

LAUREA PUBLICATIONS

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Timo Riihelä, Minna Mattila (eds.)

MANY FACES OF INNOVATION

From literature synthesis to empirical studies



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empirical studies**

Timo Riihelä, Minna Mattila (eds.)

2009 Vantaa

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Foreword

“Everything that can be invented has been invented.”
(Charles Duel, Director of the U.S. Patent Office, 1899)

The interrelationship between aspects of organisational orientation, innovation and company performance has intrigued researchers for centuries. The main reason for current interest in the innovation research is the widespread belief that innovation stimulates, in general, economic development and firm performance. Economic theories of innovation have tended to ignore services and to assume that innovation in services consists of little more than adopting innovations developed in industry. Yet theories of innovation developed on the basis of observations of industry are inadequate to explain the forms of innovation which predominate in services.

The switch to Internet age means a switch between distribution channels where competitors of Internet are the existing distribution channels. In the case of dynamically continuous innovation such as the Internet, some change in behavioural patterns is created through its adoption. The management of innovation in such an environment is not an easy task as there are several existing channels that customers may be using simultaneously.

This article compilation that ensued from the international conference “*Beyond the Dawn of Innovation*” organised by Laurea University of Applied Sciences in June 2009 contains six full-length papers covering a wide variety of innovation dimensions. All the published articles were subject to an international double-blind peer review process. We would like to express our gratitude to all the reviewers for taking the time to read and comment the manuscripts during the evaluation phase. We are convinced that your insightful comments were very useful to the authors in the final revision of the manuscripts. We would also like to thank all the authors. May your career in publishing be long-lasting and very productive.

The journey has just begun.

Vantaa 2009-12-18

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LITERATURE REVIEW: MARKET ORIENTATION AND INNOVATION

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1 Introduction

While there have been studies that have tried to link strategy with new product introduction (c.f. Gatignon and Xuereb 1997 or Souder and Song 1997), for new product research too few studies have explored the role of strategy as it interacts with innovation. Specifically, we do not see many studies that look at the use of market orientation (a strategy) and innovation. This review of the literature is intended to develop an understanding of factors that may influence a firm's market orientation, and how a preference for a proactive or responsive form of market orientation may affect the firm's organization effectiveness and innovation success.

Innovation is critical to firm survival. Firms often spend significant sums of money to develop and commercialize new products. It has been estimated that on average more than 35% of firm revenues are from products that did not exist 5 years ago. In many high tech industries the percentage is substantially greater (Nambisan 2003, Griffin 1997). However, failure rates continue to remain high with only slightly more than half of the products launched attaining commercial success. Given the amount of resources that are devoted to new product

launches it is critical that managers focus on engaging the most appropriate strategies and activities to help ensure commercial success.

So the question for managers is what can be implemented structurally to help make a new product successful? Often times it is not just the product alone that contributes to the level of success. Another important consideration is the strategy employed by managers to help position the product in the marketplace. This chapter focuses specifically on the intersection between technology and markets. We examine the relationship between market orientation and innovation, and expose the reader to the literature and latest thinking on how these two constructs complement one another. Specifically we discuss the previous literature to the extent that the reader will have a complete understanding of the intersection between market orientation and innovation. We start by reviewing the seminal works that are reflective of the market orientation literature. Next we develop the literature on innovation. Finally we conclude by examining the research that sits at the intersection of these two major streams of work and propose a set of structural relationship that researchers can explore to test these propositions.

The first section of this chapter provides an overview of the literature regarding market orientation, and then discusses in detail the constructs of proactive and responsive market orientation. Since the concept of market orientation is imbedded within the broader framework of innovation, the second section gives an overview of general innovation theory and literature, and explores the various reasons why firms may initiate innovation efforts. Subsequent sections discuss factors that may influence, or be influenced by, a firm's market orientation: organizational factors such as culture and structure; and external environmental factors such as competitive intensity. Lastly organizational outcomes such as market performance and inter-functional integration are discussed in relation to measuring innovation success. We conclude this article by presenting a model which illustrates possible relationships between the constructs under discussion within the general framework of innovation.

2 The Marketing Concept and Market Orientation

The marketing concept is a management philosophy for guiding business decisions (Kohli and Jaworski 1990). Kotler (1999, 14) defines the marketing concept as, "The marketing management philosophy that holds that achieving organizational goals depends on determining the needs and wants of target markets and delivering the desired satisfactions more effectively and efficiently than

do competitors.” Market orientation refers to a firm’s methods of putting the marketing concept into practice (Baker and Sinkula 2005). Kohli and Jaworski (1990) were the first to develop the construct of *market orientation*, which refers to the organizational implementation of the marketing concept. Placing the customer at the forefront of managerial decision making infers that the customers have a strong influence on strategic planning. The concept of market orientation as first proposed by Kohli and Jaworski (1990) has three fundamental components: (1) the generation of market intelligence; (2) the dissemination of market intelligence; and (3) the response of the firm to the market intelligence. The foundation of the market orientation construct, as proposed by Kohli and Jaworski (1990), is a customer focus and inter-organizational coordination, to disseminate market intelligence and respond to it.

Narver and Slater (1990) proposed a similar model for market orientation, with the components of (1) customer orientation; (2) competitor orientation; and (3) inter-functional coordination. Thus, a strong orientation towards listening to the customer and developing product and services that address specific market needs may lead to a competitive advantage (Baker and Sinkula 2005). Customer orientation as first conceptualized refers to the understanding of current needs of the customer, as well as future (latent) needs (Kohli and Jaworski 1990; Narver and Slater 1990).

Market knowledge competence, as proposed by Li and Calantone (1998), is an extension of the market orientation constructs developed in previous literature (Kohli and Jaworski 1990; Narver and Slater 1990). This construct consists of three processes: a customer knowledge process; a competitor knowledge process, and marketing – research and development integration. The first two processes are analogous to customer and competitor orientation (Narver and Slater 1990). The marketing – R&D integration process is a more specific form of the dissemination of, and response to, market intelligence processes (Kohli and Jaworski 1990).

Day (1994) classifies the capability of being close to the customer as an *outside-in* capability which links the external environment to the internal process of the organization. The outside-in capabilities allow firms “to compete by anticipating market requirements ahead of competitors and creating durable relationships with customers, channel members, and suppliers” (Day 1994). Moorman and Rust (1999) recognized the “marketing-customer connection” as a capability that may lead to organizational success.

Baker and Sinkula (2005) examined over 100 empirical studies regarding market orientation conducted between 1990 and 2005, and noted that out of the seventeen papers that studied the relationship between market orientation and new product success, sixteen (94%) reported a significant positive relationship. Baker and Sinkula (2005) did note that “new products can be successful in terms of consumer acceptance without increasing firm profitability or market share if (1) they are replacing obsolete brand or product line members; (2) they are cannibalizing other brand or product line members; or (3) the cost of product development and production leads to inefficient pricing or difficult break-even requirements.” They referred to these phenomena as one of the three elements of “the new product paradox” (Baker and Sinkula 2005).

2.1 The Market Orientation Paradox

One issue an organization must address regarding customers, and market orientation is whether to focus on the firm’s existing customer base and markets, or on new customers and/or new markets. Some will argue that economic opportunity is the primary reason for new product development, and so firms should focus on their existing customer base and develop products that address their expressed unmet needs. Others will argue that technical opportunity, and developing products to satisfy the latent needs of customers, is the basis for enduring success.

Narver, Slater, and MacLachlan (2004) attempt to address this paradox by dividing what has been traditionally called market orientation into two separate constructs. They explain that the concept of market orientation has both a responsive nature and a proactive nature. Thus, *responsive market orientation* is a market orientation in which a business attempts to understand and to satisfy its customer’s expressed needs, whereas *proactive market orientation* is a market orientation in which a business attempts to understand and to satisfy customer’s latent needs (unexpressed, unconscious). Responsive market orientation is concerned with current customers and satisfying their immediate unmet needs. Proactive market orientation is concerned with meeting the future needs of current or new customers (see Narver, Slater and MacLachlan 2004; Slater and Mohr 2006).

Responsive market orientation is a business behavior in which the firm attempts to understand and to satisfy customer’s *expressed* needs. Responsive market orientation is concerned with current customers and satisfying their immediate

unmet needs (Narver, Slater and MacLachlan 2004). The sort of behaviors, or actions, indicative of a responsive market orientation include

- Firms constantly monitoring their level of commitment and orientation to serving customer needs.
- Firms freely communicating information about their successful and unsuccessful customer experiences across all business functions.
- The firm's strategy for competitive advantage is based on their understanding of customer needs.
- Firms measuring customer satisfaction systematically and frequently.
- Firms being more customer-focused than their competitors.
- Firms believing that their business exists primarily to serve customers.
- Data on customer satisfaction being disseminated at all levels within the firm on a regular basis.

(see Narver, Slater and MacLachlan 2004).

Narver, Slater, and MacLachlan (2004) described proactive market orientation as an organizational behavior of attempting to understand and to satisfy customer's *latent* needs (unexpressed, unconscious). Proactive market orientation is concerned with meeting the future needs of current or new customers.

The sort of behaviors, or actions, indicative of a proactive market orientation include

- Firms helping their customers anticipate developments in their markets
- Firms continuously trying to discover additional needs of their customers of which they are unaware
- Firms extrapolating key trends to gain insight into what their customers will need in the future
- The firm's new products and services incorporating solutions to potential customer needs
- Firms searching for opportunities in areas where customers have a difficult time expressing their needs
- Firms brainstorming on how customers use their products and services
- Firms innovating even at the risk of making their existing products obsolete
- Firms working closely with lead users who try to recognize customer needs months or even years before the majority of the market may recognize them

(see Narver, Slater and MacLachlan 2004).

One can think of a proactive approach as *technology* driven, with research and development being central to deciphering these unexpressed needs and translating these needs into new products. On the other hand, a responsive approach is more *market* driven, with the marketing department paying strict attention to the customer, to ensure that their current needs are being satisfied.

A strategic issue an organization must address regarding innovation efforts is whether to focus on the expressed unmet needs of its existing customer base, or to focus on the latent, unexpressed needs of existing and/or future customers. Should firms be *responsive* to the immediate demands of the current market, or should firms be more *proactive* in their innovation efforts and attempt to develop products to address future market needs? Some will argue that economic opportunity is the primary reason for new product development, and so firms should focus on their existing customer base and develop products that address their expressed unmet needs. Others will argue that technical opportunity, and developing products to satisfy the latent needs of customers, is the basis for enduring success.

For Foster (1986) innovation “is a battle in the marketplace between innovators (i.e. attackers), trying to capture sales by changing the order of things, and defenders protecting their existing cash flows.” Since *defenders* are entrenched in sustaining operations and serving the needs of existing customers, it is the *attacker*, unconstrained by profit issues and focused on new opportunities, that has the advantage in the arena of innovation (Foster 1986).

Tushman and O’Reilly (1997) believe that innovation strategy is not a simple either or decision. The route to sustained competitive advantage is not through succeeding at incremental, architectural or discontinuous innovation, but through producing streams of innovation. Successful management of innovation streams, “managing for short term efficiency by emphasizing stability and control, as well as for long term innovation by taking risks and learning by doing,” allows organizations to sustain their competitive advantage (Tushman and O’Reilly 1997). Thus, the emphasis is on a mix of strategies that will allow for sustaining current cash flows and profitability by serving existing customer bases with incremental and architectural innovations, and by creating new opportunities by developing discontinuous innovations.

Tushman and O’Reilly (1997) feel that firms need to strike a balance between stability and change for long-term prosperity. They contend that managers need to create *ambidextrous organizations*: organizations that foster stability and incremental change, as well as experimentation and discontinuous change simul-

taneously. In the most successful firms, managers encourage tight alignment among strategy, structure, people and culture to “ensure today’s success and periodically promote revolutionary change for tomorrow’s renewal” (Tushman and O’Reilly 1997).

Since the proactive and responsive market orientation constructs were first proposed by Narver, Slater and MacLachlan (2004), there has been scant research regarding these two distinct forms of market orientation in the following areas: the antecedents of each type of market orientation; the influence of the external environment in developing either form of market orientation; and the influence of proactive and responsive market orientation on organizational outcomes.

3 Motivations behind Innovation Efforts

3.1 Technical and Economic Opportunity

For Schumpeter (1934) the primary motivation behind innovation efforts is monopoly control of markets, and consequently the ability to monopolize revenue and profits. In more recent studies, two hypotheses have been developed that go beyond the theories proposed by Schumpeter (1934). The *technology push* hypothesis, proposed by Phillips (1966), places major emphasis on underlying scientific knowledge as the primary motivation for innovation. In the technology push hypothesis, innovation is the result of technological development, as is typically initiated by a firm’s research staff. *Technical opportunity* is the driving force behind the technology-push hypothesis proposed by Phillips (1966).

The *demand pull* hypothesis, first proposed by Schmookler (1966), emphasizes economic opportunity as the primary motivation for innovation. In the demand pull model, initiation of an innovation is the result of observing, and subsequently attempting to satisfy, an unmet market need. Thus, innovation is the result of a demand, and not the result of pure scientific research looking for an application. The main premise underlying the demand pull hypothesis is that invention is a response to profit opportunities (Kamien and Schwartz 1982). Thus *economic opportunity* is the driving force behind the demand pull hypothesis proposed by Schmookler (1966).

Freeman (1973) argues that successful innovation is due to market considerations, with an understanding of user needs being the key to success. Utterback (1974) contends that “60 to 80% of important innovations in a large number of fields have been in response to market demands and needs.” Kamien and

Schwartz (1982) conclude that although technological opportunity may influence the pace and direction of technical advance in a broad sense and especially in the long run, it is the existence of economic opportunity that determines the success of innovation.

Christensen (2000) claims that management practices that typically are the most productive for exploiting existing technologies are anti-productive when it comes to developing disruptive ones. Since companies depend on customers and investors for resources, organizations must provide their significant stakeholders with what each demands. Firms provide customers with the products and services that they have expressly demanded, and provide investors with the profits that they demand from the sale of these products. The tendency of firms with mature product lines is to pursue new product opportunities that fill a need with certainty, and discourage pursuing disruptive technologies that may not initially have a defined market and may have modest initial profit and growth potential. According to Christensen (2000), an impediment to pursuing new ventures is the fact that firms may be slaves to their markets and to their investors. Since meeting the demands of existing markets generates predictable profitability, firms are reluctant to pursue new ventures since it may endanger current revenue and profit streams.

