71	72	67	66	66	67	65	64	64
Pound sterling	2	3	3	3	3	3	3	3	3	3	4	4	5	4
Deutsche mark	16	15	14	14	-	-	-	-	-	-	-	-	-	-
French francs	2	2	1	2	-	-	-	-	-	-	-	-	-	-
Japanese yen	7	7	6	6	6	6	5	4	4	4	4	3	3	3
Swiss francs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands guilder	0	0	0	0	-	-	-	-	-	-	-	-	-	-
ECUs	9	7	6	1	-	-	-	-	-	-	-	-	-	-
Euros	-	-	-	-	18	18	19	24	25	25	24	25	26	27
Others	5	4	4	4	2	1	1	2	2	2	2	2	2	2
Emerging and developing economies														
USD	72	73	74	73	72	73	72	66	61	61	62	61	61	60
Pound sterling	2	2	2	2	2	3	3	3	4	5	5	6	6	5
Deutsche mark	15	15	14	14	-	-	-	-	-	-	-	-	-	-
French francs	2	2	2	2	-	-	-	-	-	-	-	-	-	-
Japanese yen	6	5	5	4	4	3	2	2	2	2	2	1	2	2
Swiss francs	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Netherlands guilder	0	0	0	0	-	-	-	-	-	-	-	-	-	-
ECUs	0	0	0	0	-	-	-	-	-	-	-	-	-	-
Euros	-	-	-	-	19	20	22	28	32	31	30	31	30	31
Others	2	2	2	3	1	1	1	1	2	1	1	2	1	2

Source: (COFER), IMF (2009).

Table 1. Currency Composition of Official Foreign Exchange Reserves (Percent)

prices of goods, that is, “pass-through” is high. Other East Asian countries are equally vulnerable. On the other hand, the US price level is fairly immune to fluctuations in the dollar rate because both its exports and imports are largely invoiced in dollars. In periods of reasonable confidence in the US monetary policy, commodity prices in dollar are relatively invariant to fluctuations in dollar rate.

Second, the US is also the most important export destination for most East Asian countries. Based on 1990–2002 data, Kawai and Takagi (2005) showed that the US was by far the most important industrial-country destination for principal Asian exporters, such as Cambodia, the Philippines, Taiwan, Hong Kong, Thailand, Korea, Malaysia, China, and Singapore, although Japan was more important for Vietnam and the resource exporting countries of Brunei and Indonesia. As for imports, Japan was the most important source country, except in Brunei and Cambodia for which the EU was the most important. Based on direction of trade data from IMF for 2001–2007, total trade with the US (exports plus imports) is higher than that with Japan for China, Hong Kong, Korea, Cambodia, Malaysia, the Philippines, Singapore, Vietnam, India, Macau whereas total trade with Japan is higher for Taiwan, Indonesia, Laos, Myanmar, Thailand, and Brunei.

Other than direct relationship with US, trade with dollar bloc countries in Asia Pacific is significant too. As Kawai and Akiyama (2000) pointed out, it is possible that the ‘excess’ stability of East Asian currencies against the US dollar beyond what can be explained by bilateral linkage, is accounted for by the importance of trade with other countries in the dollar bloc. This is because it is “optimal” for a country to adopt an anchor currency that minimizes the sum of bilateral exchange rate volatilities, weighted by the importance of each trade partner (Oomes and Meissner, 2008). Other than in Asia, the dollar is also the international standard for invoicing goods and services and for denominating the bulk of international capital flows in the Americas, the Oceania, and much of Africa (McKinnon, 2005).

Third, American corporations have been playing a significant role in foreign direct investment in East Asia. In this aspect, the importance of dollar can be recognized by looking at the regional breakdown of FDI inflows into the region (see Kawai and Takagi, 2005). For newly industrialized economies (Hong Kong, Korea, Taiwan, and Singapore), about 23 percent of total FDI inflows during 1990–2002 came from the US, about 15 percent from the EU, and about 14 percent from Japan. For ASEAN (excluding Singapore), 22 percent of the inflows came from Japan, while 18 percent and 16 percent came from EU and the US respectively. In China, the US accounted for 10 percent of the total FDI inflows, while EU and Japan accounted for 8 percent and 6 percent respectively.