Chandy and Tellis (1998) note that organizations may be reluctant to introduce radical innovations due to the fear of the radically new products potentially cannibalizing sales of their existing product lines. They contend that firms need to have a “willingness to cannibalize”, and need to recognize that the radically new introduction may represent a superior value proposition, which will ultimately result in new market opportunities, stronger sales revenues and market growth (Chandy and Tellis 1998).

Rosenau (2000) states that customers do not purchase technology just for the sake of technology; but for the cost-effective benefits that the technology may provide. Rosenau (2000) claims that technology itself does not create a market need, but rather technology must satisfy a *latent* need in order to be a commercially viable new product.

3.2 Strategic Choice

Miles and Snow (1978) describe four types of innovation strategies: *prospectors*, *defenders*, *imitators* and *analyzers*. A particular firm's choice of strategy depends on market demand, market share, competitive threats, and industry volatility. Freeman (1982) identified six categories of innovation strategy. The first

three are similar to Miles and Snow (1978), and are *offensive, defensive, and imitative*. Other categories are *dependent, traditional, and opportunistic*. Kerin, Varadarajan and Peterson (1992) discussed first mover advantages (prospector) with respect to market share, brand identity and profitability. According to Kerin, Varadarajan and Peterson (1992), first mover strategy requires having an aggressive technology strategy that tolerates risk taking.

Slater and Mohr (2006) studied proactive and responsive market orientation in relation to the four strategy types proposed by Miles and Snow (1978). Their empirical study indicates that firms with a marketing strategy classified as a “prospector” have a tendency towards a proactive market orientation. Conversely, firms with a marketing strategy classified as either “analyzer” or “defender” have a tendency towards a responsive market orientation.

3.3 Innovation through New Product Development

Innovation has been defined as the implementation of a new idea: invention plus exploitation (Ettlie 2000). The literature tends to classify innovation into two or three categories, based on the “degree” of innovation. According to Kamien and Schwartz (1982), an innovation can be regarded as “either an upward shift of a production function or a new product, that is, a new dimension in commodity space.” While dramatically new products are rather easy to identify, Kamien and Schwartz (1982), note that most new products are not so strikingly different from what currently exists, and may constitute only small improvements. Kamien and Schwartz (1982) claim that product improvements that do not involve advancement in technology are not truly innovative.

Christensen (2000) divides new product introductions into two categories: *sustaining technologies* and *disruptive technologies*. Sustaining technologies are technologies that improve the performance of products in the ways that matter to the firm’s *existing* customers. In other words, sustaining technologies are developed to meet the known and existing needs of the firm’s established customer base. Many successful firms focus on sustaining activities because their management practices are biased towards listening to customers; investing aggressively in technologies that give those customers what they say they want; seeking higher margins; and targeting larger markets rather than smaller ones (Christensen 2000).

The other classification of new products is disruptive technologies, which change the value proposition in the market. According to Christensen (2000), although disruptive technologies may offer lower performance in terms of the attributes

that mainstream customers care about, they possess other attributes that a few fringe (generally new) customers value. Because of the possibility of new utility, disruptive technologies may appeal to a different set of users, and as a result create new markets.

Rosenau (2000) created a new-product grid, along the dimensions of “new to the firm” and “new to the market.” A *product modification* is simply an enhancement of an existing product, and as such is not new to the firm or to the market. A *me-too-product* typically is an imitation of a competitor’s product, so it is not new to a particular market, even though it may be new to a particular firm. *Line extensions* represent combining known technologies to create a new product, and as such may represent something new to the market, but not new to a particular firm. Lastly, *new to the world* products are new to the firm and to the market, created via a new technology and representing new user utility.

Chandy and Tellis (1998) also differentiate between different levels of innovation, along the dimensions of the “newness” of the technology, and the degree to which the new product is an improvement over existing products in satisfying “key customer needs”. A *radical product innovation* is a new product introduction that is significantly different from the current state of the art in terms of technology and architecture, and offers features and benefits that are a dramatic improvement over existing products (Chandy and Tellis 1998).

Tushman and O’Reilly (1997) break down new products into three categories, based along the dimensions of technological newness and user utility, similar to Rosenau’s (2000) new product grid. An *incremental innovation* is an improvement on a standard design, typically incorporating known technology and incrementally improving utility. *Architectural innovations* link, or combine, existing technologies in different ways, and may create a new level of utility, or a new utility altogether. *Discontinuous innovation* represents a technological discontinuity that breaks away from existing incremental innovation patterns, rendering standard designs obsolete and creating new markets and applications. This classification is analogous to Christensen’s (2000) disruptive technologies.

Innovation efforts arising from market pull, resulting in sustaining or incremental innovations, may be viewed as the output of an organization with a responsive market orientation. The main challenge for this form of innovation is to create a product with suitable value to meet current market needs (Rosenau 2000). Innovation efforts arising because of technology push, resulting in radical or disruptive innovations, may be viewed as the output of an organization with a proactive market orientation. The challenge for this form of innovation is to identify

a suitable market or “create the market” and then educate the market that the technology is useful and appropriate (Rosenau 2000).

4 Organizational Factors Influencing Market Orientation and Innovation

The foundation of any organization is its internal attributes: organizational structure, organizational culture, and available resources (human, physical, financial, and informational). These factors evolve over time and may act as enablers for innovation, or they may act as constraints that limit the nature of innovations and innovation strategies.

The resource-based view of the firm proposes that one of the key elements in creating, and sustaining, a competitive advantage is for firms to capitalize on their internal resources. According to Barney (1991), firm resources include all assets, capabilities, organizational processes, information, and knowledge controlled by the firm. Barney proposed that there are four indicators that can be used to gauge the potential of firm resources to contribute towards the development of a sustainable competitive advantage: value, rareness, imitability, and substitutability. Resources must be *valuable*, in that they allow the firm to exploit opportunities and/or neutralize threats in the external environment; *rare* among the firm’s competitors; *difficult to imitate*; and not have *equivalent substitutes* (Barney 1991).

Following the work of Barney, Bates and Flynn (1995) further examined the relationship between competitive advantages through innovation and resources available within the firm. In their resource-based view of the firm, they proposed that a firm’s internal processes create a resource bundle that can be a means of creating and sustaining a competitive advantage. Their research looked at the relationship between these unique resource bundles, innovation strategy (early, average, and late adoption), and innovation success. They theorized that manufacturing firms pursuing strategies of early adoption (analogous to the prospector strategy of Miles and Snow (1978)) will exhibit greater cost improvements, higher quality, greater volume flexibility, and faster delivery.

Narver and Slater (1990) describe market orientation as part of an organization’s culture. It is a behavior that may lead to the “creation of superior value for buyers and, thus continuous superior performance for the business” (Narver and Slater 1990). Deshpande, Farley, and Webster (1993) stated that to truly understand the dynamics of market orientation, the concept must be examined by first examining the underlying organizational culture.

4.1 Organizational Culture

Barney (1986) defines organizational culture as “a complex set of values, beliefs, assumptions and symbols that define the way in which a firm conducts its business.” Schein (1985) describes organizational culture as “The pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration.”

According to O’Reilly, Chatman, and Caldwell (1991), there are seven primary characteristics that “capture the essence of an organization’s culture.” These characteristics include the organization’s attitude towards innovation and risk taking; management’s orientation towards outcomes and results; orientations towards employee satisfaction and the use of teams; the degree of aggressiveness and competitiveness among employees; and the firm’s orientation towards stability rather than growth (O’Reilly, Chatman, and Caldwell 1991). By evaluating each of these characteristics on a continuum from low to high, O’Reilly, Chatman, and Caldwell (1991) propose that an organization can be analyzed in regards to shared feelings, norms for behavior, and an understanding of how work is performed (see also Chatman and Jehn 1994; Judge and Robbins 2007, 573).

Oden (1997, xii) states that “Creating the necessary culture is an important part of the innovation process.” Oden (1997, 5) notes that among the distinguishing characteristics of an innovative culture are an emphasis on long term strategic planning that has a strong customer focus and incorporates an understanding of near and long-term customer needs. Other distinguishing features include organizational flexibility and adaptability, a high degree of mutual commitment and trust among employees, the effective communication of information, and an emphasis on continuous improvement.

At the heart of an innovative culture is a customer focus (Oden 1997). A customer focus requires an organization to be oriented towards its outward environment, with customer satisfaction as a central criterion for decision-making. Customer focus means not just being conscious of current customer needs, but also anticipating “what the customer will want and need in the marketplace of tomorrow” (Oden 1997, 97).

In Kohli and Jaworski’s (1990) initial conceptualization of market orientation, they postulated on some of the organizational conditions that might foster a market oriented culture. They identified several internal organizational factors

which might play a role in the creation of a market oriented organizational environment: the risk aversion of top managers; the senior manager's attitude toward change; interdepartmental dynamics, such as the degree of conflict and the degree of connectedness; and the existence of organization systems such as the degree of departmentalization, formalization, and centralization.

Further research by Jaworski and Kohli (1993) found support for some of their hypotheses regarding the antecedents that foster a market oriented culture. The results of their analysis revealed that managerial aversion to risk appears to have a negative effect on the responsiveness of the organization; interdepartmental conflict may inhibit intelligence dissemination and responsiveness; interdepartmental connectedness appears to facilitate the dissemination of market intelligence; and the centralization of decision making may inhibit all three components of market orientation (Jaworski and Kohli 1993).

4.2 Market Orientation and the Competing Values Cultural Framework

The research of Deshpande, Farley, and Webster (1993) was the first attempt to empirically study the relationships between culture and market orientation. They applied the competing values framework of organizational culture, first operationalized by Quinn and Rohrbaugh (1983).

The competing values framework of organizational culture (Quinn and Rohrbaugh 1983) is a typological approach that incorporates many of the values, norms and behaviors noted by O'Reilly, Chatman, and Caldwell (1991) and Oden (1997). The competing values framework categorizes culture types on the basis of two dimensions: organizational structure and strategic focus. The structure dimension has organic structure at one end of a continuum and mechanistic structure at the other extreme. The strategic focus dimension has external focus at one extreme of a continuum and internal focus at the other (Cameron and Freeman 1991). The intersection of these two axes results in four quadrants, within which four distinct types of culture may be classified, as illustrated in Figure 1.

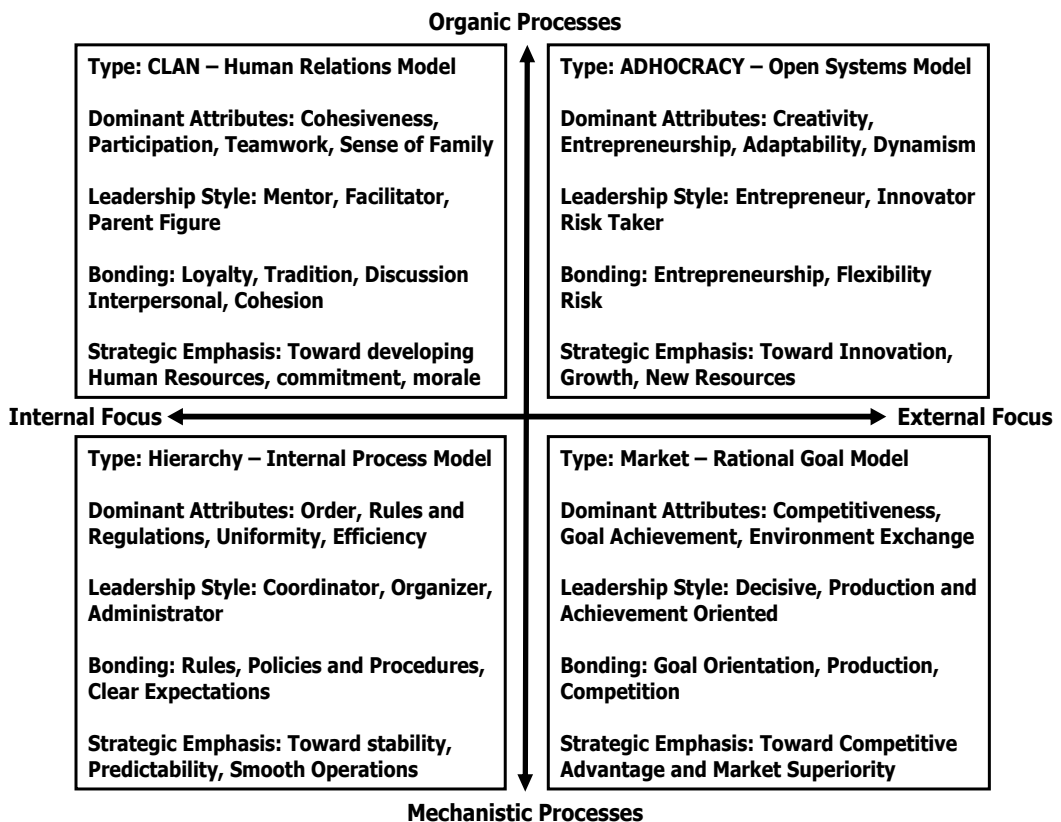


Figure 1. Organizational Culture: Competing Values Framework

Cameron, Kim and Sarah J. Freeman (1991), "Cultural Congruence, Strength and Type: Relationships to Effectiveness", Research in Organizational Change and Development, Vol. 5, R. W. Woodman and W. A. Passmore, eds., Greenwich, CT. JAI Press, Inc.

The *market* culture has an external focus, emphasizing competitiveness and market superiority, and tends to be mechanistic in nature. Attributes of a market culture include

- Change Orientation: Predictability, Order, Toward Centralization, Integration
- Environment Orientation: External Focus, Toward Competitive Position of the Overall System
- Organizational Orientation: Toward Maximization of Output and Productivity
- Time Horizon: Short Time Lines

- Dominant Attributes: Competitiveness, Clear Direction, Goal Achievement, Environment Exchange
- Leadership Style: Decisive, Production and Achievement Oriented
- Bonding (organizational glue): Accomplishment, Goal Orientation, Production, Competition
- Strategic Emphasis: Toward Competitive Advantage and Market Superiority, Profit/Impact

The *adhocracy* culture values creativity, and seeking out innovative solutions to serve market needs. Attributes of an adhocracy culture include

- Change Orientation: Spontaneity, Flexibility, Toward De-Centralization, Differentiation
- Environment Orientation: External Focus, Toward Competitive Position of the Overall System
- Organizational Orientation: Toward Expansion, Transformation
- Time Horizon: Short Time Lines
- Dominant Attributes: Creativity, Entrepreneurship, Adaptability, Dynamism, Insight, Innovation
- Leadership Style: Entrepreneur, Innovator, Risk Taker
- Bonding (organizational glue): Entrepreneurship, Flexibility, Risk Taking
- Strategic Emphasis: Toward Innovation, growth, new resources (resource acquisition)

The *clan* culture is internally focused with an organic nature, fostering an environment of trust, support and sharing. Attributes of a clan culture include

- Change Orientation: Spontaneity, Flexibility, Toward De-Centralization, Differentiation
- Environment Orientation: Internal Focus, Toward Maintenance of the Socio-technical System
- Organizational Orientation: Toward Development of Human Resources
- Time Horizon: Long Time Lines
- Dominant Attributes: Cohesiveness, Participation, Discussion, Teamwork, Sense of Loyalty
- Leadership Style: Mentor, Facilitator, Parent-Figure
- Bonding (organizational glue): Loyalty, Tradition, Concern, Interpersonal Cohesion

- Strategic Emphasis: Toward developing Human Resources, commitment, morale

The *hierarchical* culture is a mechanistic culture, dominated by rules and procedures, creating an environment of conformity. Attributes of a clan culture include

- Change Orientation: Predictability, Order, Toward Centralization, Integration
- Environment Orientation: Internal Focus, Toward Maintenance of the Socio-technical System
- Organizational Orientation: Toward Consolidation, Equilibrium
- Time Horizon: Long Time Lines
- Dominant Attributes: Order, Rules and Regulations, Uniformity, Efficiency, Measurement, Documentation
- Leadership Style: Coordinator, Organizer, Administrator
- Bonding (organizational glue): Rules, Policies and Procedures, Clear Expectations
- Strategic Emphasis: Toward stability, predictability, control, smooth operations (see Quinn and Rohrbaugh 1983; and Cameron and Freeman 1991).

Deshpande, Farley, and Webster (1993) applied the competing values framework of organizational culture to the market orientation constructs proposed by Kohli and Jaworski (1990) and by Narver and Slater (1990). Deshpande, Farley, and Webster (1993) postulated that the market culture, with its emphasis on winning in the marketplace, is the most market oriented type of culture, and that this culture may lead to higher level of business performance than the three other types of culture. The hierarchical culture was postulated to be the least market oriented, due to its bureaucratic nature, with a heavy emphasis placed on stability. Due to the innovative nature of the adhocracy culture, it was hypothesized to be second only to market culture in terms of fostering market oriented behaviors. The clan culture was deemed too internally focused to foster a high degree of market orientation. Thus, the externally focused cultures were hypothesized to be more effective in developing a sense of market orientation within the firm. The empirical evidence supported their hypotheses: market cultures were found to have the strongest relationship with market orientation, and were associated with the best performance, followed by adhocracy cultures. Deshpande, Farley, and Webster (1993) stated that the market culture was found to be the most responsive to customer needs, resulting in the highest level of performance.

This competing values framework shows congruence with the main attributes of responsive and proactive market orientation. Proactive market orientation is a strategic approach to fulfilling customer needs by researching and anticipating latent customer requirements in advance of expressed market demand. This form of market orientation requires a culture that is comfortable with risk-taking and innovation (Narver, Slater, and MacLachlan 2004). A responsive market orientation is a strategic approach of satisfying the immediate needs of the customer, based on current market demand. This form of market orientation requires a culture that is focused on understanding the current needs of the customer in an effort to create market space at the expense of direct competitors (Narver, Slater, and MacLachlan 2004).

The intent of innovation is to seek out creative solutions to current and future customer needs. One of the key tenants of the adhocracy culture is creativity, and seeking out innovative solutions (Cameron and Freeman 1991). Thus one can assume that a strategic choice of proactive market orientation may be the direct result of fostering creativity and risk-taking, i.e., an adhocracy culture.

A market culture is based on valuing competition, whether between co-workers or with other companies. This culture is results oriented, and places an emphasis on winning in the marketplace (Cameron and Freeman 1991). Since this culture values results, it may foster an environment focused on serving the expressed needs of customers in anticipation of immediate returns and short term market dominance. Since a market culture may be an atmosphere conducive to directing resources and time towards satisfying the needs of the current customer, it may foster a responsive market orientation.

Since a proactive market orientation is focused on the latent needs of customers, the returns from this type of pursuit may not generate immediate payback or provide market dominance in the short term (Christensen 2000). One can assume that a market culture is not necessarily an atmosphere conducive to encouraging endeavors into discovering unconscious customer needs, which are resource and time consuming and not directed towards immediate market needs.

One of the basic principles behind an adhocracy culture is the drive to offer the most unique and newest products. As such, this culture may not be as conducive to supporting a responsive market orientation as a market culture may. Conversely a firm may have a responsive orientation, but still strive to have the most unique and innovative solutions to current customer requirements. As

such, an adhocracy culture that values creativity and innovation may actually be a more advantageous culture to support a responsive market orientation.

A clan culture fosters an environment of trust, support and sharing. Clan cultures have an emphasis on the internal environment of the organization, and place less emphasis on the external environment. As such, clan cultures place less emphasis on external entities such as customers and markets. Although organic and flexible in nature, clan cultures may not necessarily foster an environment conducive to innovation and risk taking (see Quinn and Rohrbaugh 1983; Cameron and Freeman 1991).

A hierarchical culture is dominated by rules and procedures, creating an environment of conformity. This culture is basically the opposite of the adhocracy culture, due to the nature of their “competing values” (see Quinn and Rohrbaugh 1983; Cameron and Freeman 1991). This culture of control is internally focused, and places less emphasis on the external environment. Since this culture is highly structured, and requires adherence to rules and procedures, it may not conducive to the type of creativity required to support a successful innovation efforts.

5 External Environmental Factors Influencing Market Orientation and Innovation

Research has suggested that a competitive environment forces firms to continuously improve, or else face extinction (Burns and Stalker 1961; Peters 1990; Porter 1980). Rivalry among competing sellers may have a strong influence on innovation strategy formulation and focus (Jaworski and Kohli 1993; Li and Calantone 1998). Kamien and Schwartz (1982) note that two of the factors influencing the level and speed of innovation activities are the uncertainty regarding the identity of rivals and their development plans, and the perceived intensity of the rivalry.

In Kohli and Jaworski’s initial conceptualization of market orientation (1990), they postulated on the moderating influence competitive intensity may have on the degree to which a firm can effectively be market oriented. They concluded that the benefits of being market orientated may be greater for organizations in a competitive industry than for organizations operating in less competitive industries. Thus, they hypothesized that the greater the level of competitive intensity within an organization’s external environment, the stronger the link between a market orientation and business performance (Kohli and Jaworski 1990).

In their study of the impact of market structure on innovation, Kamien and Schwartz (1982) observed that competitive pressures and market opportunities were important factors in determining the types of market structure most suitable for innovation. Intermediate levels of competition (between pure competition and pure monopoly) may be more conducive to innovation effort. The extremes of pure competition, with the ability for competing firms to quickly imitate, and pure monopoly, where there is no opportunity to compete with the entrenched monopolistic firm, offer firms in those types of markets little incentive to develop innovative products (Kamien and Schwartz 1982).

Based on the Schumpeterian model (Schumpeter 1934), the standard assumption is that research and development activities increase with monopoly power. In reality, Kamien and Schwartz (1982) found that a market structure intermediate between monopoly and perfect competition would promote the highest rate of inventive activity. Their studies revealed that “the largest firms appear to be far less efficient innovators than smaller rivals” (Kamien and Schwartz 1982).

Rothschild (1984) emphasizes the need to maintain a close watch on the competition and be able to respond to competitive actions. Rothschild (1984) contends that for firms to maintain a competitive advantage, management must be able to analyze competitive situations in terms of strengths, weaknesses, opportunities, and threats, and develop strategies that capitalize on new opportunities. The key to survival rests on properly dealing with external forces that influence the success of the firm. Rothschild (1984) claims that “success breeds complacency,” and managers must be continuously scanning the competitive landscape for threats and opportunities, and be flexible enough to adopt strategies that will create an advantage given the dynamics of the industry.

According to Narver, Slater and MacLachlan (2004), a responsive market orientation is typically found in firms that are obsessed with beating the competition within the current market conditions. Conversely, firms that pursue innovation without allowing competitive pressures to influence their strategies are more likely to have a proactive market orientation. To date, there have not been any empirical studies conducted to specifically explore the relationship between competitive intensity and proactive and responsive market orientation.

6 Organizational Effectiveness: the Outcomes of Market Orientation and Innovation

After an exhaustive analysis of the topic, Campbell (1977) proposed 30 criteria for organizational effectiveness. Campbell's (1977) list of metrics for organizational success includes (1) the degree of conflict vs. cohesion within the organization; (2) the degree of control management has in influencing and directing organizational behavior; (3) the level of efficiency of employees and processes; (4) the degree of emphasis on flexibility, adaptation and innovation as a response to environmental changes; (5) how information is managed and communicated; (6) the level of employee morale and satisfaction; (7) the degree of systematic planning and goal setting; (8) the degree of individual, group, and organizational productivity; (9) the amount of profit and return on investments the firm realizes; (10) the degree of stability within the firm; (11) the level of emphasis on development of human resources; (12) the degree to which the organization values human resources (Campbell 1977). What is interesting is that the criteria for success are spread across the organization, with external and internal metrics, and as much emphasis being placed on organizational development as on financial measures.

Driva, Pawar, and Menon (2001) studied the adequacy of new product development performance metrics, particularly in regard to different organizational perspectives. Driva, Pawar, and Menon (2001) contend that financial performance measures are most useful at the upper levels of the organization, where they are used to evaluate corporate strategies, but may be in opposition to the emphasis on quality within certain industries. Driva, Pawar, and Menon (2001) state that cost accounting methods alone are not true indicators of success, because financial data does not reflect other success factors such as quality, customer satisfaction, and employee morale.

6.1 Marketing – R&D Integration

One measure of organizational effectiveness may be how well the marketing and R&D functions collaborate and cooperate to ensure satisfaction of customer needs (Li and Calantone 1998). This question gets back to three of Campbell's (1977) metrics of organizational effectiveness: (1) the degree of conflict vs. cohesion within the organization; (2) how information is managed and communicated; and (3) the degree of individual, group, and organizational productivity. Marketing-R&D Integration as defined by Li and Calantone (1998), and Gupta

and Wileman (1986), is the extent to which marketing and R&D personnel cooperate and collaborate during the new product development process.

Leading companies achieve new product success because they are able to capitalize on their ability to respond to market needs by applying technology when the marketplace is ready to adopt the concept. One of the challenges facing high tech firms is getting technologists to truly understand the needs of the customers, and the marketers to truly understand the potential of the technology. Developing a financially successful, innovative product and launching it at a favorable time in the business cycle has to be a team effort (Schleiffer 2000).

New product ideas and development can be influenced by either demand pull or technology push mechanisms. The marketing function collects market information, regarding customers and competitors, related to market needs that current products are not satisfying, or specific features and functions of existing products that can be improved upon (demand pull). Conversely, ideas or technologies, uncovered by research and development efforts may lead to the development of new applications and products based on these discoveries (technology push). New discoveries may also be applied to existing products, resulting in expanded market opportunities or extended product life. With this in mind, marketing and research and development need to work closely together to uncover new market opportunities. Market opportunities may require the development of new technologies to fully capitalize on the market potential, or the innovation may lead to advancement in technology that is applied within the firm's existing product lines.

Jaworski and Kohli (1993) and Narver and Slater (1990) both proposed the notion that two major components of market orientation are market intelligence dissemination and organizational responsiveness to the market intelligence. Li and Calantone (1998) proposed a concept called market knowledge competence, which incorporates three elements: a customer knowledge process, a competitor knowledge process, and marketing – R&D integration. Marketing – R&D integration as conceptualized by Li and Calantone (1998) and Gupta and Wileman (1986) incorporates the collaborative aspects of market intelligence dissemination and organizational responsiveness to the market intelligence. Li and Calantone (1998) noted a positive relationship between marketing – R&D integration and new product advantage, and in turn a positive relationship between new product advantage and market performance.

With a responsive market orientation, organizations attempt to satisfy their current customers' expressed needs. In this sense, the customer "leads" the com-

pany into developing new offerings that satisfy existing needs. With a proactive market orientation, the firm is trying to discover unexpressed, latent, needs. So, in this sense the company is “leading” their customers to uncover new, unconscious needs, and then developing products to meet these future, unexpressed, needs (Narver, Slater, and MacLachlan 2004). Responsive market orientation may be viewed as a responsive form of a customer knowledge process, whereas proactive market orientation may be viewed as a proactive form of a customer knowledge process.

One can think of a proactive approach as technology driven, with research and development (R&D) being central to deciphering these unexpressed needs and translating these needs into new products. On the other hand, a responsive approach is more market driven, with the marketing department paying strict attention to the customer, to ensure that their current needs are being satisfied.

Day (1994) classifies capabilities that integrate the outside environment with internal processes as spanning capabilities. The mechanisms used to foster cooperation and close communication between the “outside-in” function of marketing and the “inside-out” function of R&D can be considered as spanning capabilities. Thus the integration of marketing and R&D can be considered a critical capability of the organization (Day 1994). Moorman and Rust (1999) also recognized the “marketing-R&D connection” as a critical component in the success of new product development and innovation efforts.