Fourth, a regional dollar bloc could certainly bolster dollar-pegging durability of any individual country. This is in view of the fact that soft pegs against the dollar are still strong and prevalent in East Asia in spite of the Asian crisis (McKinnon, 2005; McKinnon and Schnabl, 2004; Ogawa and Shimizu, 2006; Bauer and Herz, 2009).⁸ In South Asia, India

⁸ According to Ogawa and Shimizu (2006), the Chinese yuan, the Malaysian ringgit, the Cambodian riel, the Lao kip, the Myanmar kyat, and the Vietnamese dong had still maintained their dollar pegs in 2004 and 2005. Meanwhile, the Singaporean dollar, the Japanese yen, the Thailand baht, the Korean won, the Indonesian rupiah, and the Philippine peso, had about two-thirds of their currency basket weights on the dollar.

has been adopting a de facto dollar peg since 1993 which continued even after the crisis (see Patnaik and Shah, 2008). Even though many Asian exporters have turned around from being net capital debtors to net creditors against the US after the crisis, many still opt to maintain their soft dollar pegs because any currency depreciation will reduce the value of their dollar-denominated assets and increase the value of outstanding external debt and debt service payments whereas any revaluation would certainly impede their export competitiveness—an impasse duly labeled as “conflicted virtue”. Furthermore, many poor developing countries in Asia still have high levels of dollarization and indexation of debt (Rogoff, 2005). The prevalent pegging will most like stay because when a large number of countries are pegging to a currency, it becomes difficult to break out of this pattern into another perhaps more socially beneficial set of arrangements (see Oomes and Meissner, 2008). Since this is the case, a step forward to an Asian dollar bloc is absolutely logical.

Since the days before the Asian crisis, most Asian economies had informally soft-pegged their currencies to the dollar, a move which made them vulnerable to the depreciating yen. However, dollar pegs were entirely rational from the perspective of Asian economies—to facilitate hedging by merchants and banks against exchange risks, and to help central banks anchor their domestic price levels. Nevertheless, since their dollar pegs were ‘soft’, the obvious Achilles heel was the vulnerability to one-way speculation which struck during the crisis. In contrary, if their exchange rates were securely locked to the dollar with credible regional arrangements, the system as a whole would definitely be durable.

Fifth, the dollar is also the ‘safe-haven’ currency into which nationals in emerging markets fly in the face of a domestic financial crisis (McKinnon, 1999). Even when the US money manager, the Federal Reserve System, had been doing quite badly, as happened from the inflationary 1970s into the early 1980s, the dollar-based system proved surprisingly resilient. The resilient dollar rate even in the midst of the recent global financial crisis is another evidence. In the absence of any serious shock to the US monetary system, for any country in East Asia, the more synchronized its monetary policy with the US one (i.e., dollar exchange rate naturally stable and price level aligned with the US level), the lower will be the currency risk (e.g., from capital flight).

Sixth, anchoring domestic currencies against the multi-faceted dollar may also yield synergistic benefits. Since World War I, the dollar had emerged as the world’s currency which has remained as the predominant global unit of value, the unit of quotations for exchange rates (both spot and forward markets), the main invoice currency, the dominant international reserve medium (and official intervention currency), the de facto unit of account for IMF transactions, and the international currency of choice for investors, travelers, and even smugglers and other illicit transactions (Mundell, 2007). The extract from Paul Krugman’s comment in the beginning of this section clearly highlights this point. Since financial liberalization, which has been progressing in the Asian region, would lead to more global integration (Lee, Park, and Shin, 2004), the choice of a global currency, that is, the dollar would be most appropriate.

Lastly, other candidate currencies may not be suitable enough to serve as the monetary anchor for East Asia. Though Japan’s influence in the region is undeniably significant, due to some considerations, the Japanese yen may not be the ideal numéraire.

First, as pointed out by Mundell (2003), Japan has been facing internal macroeconomic and banking problems and its yen had been very unstable against the dollar. The tripling of the yen's value against the dollar between 1985 and 1995 weakened corporate balance sheets and saddled the Japanese banking system with trillions of non-performing loans. Had Japan locked its yen's rate to the dollar, prolonged stability in the yen-dollar rate would have quashed the resulted deflationary expectations that had gripped the Japanese economy for almost a decade (McKinnon, 2005).

Second, as mentioned before, because a large part of Japanese trade is invoiced in dollars, any changes in the yen-dollar rate would be passed through to domestic yen prices. This makes the Japanese domestic price levels vulnerable to exchange rate fluctuations.