Valuable insights can be gained by the sharing of information, whether the subject is technological advances or market trends. Accurate information, competitive intelligence, and feedback from customers are crucial for making effective and timely product development decisions. The marketing staff can provide input from the marketplace, which helps R&D incorporate the new and improved features that provide a competitive edge.

Vermette (1997) argues that organizations that encourage communication and have a high degree of departmental integration are usually those that develop products quickly and capture significant market share. Vermette (1997) found that measurement and control have a lot less to do with product development success than do factors like knowledge of customers and changes in the marketplace.

The literature suggests that market orientation and marketing – R&D integration are integral components of successful new product development efforts, yet to date there have not been any studies conducted to explore the relationship between proactive and responsive market orientation and marketing – R&D inte-

gration. A potential area of inquiry is to study this relationship. Does a high degree of proactive or responsive market orientation lead to a higher degree of inter-departmental integration?

6.2 Market Performance

Since the concept of market orientation was first introduced by Kohli and Jaworski (1990) and Narver and Slater (1990), there have been over one hundred studies related to this original construct (Baker and Sinkula 2005). To date there have been limited studies related to the proactive and responsive aspects of market orientation. Narver, Slater and MacLachlan (2004) hypothesized that both forms of market orientation would be positively related to new product success, with proactive market orientation exhibiting a greater influence. The results of their empirical analysis indicated that proactive market orientation indeed exhibited a positive relationship with new product success, but responsive market orientation exhibited a negative (though statistically insignificant) relationship with new product success.

In a subsequent study, Atuahene-Gima, Slater and Olson (2005) hypothesized that responsive market orientation has an inverted U shape relationship with new product program performance. They theorized that if firms place too little, or too much, emphasis on responsive market orientation the result will be poor performance. Thus, they theorized that firms with a medium amount of emphasis on responsive market orientation will realize the highest level of performance. The findings of their empirical study did not support their hypothesis.

One question that arises from these limited studies is whether the simple economic metrics applied by Narver, Slater and MacLachlan (2004) and Atuahene-Gima, Slater and Olson (2005) are sufficient to gauge the success of new innovation efforts.

Most of the literature suggests that innovation success can be assessed in terms of technical progress and performance, and economic return. It cannot be underestimated how technical progress can lead to new uses, and the subsequent creation of new markets. Thus, economic return cannot be viewed just in terms of existing customers and markets, but also in terms of potential new opportunities and markets due to the new utilities the new innovation provides. In general, firms undertake innovation activities to provide the firm with technical superiority (Foster 1986), profitability and impact (Cooper and Kleinschmidt 1996), and enable the firm to create a sustainable competitive advantage (Porter 1985).

Foster (1986) determined that innovation activities are stimulated by a need to improve productivity, but that defenders of established technology have a different perspective when evaluating productivity than innovation attackers. For the attacker, productivity is the improvement in performance of the new product over the old product, divided by the effort put into developing the new product (Foster 1986). This would be a measurement of *technical productivity*. The defender, on the other hand, observes the productivity of a new innovation through the eyes of market acceptance, which is a measure of *economic productivity*.

In a benchmarking study of 161 business units to identify key drivers in new product success (Cooper and Kleinschmidt 1996), ten performance measures were evaluated: the % of sales from new products, profitability, success rate, technical success, sales impact, meeting sales objectives, meeting profit objectives, profitability versus competitors, and overall success. Through responses to the survey, these measures of success were ultimately reduced to two dimensions: *profitability* and *impact*. Profitability is defined as a combination of all profit perspectives: profitability versus competitors; profitability relative to spending; and the contribution of the product on the business unit's overall profits. Impact is a function of how the new product affected the overall performance of the business. The main components of impact are the % sales from new products for the business; the impact of new products on both sales revenue and profits; the success rate of new product efforts; and the technical success of the new product. In the study, Cooper and Kleinschmidt (1996) identified four key drivers for new product success: a high-quality new product development process, presence of a new product strategy, resource availability, and sufficient R&D spending.

Porter (1999) contends that the only way to have a real advantage is through innovation and continuous improvement. True innovation requires that the firm have something unique and distinctive to offer, to separate itself from its competitors. Innovation is not about small, incremental improvements on existing technologies, but rather offering things in different ways, creating distinction by combining technologies. For Porter (1999) the winning firm is not necessarily the first to market a new technology, but rather is the firm that can best incorporate that innovation into the system of the company.

Moorman (1995) developed an instrument to assess *market performance* of new product development programs, incorporating many of the metrics of organizational effectiveness identified by Campbell (1977). Moorman (1995) developed the instrument to assess the level of success of new product development processes, with market performance gauged by the achievement of financial and or-

ganizational metrics within the first 12 months after the introduction of new products:

- Market Share relative to stated objective
 - Sales Revenue relative to the stated objective
 - Return on Assets relative to the stated objective
 - Profit Margin relative to the stated objective
 - Return on Investment relative to the stated objective
 - An acceptable level of Sales Revenue given the amount of Research and Development *financial* resources invested in New Product Development
 - An acceptable level of Sales Revenue given the amount of Research and Development *human* resources invested in New Product Development
- (see Moorman 1995).

The *market performance* instrument developed by Moorman (1995) incorporates objective financial metrics (sales revenue, return on assets, return on investment, and profit margin), along with productivity measures of the new product development process. Market share is the only metric comparing the organization's success relative to the competition. Of note, all the financial metrics, though objective, do not deal in pure financial results, but rather examine the results against stated objectives. So the question of success is, "did we meet our stated goals?" This aspect of Moorman's (1995) instrument incorporates another of Campbell's (1977) effectiveness metrics: the emphasis on systematic planning and goal setting. This instrument of new product market performance also incorporates elements of Foster's (1986) formula for measuring innovation success, namely, R&D yield (the amount of money made from advancing and commercializing the technology) and R&D return (the amount of money made from a technical investment).

The caveat in the market performance metrics is that returns are compared to a "stated objective." Thus, market performance is not based on pure financial results, but rather on a relative measurement of how well the new product program fared against pre-determined financial goals. Proactive programs may very well under-perform responsive programs in regards to immediate pure financial returns. This may be especially true when the proactive program is a "new to the world" product that somehow must recoup the R&D investment, whereas the responsive program may be a "product modification" which may not entail a huge investment in R&D resources. But, since the performance is measured relative

to stated objectives, a proactive program may out-perform a responsive program if it is realizing financial returns greater than stated goals.

7 Conceptual Model

Figure 2 illustrates a conceptual model of the literature discussed regarding market orientation and innovation. At the center of the model is the dual nature of market orientation, the responsive aspect and the *proactive aspect* (Narver, Slater and MacLachlan 2004).

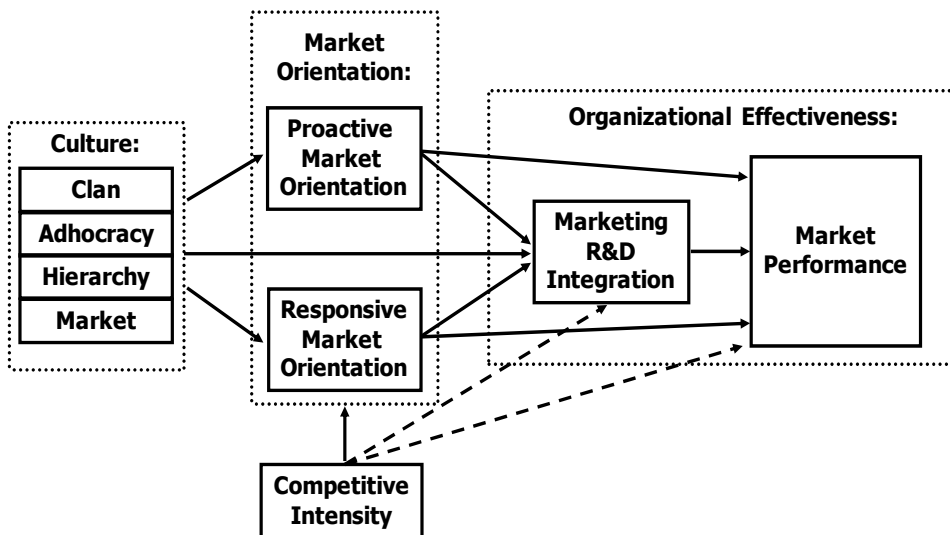


Figure 2. Conceptual Model

This review of the literature regarding organizational culture may contribute to an understanding of the underlying factors that may influence an organization's form of market orientation, which in turn determines the focus of innovation efforts. This review is also an extension of studies previously performed by Jaworski and Kohli (1993), and Deshpande, Farley, and Webster (1993), who examined the influence of organizational culture on the classically defined con-

struct of market orientation. Since the distinct concepts of responsive and proactive market orientation are relatively new to the literature, there has been little empirical research regarding the relationship between internal organizational factors and a firm's tendency to be responsive or proactive in regards to market orientation. This gap in the literature leads to the first potential research question:

What are the Organizational Antecedents of Proactive and Responsive Market Orientation?

Kohli and Jaworski (1990) concluded that the benefits of being market orientated may be greater for organizations in a competitive industry than for organizations operating in less competitive industries. They hypothesized that the greater the level of competitive intensity within an organization's external environment, the stronger the link between a market orientation and business performance (Kohli and Jaworski 1990). This review of the literature may contribute to an understanding of the influence of competitive intensity on the development of a proactive or responsive market orientation, and how external competitive factors may moderate the degree of success a firm realizes from either of the two distinct forms of market orientation. This review is also an extension of studies previously performed by Jaworski and Kohli (1993), Slater and Narver (1994), and Li and Calantone, (1998), who examined the influence of external factors on the classically defined construct of market orientation. There has been little empirical research regarding how external environmental factors, such as competitive intensity, may influence the nature of a firm's market orientation (proactive or responsive), or if external environmental factors have a moderating influence on the level of organizational effectiveness realized by these forms of market orientation. This leads to a second set of potential research questions:

What influence does Competitive Intensity have on a firm's tendency towards a Proactive or Responsive Market Orientation? What influence does Competitive Intensity have on Organizational Effectiveness?

This review of the literature sheds light on a variety of criteria that may be used to evaluate innovation efforts. Ultimately new product development programs are judged based on the degree of commercial success. This review builds upon the studies performed by Narver, Slater and MacLachlan (2004), Baker and Sinkula (2005), and Atuahene-Gima, Slater and Olson (2005) regarding market orientation and market performance. While there has been some empirical research regarding how these forms of market orientation may influence the financial performance of new product development programs (see Narver, Slater

and MacLachlan 2004; Slater and Mohr 2006), there has been little empirical research regarding how proactive and responsive behaviors might affect success from a more total organization oriented standpoint, namely the holistic metrics of market performance developed by Moorman (1995). This leads to the third research question:

What is the influence of Proactive and Responsive Market Orientation on the Organizational Effectiveness metric Market Performance?

This review of the literature may also contribute to an understanding of the influence of proactive and responsive market orientation on the degree of integration between marketing and R&D departments. This review is an extension of studies previously performed by Li and Calantone (1998), who examined the relationship between marketing – R&D integration and the classically defined construct of market orientation. Although the marketing and R&D functions are key contributors to new product success, there has been little empirical research regarding how proactive and responsive behaviors might affect the inter-departmental dynamics between the marketing function and the R&D function within the organization. This leads to the fourth research question:

What is the influence of Proactive and Responsive Market Orientation on Organizational Effectiveness metric Marketing – R&D Integration?

8 Literature Review Summary

The literature suggests that firms that have a focus on the customer, with all strategic decisions geared towards delivering ever improving customer value, have a higher rate of innovation success (Cooper and Kleinschmidt 1996; Peters 1990).

Since the proactive and responsive market orientation constructs were first proposed by Narver, Slater and MacLachlan (2004), there is scant research regarding these two distinct forms of market orientation and potential antecedents, and organizational outcomes. In addition, the influence of the external environment in developing or choosing a form of market orientation has not been examined. This paper describes some of the possible factors that influence an organization's strategic choice of whether to be proactive or responsive in terms of meeting customer needs.

Strategic choice deals with the philosophy of the firm's managers regarding actions that need to be taken in light of internal considerations (firm attributes and core competencies), and external considerations (the view of the competition

and the customers). Strategic choice issues regarding innovation strategies include urgency (need for expediency), tendency towards risk taking, and the preference for competitive advantage.

The type of strategy management decides to implement (Miles and Snow 1978) and the form of competitive advantage a firm decides to pursue (Porter 1985; Ward et al. 1996) may have a direct influence on the form of an organization's market orientation. Also, the strategic choice regarding strategy type, competitive advantage and market orientation needs to be supported by an appropriate organizational structure and culture.

The technology-push construct (Phillips 1966), with an emphasis on technological stimulation (Rosenau 2000) to supply solutions to customers' latent needs, may be viewed as a form of proactive market orientation. If the output of research and development is a "product looking for a market," the technology-push approach may be viewed as an excessive form of proactive market orientation. Likewise, the demand-pull strategy (Schmookler 1966), with an emphasis on market stimulus, and the firm supplying solutions to customers' expressed and immediate needs, may be viewed as a form of responsive market orientation. If the organization does not pursue innovation activities until required by the market, this approach may be viewed as an excessive form of responsive market orientation.

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INNOVATING THROUGH BUILDING A KNOWLEDGE CROSS-BORDER REGION

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Innovating through building a knowledge cross-border region

Euroregions are administrative-territorial structures intended to promote cross-border cooperation between neighbouring local or regional authorities of different countries located along the shared state borders. They are widely known cooperation mechanisms between the regions.

This paper explores knowledge management aspects in cross-border region based on the cross-border cooperation organisation. First, it conceptualizes euroregions and cross-border cooperation regions. Second, the article analyses management of CBC organisations and knowledge management in general. Thirdly, the article analyses how knowledge management can be used for development and management of CBC organisations based on the case study of Helsinki-Tallinn Euregio. The article concludes by presenting how a knowledge organisation can be *a tool for cross-border regional integration* and how it could contribute to the development of a common knowledge region.

Keywords: cross-border co-operation organisation, knowledge management, triple helix

Introduction

The EU enlargement has created challenging opportunities to countries for the support of economic and regional development. Peripherality is a well-known problem of border regions and there is a wide discussion in the regional development literature about the possibilities to reduce regional disparities. The cross-border cooperation is one of the most recognised ways to develop border regions (Baldwin and Forslid, 1999; Brodzicki, 2002; Pitoska, 2006). The twenty first century new global economy seems to give metropolitan regions a new central role. In Jane Jacobs's words (*Cities and the Wealth of Nations* 1985) regions make the wealth of nations, and yet, often, their governmental structures and functions do not mirror those important urban social, political, and economic and spatial facts.

Cross-border cooperation in general refers to “a more or less institutionalised collaboration between contiguous sub-national authorities across national borders” (Perkmann, 2003). One possible and wide-spread cross-border cooperation institutional structure is an euroregion. Euroregions are administrative-territorial structures intended to promote cross-border cooperation between neighbouring local or regional authorities of different countries located along shared state borders (either land or maritime borderlines). They are widely known cooperation mechanisms between the regions. However, the characteristics, management and problems of euroregions have not been thoroughly investigated in the Baltic Sea Region. Until today the concepts and characteristics of CBC organisations have been worked out and dealt with mainly by EU institutions and by associations uniting border regions. Moreover, there are very few examples of clear institutional and functional frameworks presiding over large cross-border urban regions. The authors of the article will use the term euroregion and cross-border cooperation (CBC) organisation synonymously hereafter to denote an area of co-operation of local and regional authorities situated directly at the border, or close to it and collaborating in different sectors.

The authors of the article are working for the Non-Profit Association Helsinki-Tallinn Euregio (further: Euregio) whose mission has been stated as “to enhance cross-border integration between Helsinki-Uusimaa region and Tallinn-Harju county” and the role is “to promote and assist co-operation inside the twin-region, Euregio supports and promotes inter-regional development and competitiveness, aiming to strengthen the regional knowledge based economic development”. Founded as a network in 1999 and re-organised as a non-profit or-

ganisation in 2003, its development has raised several theoretical questions that proved to be academically insufficiently covered.

The empirical part of the paper consists of the Euregio's case as its novelty lies in the fact that CBC takes place between capitals/metropolitan regions, not peripheral regions. Still, disparities between two regions exist and they both are located far from the European growth centers. The novelty of the article also lies in the fact that it analyses management of euroregions and specifically the implementation of knowledge management in a cross-border cooperation organisation based on the case of Helsinki-Tallinn Euregio.

According to the development documents of both, Estonia and Finland, and strategic plans of Tallinn, Helsinki, Uusimaa and Harjumaa (Tallinn Development Strategy 2025, Harju County Development Strategy 2025, Trends and bases for activities of the Union of Harju County Municipalities 2007-2013, Uusimaa Development plan 2030/Vision and Strategy, Helsinki Strategy Programme 2009-2012), all counterparts state that knowledge economy is the future of development of the region. This sets frames to Euregio – Euregio should be a learning organisation, and the management type for a learning organisation is Knowledge management. From the point of view of the target and mission of Euregio, the logical aim is to develop a cross-border metropolitan knowledge region.

This paper explores knowledge management aspects in cross-border region based on the cross-border cooperation organisation. First, it conceptualizes euroregions and cross-border cooperation regions. Second, the article analyses management of CBC organisations and knowledge management in general. Thirdly, the article analyses how knowledge management can be used for development and management of CBC organisations based on the case study of Helsinki-Tallinn Euregio. The article concludes by presenting how a knowledge organisation can be a tool for cross-border regional integration and how it could contribute to the development of a common knowledge region.

Methodology

In terms of methodology, the article adopts a mix of primary case study research and secondary evidence provided by the literature. Evidence was collected by participatory method via in-depth interviews, elite interviews and questionnaires. The qualitative approach was selected as euroregions are not widely known among not-involved citizens.

The empirical research evidence consists of the 3 investigations and a case-study:

(a) the investigation carried out among the thirty-five cross-border cooperation organisations in the Baltic Sea Region to identify the most crucial issues and problems for euroregions (Lepik, K-L “Euroregions as Mechanisms for Strengthening of Cross-border Cooperation in the Baltic Sea Region”, will be published in *Trames*, in autumn of 2009);

(b) investigation among Helsinki-Tallinn Euregio owners and partners

(c) elite interviews

(d) Helsinki-Tallinn Euregio case study

Our hypothesis:

A euroregion that aims at developing a cross-border region of knowledge, arts and science (in the future a cross-border metropolitan knowledge region), should develop towards a knowledge organisation itself. The management type of a Knowledge organisation is knowledge management.

The goal of the article is to show how a cross-border cooperation is enabled via CBC institution Euregio, how euregios are managed and how knowledge management could be used for enhancing cross-border cooperation, using the example of Helsinki-Tallinn Euregio.

Research methods:

(a) The leaders of the 35 CBC organisations from the Baltic Sea Region commented on the 10 statements concerning euroregions to find out the characteristics and most crucial problems for cross-border cooperation institutions and receive ideas for addressing the problems. The study was carried out in 2006.

(b) The Questionnaire

The questions involved Euregio's expected areas of expertise, influence mechanisms, supporters and co-partners. The questionnaire was sent out to 50 persons in October 2007, the stakeholders' and partners' of Euregio: members of the general meeting, members and substitute members of the board and secretariat members, entrepreneurs, artists, university lecturers, former speakers on Euregio fora, former project partners. Out of 50 questionnaires 32 answers were received. Respondents were asked to prioritise the statements. There was “other, please specify” option. The given priorities' numbers were counted and the number of points calculated.

The statements were:

1. *Euregio should influence decision-making of city governments and state governments in the following policy areas:*

- innovation
- general and spatial planning
- Environment protection
- physical infrastructure
- Social services
- Energy economy
- Education
- Regional development
- Other, please specify.....

2. *Helsinki-Tallinn Euregio should influence changes in society through:*

- Top-leaders (mayors, vice-mayors, municipality heads, MPs, CEOs, etc.)
- Middle-level leaders (heads of departments, etc.)
- Officials
- University representatives
- Artists and media people
- Entrepreneurs

3. *Helsinki-Tallinn Euregio is a representation and cooperation organisation for:*

- Politicians
- Common citizens
- University professors and students
- Artists

- Entrepreneurs
- Others:

4. *Please describe what indicates Euregio's success?*

(c) Elite interviews on regional integration

The second research question was on the perspective of regional integration between Helsinki and Tallinn metropolitan regions as the main target area for Euregio. The perspectives of development of Euregio as an institution were additionally studied.

Elite interviews on regional development perspectives were carried out with 14 experts (university, local government, entrepreneurs) from both sides of the Gulf.

Elite interview questions:

1. Which scenario do you predict to happen?

- integration between two regions will deepen;
- Joint integration will not happen at all;
- A new entity Helsinki-Tallinn twin-region will emerge
- regional integration will happen in a form of knowledge region/science and arts region/technology region/functional region/virtual region

2. Which scenario do you predict to happen to Euregio?

3. How to brand the twin-region and Euregio?

The questions were asked in the course of discussions in order to allow the respondents to comment and offer ideas connected to the research area. Every interview lasted about an hour, the interview period was February to July, 2008 and interviews were conducted by two persons and they were recorded. Respondents were promised anonymity, their names are recorded by researchers.

(d) Helsinki-Tallinn Euregio Case study

Helsinki-Tallinn Euregio's mission, role, institutional structure and management, strategy, priorities and activities for implementing of the given tasks were studied.

Additional evidence was gathered from secondary material as well as policy documents of European Union institutions, Council of Europe and cross-border organisations, Helsinki, Tallinn, Uusimaa and Harjumaa different strategy documents, Euregio fora, conference and workshop materials; articles in the local and international press, government programmes affecting cross-border cooperation and related issues as well as Internet data were reviewed.

CROSS-BORDER COOPERATION ORGANISATIONS AND CROSS-BORDER REGIONS

Historically, the euroregions have come into existence due to the fact that unnatural barriers have been created between regions and ethnic groups which actually belong together. Today the cross-border cooperation organisations in Europe differ with regard to organisational set-ups, legal forms, membership, roles and financing that characterise everyday activity of the cross-border cooperation. The euroregions are no longer only interacting within the circle of their immediate membership but they are also active vis-à-vis central governments

Knowledge management issues become more and more important, as today's effective and successful regional and interregional organisations have been built on triple-helix model. Triple helix cooperation is a term used to denote cooperation between three sectors in the society: the public sector, businesses and high schools/universities at the regional, national and multinational level. (Etzkowitz 1998). This system is complicated and demands from counterparts knowledge sharing, as well as knowledge storing systems.

Europe's "new wave of regionalism" (Paasi 2001) in the 1990s fostered regional economic development, as well as regional co-operation. The role and the function of border and cross-border regions have changed in Europe in the last decade; regions that originally were external border became internal, regions that did not play a border role at EU level became external borders. Furthermore, the Schengen Agreement abolished the physical borders among the European countries and significantly changed the nature of borders in Europe.

Border regions are in general described in terms of population density, economic strength (as percentage of the EU 27 GDP average in euro), as well as the territorial types of border regions (Kosonen 2004, Paasi 2001, Bomann 2005). Cross-border regions are defined geographically by regions with a national border separating their territory into spheres of different national administrative governance. The current study considers the fact that the term euroregion is derived from the institutionalized cross-border cooperation context and is then applied to refer to a joint or twin-region whereas the regions belong to at least two different countries sharing a border. At the same time, the existence of an institutionalized cooperation structure does not automatically make a region a joint region or a euroregion. There are also regions which share a border and have very tight cooperation in various fields typical to euroregions without possessing a special institution to promote the relations and cross-border activities. There can also be

regions possessing an institution for management of cross-border activities but without significant cross-border interaction.

KNOWLEDGE MANAGEMENT OF CROSS-BORDER COOPERATION ORGANISATIONS

According to the type and role of a certain cross-border cooperation organisations in Europe, they differ in management categories and implementation of management.

According to Hellriegel et al (2002) classical managerial functions include planning, organising, leading and controlling. The competencies of a manager include communicative, planning and administrative, teamwork, strategic, global awareness, and self-management competencies, which all apply to a management of cross-border cooperation organisation as well. In a cross-border international and interregional organisation's context these managerial functions can be implemented through different management types - project management, cross-cultural management, communication management, strategic management and knowledge management.

The authors of the article presume that in the case, where the strategy, vision and mission of a cross-border cooperation organisation is focused on basic knowledge processes, then knowledge management should be applied. They share the understanding that "Knowledge management is a process where knowledge, skills, expertise and communication are catered for, administered and steered with skill and wisdom in a goal-oriented fashion" (Holma, Lappalainen and Pilkevaara, 1997).

An organization's competitiveness is based on its capabilities that impact its performance. Those capabilities are based on a fusion of effective goal-oriented business and management processes and skills, both of which are forms of knowledge.

The concept of knowledge has long fascinated scholars in many disciplines. This has contributed to making this issue extremely complex. Different perspectives have given rise to different methodologies by which knowledge can be studied and different ways for analysing, interpreting and managing knowledge. (Troilo, 2006, Firestone, 2001) Over the last decade the concepts of knowledge and knowledge management in business and management sciences have been up and down the sinuous curves of the hype cycle. Now it is recognised that knowledge as a management theme is a fundamental part of our present and future. (Dawson, 2005)

Traditional view on knowledge management can still be found - this view draws no distinction between differing levels of information, quite often utilising the terms “data”, “information” and “knowledge” as synonyms. Instead, different theories show that the three concepts represent different phenomena and managing these three levels require differentiated approaches.

One of the best ways of understanding knowledge is to bring out the distinctions between information and knowledge. A common distinction is to note that information is anything that can be digitized. As such, if it can be stored in a database or attached to an e-mail, it is information.

The other important distinction is between tacit and explicit knowledge, introduced by Polanyi (1996): we can know more than we can tell or explain to others. Explicit knowledge is what we can express to others, while tacit knowledge comprises the rest of our knowledge—that which we cannot communicate in words or symbols. Much of our knowledge is tacit. That is, we do not even necessarily know what we know, and what we do know can be very difficult to explain or communicate to others. Explicit knowledge, conversely, can be put in a form that can be communicated to others through language, visuals, models, diagrams or other representations.

When knowledge is made explicit by putting it into words or other representations, it can then be digitized, copied, stored, and communicated electronically. It has become information. What is commonly termed explicit knowledge is information, while tacit knowledge is simply knowledge.

One way we can share our tacit knowledge with others is socialization, where we converse directly, share experiences, and together work toward enhancing another person’s or organization's knowledge (Dawson,2005).

Firestone (2001) defines Knowledge management as human activity that is part of Knowledge Management Process (KMP) of an agent or collective. And the KMP, in turn, is an ongoing, persistent, purposeful network of interactions among human-based agents through which the participating agents aim at managing (handling, directing, governing, controlling, coordinating, planning, organizing) other agents, components, and activities participating in the basic knowledge processes (knowledge production and knowledge integration) in order to produce a planned, directed, unified whole, producing, maintaining, enhancing, acquiring, and transmitting the organisation's knowledge base.

There is no consensus on the nature of knowledge (Firestone, 2001). Definitions vary from “Justified true belief” (Nonaka and Takeuchi, 1995), “Knowledge, while made up of data and information, can be thought of as much greater un-

derstanding of a situation, relationships, causal phenomena, and the theories and rules (both explicit and implicit) that underlie a given domain or problem.” (Bennet and Bennet,1996) to “Knowledge is the capacity for effective action” (Karl-Erik Sveiby). This definition is the one favoured by the organisational learning community. Similarly, Tom Davenport and Larry Prusak contend that “knowledge can and should be evaluated by the decisions or actions to which it leads”, while Donald Schön notes of professionals that “our knowledge is in our action.”

Firestone (2001) distinguishes three types of “knowledge”:

- World 1 “knowledge” - encoded structures in physical systems (such as genetic encoding in DNA) that allow those objects to adapt to an environment;
- World 2 “knowledge” - validated beliefs (in minds) about the world, the beautiful, and the right;
- World 3 “knowledge” - validated linguistic formulations about the world, the beautiful and the right.