Third, as Shirono (2009) and Kwan (1998) have discovered, besides the declining dependence on Japan, the economic structure and the inflation level of Asian economies which were significantly different from those of Japan would certainly be a great deterrent to a yen bloc. At the same time, Sato, Zhang, and McAleer (2003) and Chow and Kim (2003) have found that Japanese real business cycle was significantly different from those in the region. Other difficulties with the use of the yen are associated with the unfamiliarity with the Japanese language and emotional issues associated with acknowledgement of Japan's culpability in World War II (Mundell, 2003). Perhaps for the above reasons, there has been no Japanese yen bloc in the world (see Oomes and Meissner, 2008). Another possible reason is the Japanese *de facto* dollar peg in 1949–1977 and tight regulation which existed in the Tokyo financial market until the end of the 1980s which had simply promoted the rise of the dollar in Asia.⁹

Fourth, as shown in Table 1, the importance of the Japanese yen in official foreign exchange reserves in the world and in emerging and developing economies has been declining steadily. This indirectly indicates the declining role of the yen in international transaction and store of value.

What about the possibility of the Chinese renminbi as the anchor? At present, the China's currency is not convertible on capital account, and its financial system is not well developed (Mundell, 2003). Of course, keeping foreign reserves in the form of Chinese government assets would not be perceived as risk-free as putting them in Japanese government bonds or US treasury bills. The fact that China places 70 percent of its savings in the US is a good evidence.

In addition, the choice of an internal anchor, yen or renminbi, could be a source of distrust between rivals. As aptly put it by Katada (2008), despite emerging signs of challenges, Japan's domestic resistance and the region's power rivalry between Japan and China still makes the dollar the currency of choice in the medium term future.

⁹ Japan maintained a parity of 1 dollar = 360 yen from April 1949 to August 1971. Reasons why Japan preferred the dollar to the British pound were the US economic aid during the reconstruction period and the windfall demands of the Korean War which promoted dollar transactions whilst at the same time, sterling had the disadvantage of nonconvertibility (Oomes and Meissner, 2008). Thereafter, the dollar stabilized its position as the key currency for Japan because coincidentally trade in dollars also increased its share in the Asian region while at the same time trade finance in the New York money market became more important (Iwami, 1994).

6. The case for currency basket as an alternative

Though the case for dollar is well demonstrated, current developments particularly the recent global financial crisis has nevertheless made the option of a currency basket arrangement for East Asia more appealing.

On July 21, 2005, the China's government announced that the monetary authority would adopt a managed floating exchange rate system with reference to a currency basket. In recent years, so too have some East Asian countries, namely Singapore, Thailand, Japan, Korea, Indonesia, and the Philippines (Kawai, 2008).

In the literature, Kawai and Akiyama (2000), Ogawa and Ito (2002), and Williamson (2005) were among the vocal advocates which suggested that East Asia adopts a common currency basket in order to stabilize intra-regional exchange rates and at the same time allow both misalignment among intra-regional currencies and volatility vis-à-vis the outside currencies, including the dollar and the euro, to be restrained.

Under a common currency basket, the monetary authorities of the East Asian countries use the value of a basket of major international currencies (i.e., the US dollar, yen, and euro) as a reference to make regional coordination in exchange rate policies so as to not deviate each of the Asian currencies from the common reference (Ogawa and Shimizu, 2006). Such an arrangement can be called a G-3 currency basket. The most apparent benefit of the G-3 currency basket (with optimal weights) is that it keeps trade competitiveness relatively stable because real effective exchange rates would be more stable against large shocks to their trade balances. On the other hand, a common US dollar (hard) peg could possibly deviate their effective exchange rates from desirable levels because Asian economies have strong economic relationships with not only the US but also Japan and the EU (Kawai and Akiyama, 2000; Kawai, 2008).

What about individual currency basket? An individual currency basket is composed of its own trade partner currencies based on its own trade weights (Ogawa and Shimizu, 2006). Too much variety within an individual currency basket composition would have adverse effects on stability of intra-regional exchange rates if the monetary authorities target the individual currency baskets.

Empirically, Williamson (2005) managed to demonstrate the superior performance of a common currency basket over a series of individual currency baskets. The common currency basket was found to be able to reduce instability of intra-regional exchange rates. As Rajan (2002) pointed out, a common currency basket would be more favorable than individual currency baskets because the possibility of a competitive devaluation would exist if national monetary authorities can choose their own individual currency baskets.

Notwithstanding the popularity of a common currency basket, it will only work in practice if the yen-dollar and dollar-euro rates were stable (see Mundell, 2003). Along this argument, McKinnon and Schnabl (2004) raised two other important reasons why an East Asian dollar bloc is favorable to a common currency basket bloc.