In many organizations, there is little concern with world 1 knowledge and with the beautiful, and only slightly greater concern with the right, so world 2 and 3 knowledge of reality is in the outcomes of knowledge processes that are of primary concern to knowledge management .

Yogesh Malhotra looks at knowledge management as “a synthesis of IT and human innovation: knowledge management caters to critical issues of organisational adaption, survival and competence, in face of increasingly discontinuous environmental change. Essentially, it embodies organisational process that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings” (2001).

The authors of this article consider Karl Wiig's (2000) understanding of knowledge management relevant for cross-border cooperation organisations that have chosen their development towards a knowledge organisation:

“Knowledge management in organisations must be considered from three perspectives with different horizons and purposes:

- Business Perspective - focusing on why, where, and to what extent the organisation must invest in or exploit knowledge. Strategies, products and services, alliances, acquisitions, or investments should be considered from knowledge-related points of view.

- Management Perspective - focusing on determining, organising, directing, facilitating, and monitoring knowledge-related practices and activities required to achieve the desired business strategies and objectives.
- Hands-On Operational Perspective - focusing on applying the expertise to conduct explicit knowledge-related work and tasks.”

Knowledge management in Cross-border organisations

Euregios are part of Knowledge Management Process, being collective agents of managing knowledge production, knowledge integration and knowledge transfer. They embody organisational process, combining information processing capacity of information technologies, and the creative and innovative capacity of human beings. Euroregions use IT systems and change processes to generate ideas, transform the organization or the problem into a new quality, manage change processes, use information, data and knowledge to achieve organisational goals.

Knowledge management is an inherent part of the work of developed cross-border cooperation organisations as it demands organisational capabilities. As cross-border organisations act in a very practical world, Firestone's World 3 “knowledge” accompanied by Wiig's business, management and hands-on perspectives form theoretical basis to analysis of management of cross-border organisation. Explicit and tacit knowledge are important part of everyday life of these organisations.

Cross-border cooperation organisations are well informed about the local needs and problems of border territories and they are bearers of longstanding tradition of cross-border co-operation on the grass-root level. This knowledge and experience of the cross-border cooperation organisations are valuable for discussions concerning crucial issues of the region. Effective knowledge management in a cross-border organisation would contribute to developing regions' competitiveness. This means that knowledge creation, storage, and transfer are essential factors of raising regional competitiveness.

According to Lepik (2009) newer euroregions are in lack of funds and human resources that raises a dual situation – on the one hand, there is lack of finances for using them in developing knowledge formation, storing and management, and lack of time to develop special knowledge systems; on the other hand, as in majority of euroregions in the Baltic Sea region there are one to four employees, a manager is expected to be competent in all areas of activities and processes on different sides of borders. She or he becomes a real knowledge bank – if the

manager leaves, organisation is at risk of not being sustainable, as explicit knowledge consists basically of minutes of meetings, project descriptions and annual reports; good or bad working relations, unofficial networks, contexts and inside information are not described in the written form.

In knowledge management of euroregions predominant is tacit knowledge, both, in older and newer organisations: this is the information, competencies, and experience possessed by employees, including professional contacts and cultural and interpersonal dimensions – openness, lessons to be gained from successes of failures, anecdotal fables, and information sharing (Hellriegel 2002). Tacit knowledge is inexpressible, so, in many instances, it is impossible to share even through non-verbal communication. Thus, if we accept the idea of personal, tacit knowledge, we must also accept that knowledge is not always experience we can share.

In older/institutionally better developed cross-border cooperation organisations actors of knowledge management are covered or partly covered: use of new technologies (tele-conferences, Skype, etc.), knowledge producing and preserving procedures are well established (systems of minutes, information sharing etc.), still, the problem of one-person-connected knowledge and knowledge management makes cross-border cooperation organisations vulnerable.

Importance of knowledge management has increased as today's effective and successful regional and interregional organisations have been built on triple-helix model and forms a complicated system. This system is many-sided and demands knowledge storing systems, as well as knowledge transfer and competencies to use the positive effects knowledge management process in different aspects offers.

HELSINKI-TALLINN EUREGIO CASE STUDY

Introduction of the research strategy

Helsinki-Tallinn Euregio case study is defined as a research strategy, an empirical inquiry that investigates a phenomenon of the organisational development and goals within its real-life context. Case study research includes qualitative evidence – the questionnaire, and relies on multiple sources of evidence (expert interviews, literature, seminars) and benefits from the prior development of theoretical propositions (questionnaire on euroregions, 2006).

When selecting a case Helsinki-Tallinn Euregio for a case study, we use information-oriented sampling. Euregio has a well-developed institutional organisation with characteristics of a classical management system: General meeting, Board meetings, Secretariat meetings as strategic management bodies, manager, project managers as implementing bodies; permanent funding by partners, additional funding from European projects; priorities and action plans are worked out yearly, information producing and preserving mechanisms established. Since 2001 the target area is innovation, science and arts co-operation, competitiveness of the region. Additionally the organisation has a specified target area of activities – Harjumaa/Tallinn and Uusimaa/Helsinki metropolitan regions.

From both, an understanding-oriented and an action-oriented perspective, it is more important to clarify the deeper causes behind a problem of further developments of the Euregio and the region. For the research proposed by the authors are following aspects of the Euregio tasks:

- innovation, general and spatial planning, environment protection, physical infrastructure, social services, energy economy, education and academia, regional development;
- Euregio influences regional developments via top-leaders (mayors, vice-mayors, municipality heads, MPs, CEOs, etc.), middle-level leaders (heads of departments, etc.), officials, university representatives, artists and media people, entrepreneurs, media.

Euregio is a representation and co-operation organisation for: politicians, common citizens, university professors and students, artist, entrepreneurs.

Helsinki-Tallinn Euregio – organisation, mission, priorities

Helsinki-Tallinn Euregio started as a cross-border co-operation network in 1999. The non-profit association (NPA) for providing services to the partners of the network was established in 2003. Helsinki-Tallinn Euregio's role is to promote co-operation inside the region and enhance regional integration by:

- being a cross-border, triple helix driven tool;
- aiming to strengthen the cross-border regional knowledge based economic and political development;
- aiming to develop of a united multi-cluster innovation region of high competitiveness

The financing of Euregio is provided from annual membership fees paid by the partners. Additional sums for joint projects are applied for from various national and international funds.

Key events of the cooperation process are Euregio forums, which take place every 1,5 years. The second most important event is the Knowledge Arena, which takes place once a year. Effective work in the period between the key events is carried out in seminars, conferences, round table meetings, minor and major cooperation networks, project groups, forming, maintaining and mediating of contacts between local governments, academic circles and entrepreneurs.

The list of co-operation partners includes Culminatum Ltd. (Uusimaa research and development centre), the Tuglas Association, the Finnish Institute in Estonia and the Estonian Institute in Finland, embassies, EAS (Enterprise Estonia), universities, science parks, chambers of commerce and trade and ministries. Helsinki-Tallinn Euregio members are: Helsinki, Tallinn, Uusimaa Region, Republic of Estonia represented by Harju county government and Union of Harju county municipalities.

The mission of Euregio is to increase balanced cross-border integration and to contribute to the emergence of the Harjumaa-Uusimaa a cross-border metropolitan knowledge region by boosting the entire area's competitiveness and sustainability. The development of an integrated cross-border region is based on the principle that both sides should benefit from closer ties and co-operation and that balanced mutual economic co-operation makes the two metropolitan regions stronger and more visible together than they could be apart. The basis for this process is provided by an innovative and creative environment, knowledge-based economy, mutual support and operation according to the "triple helix" principle – co-operation of universities, business and local governments to either side of the Gulf of Finland.

Euregio's organisation and interplay with owners and interested parties can be described as follows:

Euregio's organisation and interplay with owners and interested parties can be described as follows:

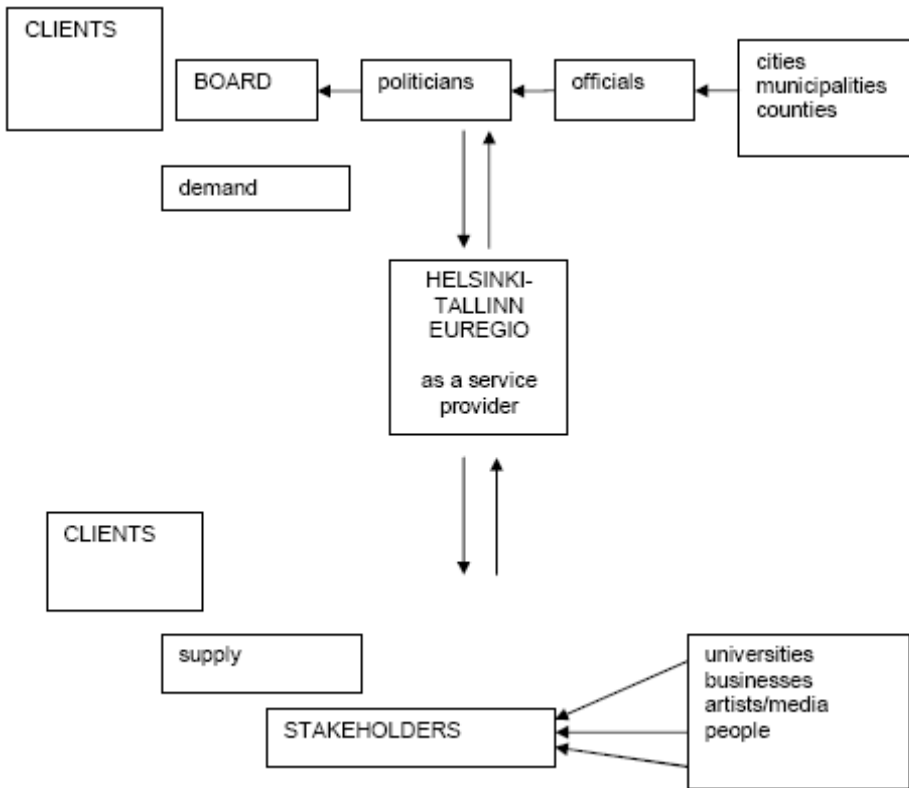


Figure 1. Euregio's supply and demand chart

Euregio is the only regional level tool between Estonia and Finland which deals with contact making between universities, enterprises and local governments. This task is not given to any other institution in Estonia by law and not by general practice either. Helsinki-Tallinn Euregio is also the only institution between Finland and Estonia whose primary task is enhancing regional integration towards a joint region, in Euregio documents also referred to as a twin-city and twin-region.

RESULTS OF THE TWO INVESTIGATIONS

(a) Results of the stakeholders' questionnaire

1. The areas where positive changes are expected

Respondents favoured innovation (28 points), education (27), regional development (25) and social services (24), environment protection (1), physical infrastructure and energy economy (0 points). The latter indicates that university co-

operation with local authorities and entrepreneurs is not noticed or is understood in a narrow way, hands-on action could be connected to infrastructure and energy.

2. Power of influence of stakeholders

Euregio is influential via top leaders (18 points), entrepreneurs (14 points), artists and media people (13 points), university representatives (10 points), middle-level leaders (heads of departments, etc.) (0 points), officials (0 points). Strong connection to the respondents' profession or position was noted: university and art representatives did not mention official top-leaders; official top-leaders did not mention middle-level leaders and artists. It may indicate that for official city leaders' new developments in city entrepreneurship bases is not familiar and ideas of city economic bases are traditional.

3. Euregio partners in the strategy process

Euregio was considered as a representation and co-operation body for city authorities (others – 6 points), artists and media people (5 points), entrepreneurs (3 points); politicians and common citizens were not mentioned. It may indicate the fact that mayors and vice-mayors are not considered to be politicians, and the link to common citizen is understood directly.

4. Euregio's success factors

Euregio's success factors were connected with fora, seminars, projects, implementing new ideas.

There was a strong connection with respondents' profession. University-connected respondents tended to consider Euregio as a developer of a science and arts region through people connected to universities and artists and they under-estimated local government and politicians' roles. This trend needs further study. Respondents being the city or regional officials under-estimated university co-operation and pointed out co-operation between local authorities. Only one respondent indicated that success factors can be characterised by the development of co-operation between the regions, namely, the number and scope of joint projects, the number of joint events, marketing and representation of the region in fairs, seminars, etc., the number of joint publications, etc. For the Euregio staff the study indicated the necessity to repeat the questionnaire and organise interviews with key persons. It is also necessary to achieve common understanding between main stake-holders about the expectations towards Helsinki-Tallinn Euregio organisation and towards the twin- region as the main goal. Proceeding from these results Euregio brand can be developed.

(b) Results of the elite interviews

Future of the Helsinki-Tallinn metropolitan regions co-operation models

Helsinki-Tallinn Euregio is the only institution between Finland and Estonia whose primary task is enhancing regional integration towards a joint region, in Euregio documents also twin-city and twin-region. According to the studies of Kosonen et al, Helsinki and Tallinn metropolitan regions do not form a twin-region.

The problems to solve were:

- (a) development of the competitive cross-border region;
- (b) perspectives of the organisation Helsinki-Tallinn Euregio.

The problem behind the activities is disparities in the development of innovation environment between Finland and Estonia. Learning process is two-fold:

- organizational learning about the actors that help to overcome this disparity;
- influencing regional decision-makers for actions that help to overcome these disparities.

1. Future trends:

1.1 Integration between the two regions will deepen – television and e- and m-services, integration of university and science institutions; joint city and regional planning activities; job mobility; joint festivals; joint marketing, joint television programmes. Still there is no twin-region self-identification; (8 experts)

1.2 Joint integration will not happen at all. The cities and the regions will follow different paths and the present interaction and networking will be stopped either by internal (common will, laws, economic situation etc.) or by external (national security situation, natural disasters, etc.) forces; (2 experts)

1.3 A new entity Helsinki-Tallinn twin-region will emerge.

A twin-entity may correspond to many features. It may include for example joint universities between the cities, joint city councils, joint city departments, joint services in the region (social services, health care, procurement, etc.), joint resources, joint transport networks (tunnel), joint spatial planning (general and regional planning), etc. A new dialect (like stadia) might emerge. (4 experts)

2. What should a manager of Euregio do to enhance and improve the capacity of Euregio according to the scenario? - Scenarios for Euregio development:

2.1 Euregio as a strong networking and matchmaking organisation between Estonia and Finland. (8 experts)

2.2 Euregio will continue working as it has so far and no significant changes happen. The awareness of the activities and results of Euregio remains low among the stakeholders as well as the target group. (3 experts)

2.3 Euregio will be transformed into something else like Öresund Committee or, Euregio might finish its existence. (3 experts)

The number of respondents who believe in positive qualitative developments indicates that Euregio activities and goals correspond to interviewed partners' expectations.