First, exchange rate fixation to just one pivotal currency helps individual merchants and bankers better hedge their own foreign exchange risks. Because of the missing bond and forward exchange markets in many developing countries in Asia, governments would provide

an informal hedge by keeping the domestic currency stable against the dominant currency (the dollar). Suppose Japan is part of an East Asian dollar bloc, this would leave merchants to the 'extraneous' fluctuations in the dollar-euro rate which, however, can be hedged by making use of well-developed forward market between dollar and euro. On the other hand, under a currency basket, merchant's hedging strategy would be confused¹⁰, particularly if the weights of the major currencies in the basket are somewhat vague, and the timing of official changes in the rate between national currency and the dollar (intervention currency that governments use) is also uncertain. Basket pegging would reduce risk only if merchants could not hedge. However, almost all merchants today use forward hedging strategies.

Second, picking the appropriate official weights in a common currency basket is extremely problematic. A simple trade-weighted basket would not reflect the dollar's overwhelming predominance as a currency of invoice, where external dollar prices of goods and services are sticky and do not vary much with changes in the dollar-euro rate. Nor, would it reflect the currency of denomination of outstanding external debts. As Kenen and Meade (2008) added, no simple set of trade weights will give optimal results because optimality itself is a multi-dimensional notion, and no one really knows enough about the relevant parameters to modify the trade weights in a satisfactory way. In the East Asian context, Korea trades far more heavily with Japan than do most ASEAN countries. Within ASEAN, Indonesia and Thailand trade more heavily with Japan than with US whereas Singapore trades more heavily with US.

7. Empirical review

The most common method used in empirical Asian OCA literature, probably due the precedence set by Bayoumi and Eichengreen (1994), is the structural vector-autoregression (SVAR) approach. In a nutshell, the VAR approach attempts to identify most homogenous countries so that costs associated to monetary union participation can be minimized. If the responses of certain variables (e.g., price, real exchange rate, unemployment, etc.) to some macroeconomic shocks (e.g., demand and supply shocks) are symmetrical in terms of magnitude, pattern, and speed of adjustment, the costs of forming a monetary bloc would be presumably small. Other strands of methodologies have strived to achieve similar objective, that is, identification of homogeneous groups.

Of the 20 papers dated 1994–2009 reviewed, some studies have indicated relatively broad integration comprising four or more countries in a group whereas others have suggested smaller groups as potential candidates. The studies can be categorized into those which use dataset prior to the Asian crisis in which the region was experiencing remarkable growth (pre-1997 dataset), those which also include the crisis period (pre-2000 dataset), and those which extend the dataset till the post-crisis period (pre-2008) but before the 2008 global financial crisis. While some studies have investigated multiple aspects of convergence, only results from the main econometric analysis are extracted.

Pre-1997 dataset

In their 1994 much celebrated piece, Bayoumi and Eichengreen (B-E) compared 9 East Asian countries to Western Europe, by asking whether Asia came as close as Europe to

¹⁰ A clear illustration is given in McKinnon and Schnabl (2004).

being an OCA. 1969–1989 data and Blanchard-Quah (B-Q) extraction technique were used to extract and quantify demand and supply shocks that affect a country's economy. The higher the correlation between the shocks of a pair of countries, the stronger the economic integration. They also asked how rapidly each country individually adjusted to each type of shock.

The number of large positive correlations expressed as a percentage of the total country pairs in Asia exceeded the corresponding percentage in EU. Asian countries also adjusted more rapidly to both types of shocks than did the EU countries. Accordingly, they concluded that East Asia came as close as the EU to being an OCA, and specifically two country subsets came even closer to being OCAs: (1) a Northeast Asian bloc comprising Japan-Korea-Taiwan, and (2) a Southeast Asian bloc comprising Hong Kong-Indonesia-Malaysia-Singapore, and possibly Thailand.

Later in 1999, Eichengreen and Bayoumi complemented their earlier results by regressing bilateral exchange rate volatility on relative output variability, dissimilarity of export composition, strength of bilateral trade, and economic size. Time period used was 1976–1995 and 8 Asian countries were included. The simulated levels of exchange rate variability in East Asia had been found to approach the Western European levels. Specifically, three country groups have displayed significant correlation in exchange rate variability: (1) Singapore-Malaysia, (2) Singapore-Thailand, and (3) Singapore-Hong Kong-Taiwan.

Another support based on pre-crisis data came from Loayza, Lopez, and Ubide (2001) which utilized 1970–1994 data of 7 Asian economies to present evidence from an error components model. The shock dimensions examined were country-specific, sector-specific, and common shocks. The study discovered significant short-run and long-run co-movements of shocks within East Asia which were comparable to those found within Europe. Specifically, two potential country groups were identified: (1) Japan-Korea-Singapore-Taiwan, and (2) Indonesia-Malaysia-Thailand.

Pre-2000 dataset

In 2000, Yuen used GDP per capita, real GDP growth, aggregate price inflation, deposit interest rates, gross domestic investment, value-added in agriculture, and value-added in services with hierarchical clustering to identify prospective East Asian countries for monetary union. 1990–1997 data were used and Asian countries made up 9 of the total cases. The results suggested five country groups: (1) a mature group of Japan-Australia-New Zealand-US (high income per capita, low GDP growth, moderate inflation), (2) a high growth group of Korea-Malaysia-Thailand (income per head, inflation, interest rates), (3) a moderate growth group of Indonesia-Philippines (moderate growth, low income per capita, and high inflation), (4) a small open economy group of Hong Kong-Singapore (highest income per capita, lowest interest rates, highest value-added in services, lowest value-added in agriculture), and (5) China which was distinctly different from the rest.

In a 2001 paper, Bayoumi and Mauro updated the earlier B-E work with a larger dataset of 1968–1998 which includes the crisis period. As before, 9 Asian countries were examined. They concluded that the size of disturbances in East Asia was larger than that in EMU, reflecting the situation during the Asian crisis. Nevertheless, perhaps due to higher domestic labor flexibility, the speed of adjustment in East Asia was faster than that in EMU.

They identified two country sets which displayed faster speed of adjustment from supply shocks: (1) Hong Kong-Indonesia-Malaysia-Singapore and (2) Philippines-Thailand.¹¹

Adopting B-E methodology, Ngiam and Yuen (2001) used 1967–1997 dataset and included 9 countries. The study however did not use impulse response function and EMU as benchmark. Considering VAR results with geographic proximity and social-cultural compatibility, they proposed three plausible monetary unions: (1) Brunei-Singapore-Malaysia, (2) Japan-Korea, and (3) Taiwan-Hong Kong.

Lee, Park, and Shin (2004) also discovered some strong support for monetary integration in East Asia based on 1978–1999 data and 10 Asian economies. Based on a dynamic factor model, the region's common shocks in 1990s were found to be at least comparable to those in Europe. In particular, Indonesia, Korea, Malaysia, Thailand, and the Philippines shared higher degree of regional output co-movements.

Kawai and Takagi (2005) applied a variation of SVAR model to study the impulse response patterns of real GDP and price to exchange rate depreciations among 9 East Asian economies. Time period under review is 1970–1998. Symmetry of response pattern in real GDP could be found in 'non-crisis' economies of (1) China-Hong Kong-Singapore-Taiwan and 'crisis' economies of (2) Indonesia-Korea-Philippines-Thailand. With respect to symmetric response pattern in price, the symmetric groups were: (1) China-Hong-Kong-Singapore-Taiwan-Korea and (2) Indonesia-Malaysia-Philippines.

Pre-2008 dataset

Stretching the time period to cover the post-crisis Asia, Kawai and Motonishi (2005) used 1980–2002 data of 11 Asian economies to demonstrate that real activity variables, namely growth rates of real GDP, real personal consumption, and real fixed investment, were highly correlated among Japan, Korea, Taiwan, Singapore, Malaysia, and Thailand with Indonesia and the Philippines beginning to join this group. Nevertheless, real activity variables of China and low-income ASEAN members were not highly correlated with those of other Asian economies.

While most studies do not specify any reference country, Font-Vilalta and Costa-Font (2006) set Japan as the monetary anchor for 5 countries studied. In this correlation-based paper which utilized 1963–2001 data for Asian countries, the authors examined synchronization of exchange rates, business cycles, interest rates, exports, and imports to assess the feasibility of a yen bloc. To explore the pattern of convergence across different economic conditions, a multi-period analysis across three periods, 1963–1979, 1980–1997, and 1997–2001 was carried out.¹² Only Singapore and Korea have been found to experience increasing synchronization in terms of the dimensions examined.

Complementing VAR approach with generalized purchasing power parity (GPPP)¹³ model and using real exchange rates with Japan as the basis, Ahn, Kim, and Chang (2006) managed

¹¹ Demand shocks were not examined in this paper as they were thought to be unlikely to be invariant to demand management policies and currency regimes.