DISCUSSION: KNOWLEDGE REGION ORGANISATION AS A TOOL FOR INNOVATION

The authors claim that the structure has to be interlinked with the mission and the strategy of the organisation. The structure of the knowledge organisations is without hierarchical system. It would be logical to have the top-politicians in the general meeting taking the decisions on strategic level and have the officials in the board to deal with everyday management of the organisation. Still, this is not enough for developing Euregio as a knowledge organization. Managing knowledge between three counterparts (triple-helix) cross-border, sets a demanding task before management of cross-border co-operation organisations. Based on the questionnaires we can list that for the advanced cross-border co-operation organisations dealing with innovation and knowledge the areas of management include:

- Networking – fostering networks among people, local governments, universities and firms
- Stimulating knowledge - studying and analysing the cluster, provide services, improve awareness of cluster
- Strategic communication – gathering of information relevant for the development of regions, help public sector, companies and universities with their intercommunication, assist public authorities in taking the right decisions
- Cross-cultural communication – uniting different work cultures
- Branding - creating regional brand and by doing so attracting firms, capital and talent to the region

- Research and education - promoting new technologies and information about them to public sector
- Innovation - promoting innovation, incubator services, and formation of spin-offs by networking
- Commercialisation - transferring and diffusing technology within the region by provision of information and facilitating contacts

Euregio as a tool for cross-border regional integration

According to the authors of the article, Helsinki-Tallinn Euregio should strive for being a knowledge organisation. The target status of Euregio could be as follows: (next page)

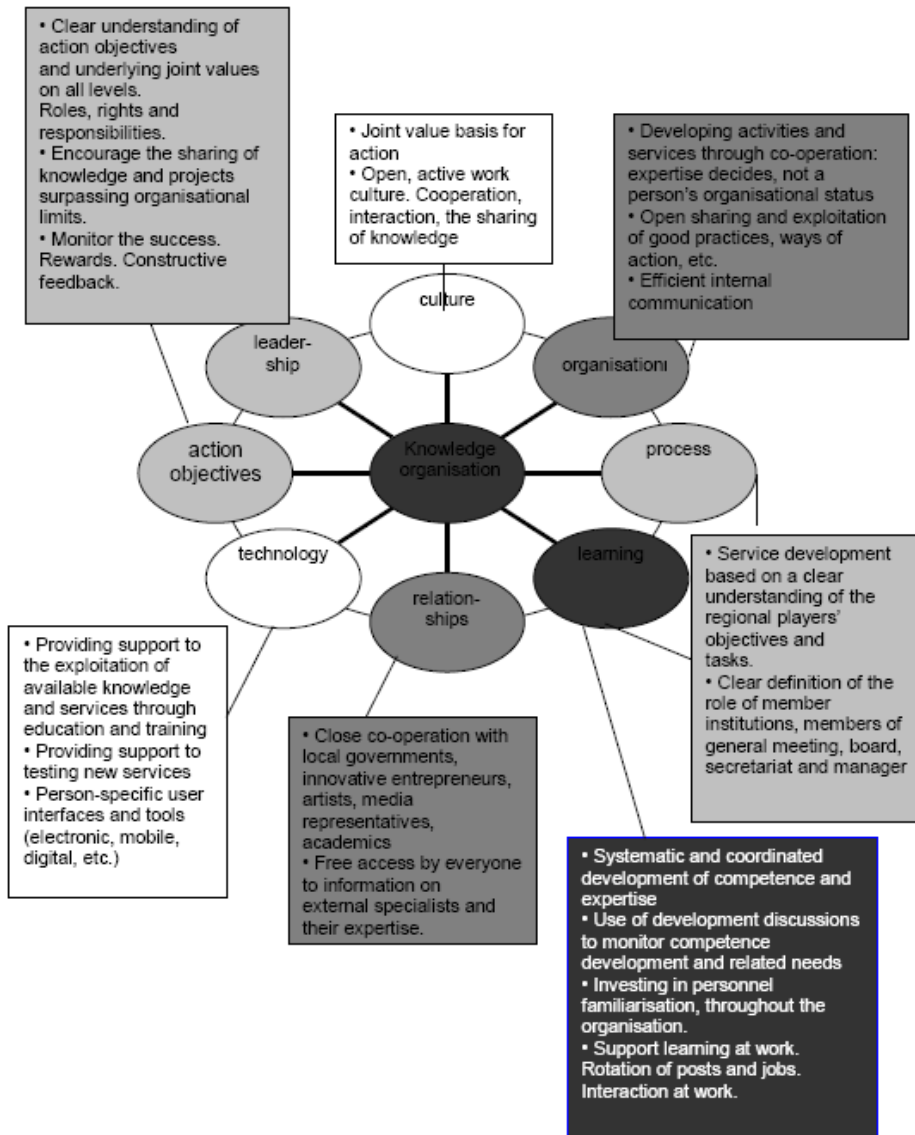


Figure 2. Euregio's target as a knowledge organisation

In order to achieve knowledge organisation's status, the authors forecast that with new and visible tasks Euregio should grow, both, in capacities and numbers of working force and should remain as one of the leading forces in promoting

cross-border regional integration. Further regional development via joint projects like services, television, festivals, marketing is the most possible development for Euregio in the near future. Branding of a region is usually a task for national governments, but as cities play growing role in regional economic development, still a joint marketing system for the region should be established. Branding the region and the organisation is inter-connected. Euregio's brand is connected to fora, seminars, innovative festivals, innovation-promoting activities. Big and visible projects, like tunnel/fixed link study, serve as branding actions. However, high-level political decisions are needed to take the necessary steps towards integration, but the level of decision-making is not determined at this moment. Euregio has a strategy discussed and approved by the board, thus by the vice-mayors and heads of municipal associations, who are considered politicians. The provision of integrated services can be decided on that level. Some general planning matters however, like the tunnel, need national as well as EU level decision-making which is not part of the organisational structure.

Euregio will continue contributing to the deepening of the integration between the two regions – television and e- and m-services, integration of university and science institutions; joint city and regional planning activities; job mobility; joint festivals; joint marketing, joint television programmes. The actual twin-region may correspond to many features. It may include for example joint universities between the cities, joint city councils, joint city departments, joint services in the region (social services, health care, procurement, etc.), joint resources, joint transport networks (tunnel), joint spatial planning (general and regional planning), etc. Euregio as a knowledge organisation could be a strong networking and matchmaking organisation between Estonia and Finland.

Implementation of knowledge management in the work of CBC organisations requires further academic research.

Conclusion

Euroregions are administrative-territorial structures intended to promote cross-border co-operation between neighbouring local or regional authorities located along shared state borders (either land or maritime borderlines). Existing cross-border co-operation organisations are initiatives of border regions or other local bodies of several countries (not necessarily Member States of the EU) and have no clearly defined status in the EU context. Until today the concepts and characteristics of CBC organisations have been worked out and dealt with mainly by EU

institutions. However, the EU's impact is often overestimated as it disregards the fact that cross-border co-operation is bottom-up driven.

Generally the cross-border co-operation organisations do not form a separate new level of governance. The CBC organisations may consist of the regions with different levels of development but they also differ in terms of geographic features, physical and natural conditions, demographic situation and population density, socio-economic structure, level of development etc. They differ with regard to organisational set-ups, management, legal forms, membership, financing etc. that characterise everyday activity of cross-border co-operation.

If the scope of the activities of cross-border co-operation organisations is broader than the classical management requires, then implementation of the more effective type of management paradigm is needed. In a cross-border international and interregional organisation's context managerial functions can be implemented through different management types - project management, cross-cultural management, communication management, strategic management and knowledge management.

Effective knowledge management would contribute to developing regions' competitiveness. Knowledge management is an inherent part of the work of developed CBC organisations as it demands organisational capabilities. In case the strategy, vision and mission of CBC organisations are focused on knowledge creation, then knowledge management needs to be applied. Authors of the article share the understanding that knowledge management is a process where knowledge, skills, expertise and communication are catered for, administered and steered with skill and wisdom in a goal-oriented fashion.

The investigations carried out among CBC organisations made evident that in older/institutionally better developed cross-border cooperation organisations technological actors of knowledge management are covered or partly covered: use of new technologies (tele-conferences, Skype, etc.), knowledge producing and preserving procedures are well established (systems of minutes, information sharing, reports etc.), still, the problem of one-person-connected knowledge and knowledge management makes CBC organisations vulnerable due to unpredictable results using explicit and tacit knowledge.

Importance of knowledge management has increased as today's effective and successful regional and interregional organisations have been built on triple-helix model, which includes public and private sector plus university stakeholders and forms a complicated system. This system is many-sided and de-

mands knowledge sharing from counterparts, as well as knowledge storing systems.

The most crucial issue for several new cross-border co-operation organisations between the EU member states and new member states is being in absence of funding and the required co-financing in projects. This also prevents them from having joint structures with common resources and they have to work merely on project bases rather than have permanent staff and long-term co-operation strategies. As technical, administrative, financial and decision-making instruments are vital for lasting cross-border co-operation activities, the results allow presuming that advanced and complicated management systems are to be developed in the future. The prevailing management type is a board, consisting from stake-holders, and a manager; the management type being project management. The project management is of utmost importance because the goals of the organisations are achieved by implementing projects which support the strategy. On the other hand, lack of storing, managing and communicating knowledge raises questions about sustainability of organisations.

More integrated and advanced cross-border cooperation organisations can today be platforms for all three elements of triple helix cooperation (public sector, business and high schools/universities). However, it turned out that triple helix model does not yet function in all CBC organisations or functions only partially. There is a need for clarifying the triple helix concept and the added-value of developing such co-operation as well as developing common long term strategies for how to achieve it. Helsinki-Tallinn Euregio which was the research case is the only regional level tool between Estonia and Finland which deals with triple-helix contacts. Euregio is also the only institution between Finland and Estonia whose primary task is enhancing regional integration towards a joint region, in Euregio documents also twin-city and twin-region. While comparing Euregio's mission and priorities with the structure of the organisation itself, the authors noted that Euregio has a very hierarchical system which does not correspond to principles a knowledge management organisation should be run. The authors claim that the structure has to be interlinked with the mission and the strategy of the organization. The mission of Euregio has long been to be a cross-border development organization with a role to initiate, facilitate and mediate activities that contribute to the development of the region. However, the scope of Euregio's activities has increased yearly and the new priorities demand different type of management. The structure of the knowledge organizations is without hierarchical system. However, it would be impossible to immediately change Euregio's

structure this way as the members are public organisations with fixed structures and rule systems.

In order to achieve knowledge organisation's status, the authors forecast that with new and visible tasks Euregio should grow, both, in capacities and numbers of working force and should remain as one of the leading forces in promoting cross-border regional integration. However, high-level political decisions are needed to take the necessary steps towards integration, but the level of decision-making is not determined at this moment. Implementation of knowledge management in the work of CBC organisations requires further academic research.

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INNOVATIVE DEVELOPMENT OF AN ENVIRONMENT FOR INNOVATIONS

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Sub-themes:

Innovative Organisational Culture

Facilitating and Sustaining Innovation Environments

Tools for Innovation

Innovative development of an environment for innovations

Abstract

The Open Innovation Banking System (OIBS) is a new generation environment for innovation in higher education. The technical implementation of the environment as a web based application is in progress as a joint effort of the OIBS community formed by the participating higher education institutions. After the initial release of the core application by the development team, anyone can join the community as a developer. The development key persons will concentrate on distributing the development and maintaining the community, and the community will be actively involved in entirely distributed development of the OIBS environment.

Keywords: innovation, education, open source

1 Introduction

In 2008, a number of Finnish higher education institutions decided to join their forces in order to develop a new generation environment for innovation in higher education. The development of the Open Innovation Banking System (OIBS) was started based on the concept developed in Laurea University of Applied Sciences and Turku School of Economics (Santonen et al. 2007). The OIBS project is funded by the European Social Fund (ESF) and the participating higher education institutions.

TAMK University of Applied Sciences took the responsibility of the technical development of the OIBS software. The main goal for this technology development subproject is to figure out a way of developing this kind of web based application collaboratively.

The OIBS technology subproject is entirely open source, released under the GPL v2. The source codes are available to anyone, anywhere – the exact code location can be found from the OIBS wiki at <http://www.oibs.fi/wiki>.

2 User requirements for open innovation support software

The idea is to provide an environment for innovation as an integrated part of studies in higher education institutions. OIBS can be taken into use as part of any study programme and any individual course whenever the time is right for looking at trends of development and needs for new solutions related to the topics of the study programme. The users of OIBS are ordinary teachers and students in higher education institutions. Fig. 1 shows the third version of the OIBS user interface.