¹² This non-overlapping multi- period analysis which is common in applied economics is also used in the present paper.

¹³ Long-run purchasing power parity (PPP) implies that real exchange rates are stationary. A vast literature has, however, shown that they are nonstationary. This is because fundamental macroeconomic variables

to find ASEAN 4 (Indonesia, Malaysia, Singapore, and Thailand), Hong Kong, Korea, and Taiwan to qualify for an OCA with respect to significant symmetrical response to supply shocks in terms of magnitude and speed of adjustment. Besides, ASEAN 4, Hong Kong, Korea, Taiwan, and Japan were shown to share common trends in real exchange rate movement. Time periods used were 1960–2002 (SVAR) and 1970–2003 (GPPP) and 10 Asian countries were studied.

Using 1970–2002 Asian data of 9 economies and 1979–1998 EMU data as benchmark, Huang and Guo (2006) also found Hong Kong, Indonesia, Korea, Malaysia, Singapore, and Thailand to be viable candidates. A four-variable SVAR model was developed to extract external supply, domestic supply, demand, and monetary shocks. Degree of labor mobility and extent of intra-trade were also reviewed.

Sato and Zhang (2006) employed 1978–2004 Asian data and 1980–1997 EMU data as benchmark to assess real output co-movements of 8 Asian economies with cointegration test. The analysis also employed Vahid test to examine for long-run relationships and Engle tests to check for short-run interactions in real outputs. Short-run common business cycles were found in Southeast region of (1) Singapore-Thailand-Indonesia, and in the Northeast region consisting of (2) Hong Kong-Korea-China, as well as between (3) Japan and Taiwan. Although the underlying structural shocks were less symmetric and the average size of the shocks was larger, the speed of adjustment to shocks in East Asia was much faster than in the EU.

Based on fuzzy cluster analysis, Nguyen (2007) detected a divergence in the post-crisis East Asia and from 10 economies considered, the only grouping that weathered all the periods was Singapore-Malaysia. The criteria used are: synchronization of business cycles, volatility of real exchange rate, degree of openness to regional trade, inflation differential from the regional average, and level of export diversification. No reference country is assigned. The analysis used a dataset of four overlapping periods: 1990–1996, 1990–2000, 1999–2003, and 1990–2003.

By investigating the intra-regional interdependencies, Rana (2007) has also found increasing prospects for monetary union. The paper provided simple 10-year moving correlations between real GDP growth of 11 Asian countries and the group as a whole from 1989 to 2005. Correlations had been converging towards very high levels in (1) the Philippines, Indonesia, Japan, Malaysia, and Thailand. They were, however, a bit lower in (2) Laos, China, Singapore, and Vietnam.

Bacha (2008) examined the feasibility of an OCA for 12 East Asian economies based on SVAR and correlation analysis. Time period used is 1970–2003. For the SVAR analysis, the paper examined the interrelationship among the real GDP growth rates and countries' response to external shocks, represented by world real GDP. For the correlation analysis, the study looked into similarity of inflation, trade relationships, similarity in business cycles, and extent of policy congruence. The results indicated four potential country pairs: (1) Malaysia-Singapore, (2) Japan-Korea, (3) Indonesia-Thailand, and (4) Australia-New Zealand. It was postulated that geographic proximity could have enhanced trade intensity and factor mobility, enforcing the measures used.

that determine real exchange rates are nonstationary. A system of nonstationary real exchange rates may have a long-run equilibrium path in common since the individual nations will experience a set of common real macroeconomic shocks. This is termed as GPPP hypothesis.

Ibrahim (2008) utilized both hierarchical and fuzzy clustering methods on 7 East Asian countries using OCA criteria and 'adjusted' Maastricht Treaty criteria to identify for potential groups. Results from pre-crisis (1991–1997) and post-crisis (1998–2004) periods are compared. Japan is set as the reference country. The OCA criteria used are volatility in real GDP, volatility in real exchange rate, volatility in interest rate, trade openness, and convergence of inflation. The adjusted Maastricht criteria are budget deficit/GDP, external debt/GDP, exchange rate volatility, inflation differential, and annual prime lending rate. Results for pre-crisis period indicated groupings of Indonesia-Philippines and Malaysia-Thailand-Korea. Meanwhile, post-crisis OCA results suggested groupings of Malaysia-Philippines-Thailand-Korea whereas post-crisis Maastricht results indicated groupings of Malaysia-Philippines-Thailand and Singapore-Korea-China.

Another support came from a multi-faceted study by Kawai (2008) who reviewed various aspects of economic integration in East Asia. The author looked at how rapidly and deeply regional integration has been proceeding in trade, FDI, and other activities; presented the evolution of exchange rate arrangements in the post-crisis period; explored the implications of a possible unwinding of global payments imbalances and surges in capital inflows; and posed the challenges for monetary coordination. Period studied is 1989–2003. Comparisons to post-euro EMU and other parts of the world are made. From 10 economies examined, those which were sufficiently integrated were (1) Japan-Korea, (2) China-Hong Kong, and (3) Singapore-Malaysia-Brunei. The author also presented a strong case for a currency basket as the monetary anchor in East Asia.

More recently, Sato, Zhang, and Allen (2009) managed to identify two prospective groups, one comprising the US, Taiwan, Hong Kong, and Singapore, and the other containing ASEAN 5 (Thailand, Malaysia, Singapore, the Philippines, and Indonesia) and Japan. The study employed Johansen cointegration to check for long-run co-movements of real outputs. Data series extended from 1978 to 2006 and were seasonally adjusted using the Census X-12 method. 10 Asian countries were selected. Notably, China was not a potential member with any of the grouped economies. More interestingly, the ASEAN countries were associated only when Japan was included.

Quah (2009) compared the values of the OCA dimensions, namely inflation convergence, export diversification, labor market flexibility, and external indebtedness of 17 Asian economies to the EMU and dollarized countries in an attempt to draw patterns in the data which are consistent with those in the benchmark countries. The anchor currency used is the US dollar. Dataset was segmented into 1980–1996, 1997–2000, and 2001–2007, which contain post-euroization and post-dollarization periods. Results suggested that inflation rates and levels of export diversification in Asia were comparable to those in dollarized economies; labor markets in the region were at least as flexible as those in EMU; external debt levels in Asia have fallen considerably in comparison to the dollarized countries, indicating reduced incentive to fix exchange rates to the dollar; and the most prospective countries for a dollar bloc were India, Thailand, and Malaysia.

8. Discussion and conclusion

Some generalizations can be made from the review. First, though the empirical papers have used different methods, some common 'groupings' can still be found in many of the results.

Based on pre-1997-dataset results, two general groupings can be recognized: the Northeast Japan-Korea-Taiwan group and the Southeast Thailand-Malaysia-Singapore-Indonesia group. The pre-crisis (growth period) data appear to have generated groupings by level of economic development; the more developed Northeast group and the less developed Southeast group.

For those using pre-2000 datasets, the “Asian Tigers” Taiwan-Hong Kong-Singapore group, the ‘crisis’ Korea-Thailand group, and the Southeast Malaysia-Philippines-Indonesia group can be detected. Obviously, the dataset which encompasses the pre-crisis and the crisis period has produced the Asian Tigers group which has been robust during the crisis period, the crisis group which has been severely distressed, and the Southeast group which has been relatively less affected.

When pre-2008 datasets are utilized, an ‘extended Southeast’ Korea-Philippines-Thailand-Malaysia-Singapore-Indonesia grouping can be commonly found. It is apparent that this group represents the countries which have been substantially severed during the crisis but have since rebounded significantly.

Despite the variations in the groupings, the original ASEAN members, Thailand, Malaysia, Singapore, Indonesia, and the Philippines, have appeared to be consistently indicated as prospective countries. With the expected benefits and the substantially flexible labor in these markets, there is a strong case for a monetary bloc centered on a stable anchor such as the dollar in ASEAN.

Nonetheless, this finding is not highly conclusive since selection bias could have contributed to the results. The fact that the number of countries included differs from one study to another study does indicate that the sampled cases are varied. Among the studies reviewed, relevant Asian economies such as India, Vietnam, Macau, and Brunei have almost been neglected

Some motivation could be behind this. In selecting the countries to examine, aside from data constraints, the authors could have been influenced by the notion that flexible exchange rates are detrimental to highly open (small) economies. Hence, only highly open Asian economies such as ASEAN 5, Japan, Korea, etc., are given much importance. What remains to be unclear, however, is the non-inclusion of Brunei in almost all the studies even though Brunei is a highly open small economy with total trade more than its GDP (see Kawai and Takagi, 2005). Of course Macau is also a highly open small economy. If Hong Kong, a China’s territory, can be treated as a separate entity in the studies, so does Macau.

Nevertheless, the authors could have also been adhering to another facet of the traditional theory when selecting the countries. Consider this:

If a prevailing exchange rate regime, fixed or flexible, can maintain external balance without causing unemployment (or demand-induced wage inflation), that regime is optimal. If the currency regime within a given area causes unemployment somewhere in that area (or compels some other portion of that same area to accept inflation as the antidote to unemployment), it is not optimal.

(Kenen, 1969, p. 41).

The excerpt above is an interpretation given by Peter Kenen on the definition of optimality implied by Mundell (1961). Hence, if an Asian country has already achieved those objectives with existing exchange regime, moving into a monetary union is not necessary. This might also be a reason why some countries are consistently not examined in the studies. But then again, the reasons for including certain countries and not including the others are rarely made clear in the empirical works. Along these lines, it is not totally unfounded to conjecture that early theoretical views might have been overshadowed by current considerations¹⁴, such as the case for monetary union and most importantly the need to demonstrate the rigor in the methodology involved.

Secondly, while the early intellectual debate has been spurred by the fact that homogenous regions or countries hardly prevail and hence adjusting mechanisms such as factor mobility, product diversification, flexible exchange rates, etc., are needed to achieve the objectives of price stability, full employment, and external balance, the empirical OCA literature appears to have always been in the search for homogeneous economic regions, made up of economies which share common macroeconomic circumstances (output variations, real exchange rate movements, etc.) in an attempt to identify potential candidates for monetary union. There seems to be a consensus among the empirics that sufficiently symmetrical countries can be identified in Asia so that adjustment mechanisms may be less needed if a common monetary standard is implemented across the countries. Along these lines, the current empirical literature could be regarded as the other side of the coin to the early theoretical debate.

Thirdly, those studies which used EMU as a metric for East Asia (e.g. Huang and Guo, 2006; Sato and Zhang, 2006) can be commended for bringing the theoretical grounds of OCA closer to pragmatic circumstances, given that statistical significance alone still leaves much to be desired. Nonetheless, the validity of the results could have been greatly enhanced if measures from the post-euro EMU are used in the comparative analyses between Asia and EMU, hence, mitigating the criticism from the endogeneity of OCA criteria argument (see Frankel and Rose, 1998). Suppose OCA criteria are indeed endogenous, that is, achieved only after monetary union is formed, using post-euro benchmarks would be much more appropriate than using pre-euro benchmarks. In this respect, studies done after euroization, those which used post-1999 Asian data (e.g. Huang and Guo, 2006; Sato and Zhang, 2006) have obvious advantage of using the post-euro data. Among the papers reviewed, however, perhaps due to insufficient post-euro data for econometric modeling, only Rana (2007), Kawai (2008), and Quah (2009) have demonstrated this in a descriptive manner. But then again, no due emphasis has been given to the endogeneity argument. Hence, it is not unreasonable to say that little has been done in view of the endogeneity criticism.

Lastly, notwithstanding the obvious case for the dollar as the monetary anchor for East Asia, it has nevertheless gained little attention among the empirics. Perhaps due to the ambiguity of a center economy in Asia (unlike in EU where Germany is commonly

¹⁴ For instance, Font-Vilalta and Costa-Font (2006) selected the set of countries according to availability of data and affiliation to the Japanese economy. Clearly it is not based on whether the existing arrangement is not optimal or otherwise.

accepted as the center economy), a monetary anchor is rarely set a priori in the empirical studies.

In conclusion, this paper has concisely discussed the essence of the early theoretical foundations of OCAs; highlighted more recent developments such as why monetary union anchored on a stable currency would not only be favorable but also feasible for East Asia; presented the case for US dollar and the case for a currency basket as the monetary anchor; reviewed a substantial number of current empirical papers on Asian OCA; and made some interpretations in view of the early conceptual principles and the current empirical works.

Unquestionably, the conclusions made here are limited in the sense that only 20 empirical papers published in 1994-2009 have been reviewed which certainly do not represent the studies in the field at large.

9. References

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In this 21st century of opportunity and turbulence, business firms need to equip themselves with new competencies that were never thought of before. For this reason, this book is timely as it introduces new insights into new problems in the aspects of performance and quality improvement, networking and logistics in the interconnected world, as well as developments in monetary and financial environment surrounding private enterprises today. Readers shall find that reading this book is an enlightening and pleasant experience, as the discussions are delivered in a clear, straightforward, and “no-frills” manner - suitable to academics and practitioners. If desired, the book can serve as an additional piece of reference for teaching and research in business and economics.

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