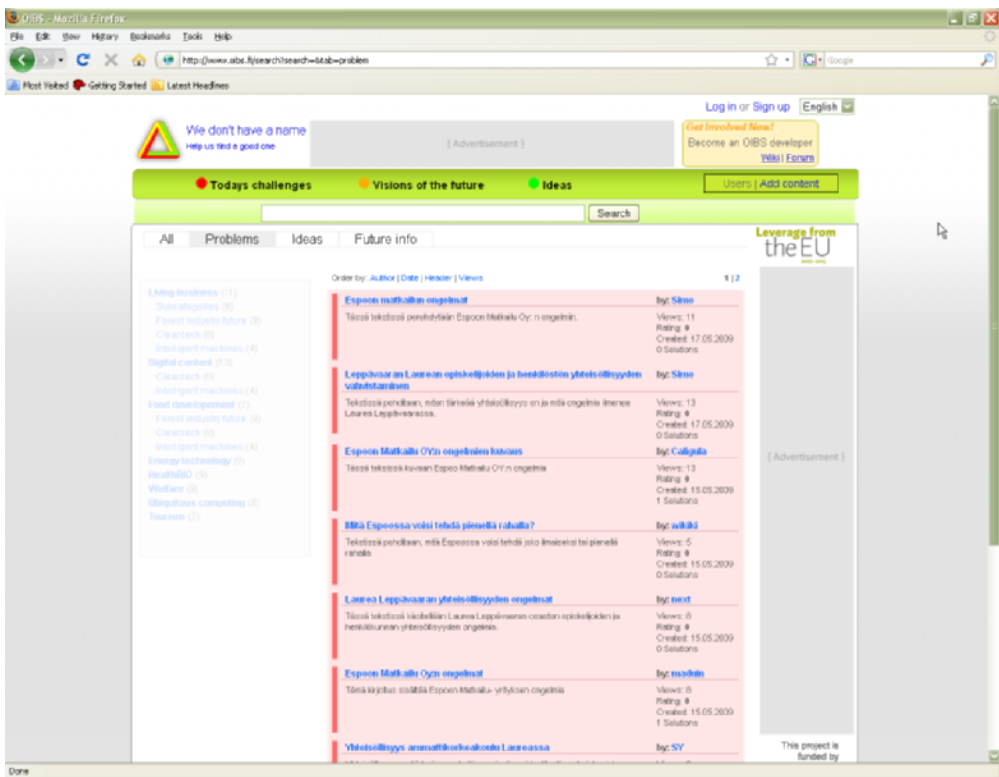


Figure 1. Third version of the OIBS user interface.

The intended widespread use of OIBS makes the design of the user interaction challenging. The system should be easy to learn and use. Still it should have very powerful features for the management, processing and presentation of huge amounts of fairly unstructured data. Advanced reasoning mechanisms have been applied successfully in the engineering domain (Heino 1999) and could be taken into use in the OIBS environment in the future.

One example of situation based access to information is the method developed in the European project CHEM (Heino et al 2002). The aim was to develop a tool to support the processing and storage of the safety and reliability analysis results in such a form that they can be more easily utilized. The available reliability and safety information is considered to be decision support advice for abnormal situation management (ASM). An applicability profile is attached to every piece of ASM advice. The applicability profile is defined as a combination of the values describing the process state. These values can be quantitative measurement values or their qualitative interpretations. A piece of advice is assumed to be relevant when it fulfils the conditions specified in the applicability profile. Careful definition of the applicability profiles is required in order to achieve a powerful disturbance analysis capability.

Another example is the method adapted in a process safety hyperbook which was developed in the European STOPHAZ project (Heino and Koivisto 1998). The aim was to create an advice system for chemical process designers. Each piece of advice on a specific topic is called an advice note. These advice notes contain text, diagrams, simple calculation tools and links to other advice notes. In order to make the system context sensitive, invisible definitions are associated with each advice note. These invisible definitions include query keywords and information on the validity range of the advice in terms of topics and equipment subtypes.

3 The developer community approach

The technical implementation of the environment as a web based application is in progress as a joint effort of the OIBS community formed by the participating higher education institutions. The basic idea is that the development team releases the core application, which is also made partly by the OIBS community. After the initial release, everyone can join the community as a developer. The whole process is documented in OIBS Wiki. For community interaction and discussion, the development community uses e-mail, a forum and a live IRC channel. Fig. 2 shows the OIBS Wiki user interface.

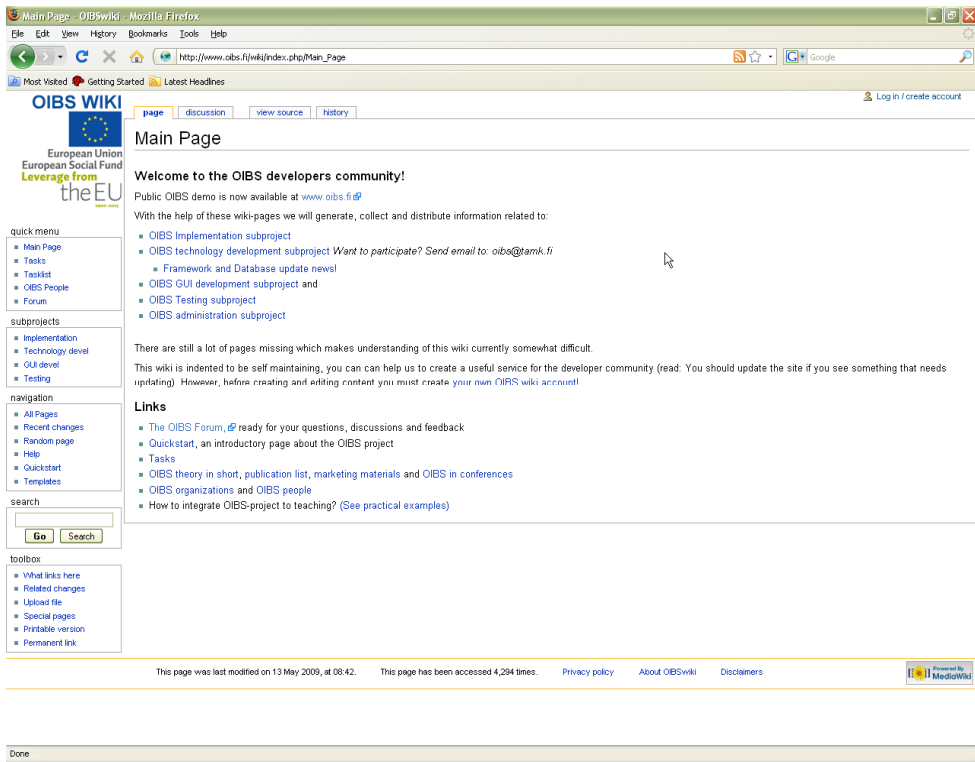


Figure 2. The OIBS Wiki user interface.

After the initial launch of the OIBS platform, the development key persons will concentrate on distributing the development and maintaining the community, and hopefully the community will be active enough to support entirely distributed development. As with most projects, the OIBS technical development will most likely never be considered complete. As new trends emerge in social networking, internet communities and distributed development, the community will hopefully keep our project up to date and interesting as well. An infinite number of mash-up possibilities, features that would benefit users and an ever-changing environment will ensure that updates are always needed.

The OIBS project technology development is based on collaborative development where anyone can be a developer and submit code to benefit the project. The project is built utilizing the Zend Framework PHP libraries and commented in a PHPDoc-compatible way to make it easy to understand and standardized. The wiki is user-driven, editable and registration is encouraged. Coordination of

development tasks is entirely coordinated via a ticket system where bug reports, feature enhancements and coding tasks are handled as individual tasks. Tasks can be reserved and manipulated freely by any community member ensuring that tasks suit the skill level and interest of the coder.

The following instructions about the coding workflow and programming standards have been given to the developer community:

Coding Workflow

- Check the task system (trac) for a suitable task
- Update your working copy of the codes
- Code
- Make sure the code works
- Update your working copy to minimize the chance of on-commit conflicts
- Commit changes to SVN
- If necessary, fix conflicts
- Close or reassign trac ticket

OIBS Programming Standards

- Follow PHPDoc commenting standards
- Never leave any debugging features to the code you commit to the SVN
- Upload only working and carefully tested code
- Keep your variable names clean and informative
- Only inherit functions to /application from /library, never the other way around.
- Proactively think about security issues (sql injection etc.)
- Follow Zend Framework PHP coding standards
- Follow proper MVC-model coding

Technical developers check out the development branch, work on their part of the system and commit working code to the repository or discuss changes within the community. When the community feels that a development version has reached an important stage and that it is ready for another release, one member of the community takes the current development branch under work, tests it further using an exact copy of the release server environment to make sure no fatal errors make it into the release server. After careful checking, the release candi-

date is copied to the release server and made public. Currently the releases follow a simple 1.0 - 2.0 – n.0 version numbering.

4 Overview of the OIBS software architecture

As the development community develops, so does the architecture. Currently, the OIBS release platform, forum and wiki run on a single Linux server while development can be done nearly anywhere with local servers.

The user interface can also be developed by any interested party, documenting to the wiki as the new user interface ideas and revisions are thought up. User interface development is currently done in the same way as coding tasks – however often GUI developers prefer to send a picture of their vision and have someone else implement the changes.

The entire OIBS codebase is located in a SVN repository, with the exception of databases, which are location-specific. The database guidelines and specifications are distributed via the development wiki – anyone can set up their own OIBS environment using their own servers. Fig. 3 illustrates the technical architecture of the OIBS system.

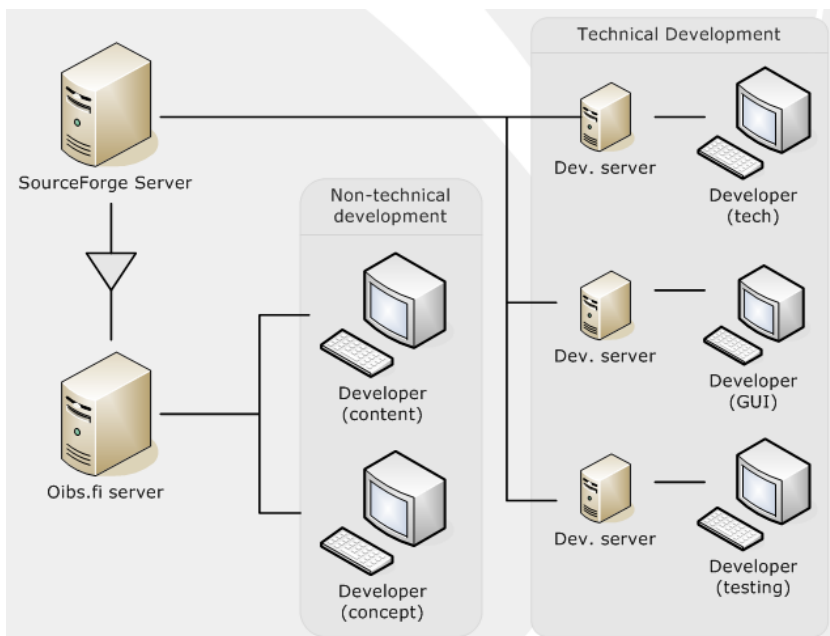


Figure 3. The OIBS technical network

The OIBS technical network consists of two central servers and a variable amount of developer participants. The oibs.fi server hosts the release version of the code and the primary database of users and content. On the SourceForge server, the development community hosts three code branches, one for technical and user interface development, one for testing and one for the release version.

The OIBS sources are globally available in SourceForge. In order to commit changes to the repository, you have to request write access from one of the project administrators.

Repository folder structure (30.07.2009, 3 directory deep listing)

```
/License.txt
/site/
  /branches/
    /alpha_3.0/
    /dev/
    /stable_1.0/
    /testing_2.0/
  /tags/
    /release_1/
    /release_2/
  /trunk/
    /application/
    /config/
    /library/
    /logs/
    /sql/
    /www/
  /utils/
    /branches/
    /tags/
  /trunk/
    /database_converter/
```

The structure of the OIBS database (30.07.2009) is presented in Fig. 4.

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QUALITY SYSTEMS FOR GLOBAL BUSINESSES AS A COMPETITIVE ADVANTAGE

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Sub theme: Innovation as competitive advantage

ABSTRACT

This research deals with the impact of the quality process on the economic and financial performance of the organizations. It aims to identify Portuguese organizations that perceive that relation. Literature review consisted of the following issues: the organization structure and the process of quality; its implementation according to the ISO norms and costs related; and at last, the connection between the quality process and the performance. A model of analysis under Deming, Malcolm and EFQM's inspiration, was built. It consists of non-financial and financial measures. Both combined will enable an indicator on quality: ROQ – return on quality. This indicator will be constructed with the data retrieved from a

questionnaire addressed to a relevant mix of Portuguese organizations. ROQ will enable a ranking of the companies as to quality showing it as a competitive advantage in the global market we are in.

Keywords: organization, quality process, ROQ - return on quality

1 Introduction

Through the last decades the globalization phenomenon has involved a great part of the organizations and their businesses. The big international companies move all around the world searching for more competitive resources and settle in countries that offer more competitive advantages. All this movement, all these international transactions are in the scope of WTO (World Trade Organization) and are ruled by international agreements. One of them is TBT - Technical Barriers to Trade – and considers the need for quality in the global transaction amongst all partners. So, in this sense, a direct common language must be considered. The need for certification is an essential assumption of survival for any business competing in the global market, either from the manufacturing or from the services point of view. Examples of these are brands like: McDonald's, Zara, Carrefour, NOKIA, ADIDAS. Portuguese organizations are conscious of quality as something necessary to maintain a market, which nowadays, has been expanding thus becoming global. So a significant growth of Portuguese certified organizations (see Table 1) has occurred mainly in 2004 and 2005.

Table 1. National /International overview – certified ISO 9001 organizations

Global	December 2004	December 2005	Gap %	December 2006	Gap %	December 2007	Gap %
World	660 132	773 867	17,2	896 929	15,9	951486	6,0
Europe	320 748	377 196	17,5	414 232	9,8	431 479	4,1
Portu- gal	4 733	5 820	22,9	5 851	0,5	5283	(9,7)

Source: ISO Survey – 2007

In 2007 there was a change of performance of the European market decreasing its growth. Certified organizations in 2006, in Europe, had registered an increase of almost 10% in the previous year (2005) but in 2007 they just registered an increase of 4% when compared to the precedent year of 2006. In Portugal, the growth rate of certified organizations, had a boom in 2005 (23%) and began falling until 2007. In 2007 Portugal had less certifications than in 2006. These numbers reflect the state of art of the European economy, revealing some weaknesses. Nevertheless when reading these numbers one can ask:

-What are the main characteristics of the organizations pursuing a quality management?-What costs and benefits emerge from quality management?-What about the effects, in the medium term, of quality management on the competitiveness of the organization?

The general aim of this research is to study the relation of the quality process - a common benchmark in the global business - on the management and on the financial performance of the organizations. To reach this goal companies from the Portuguese Stock Market will be asked, through a questionnaire, about this issue. This questionnaire was built after the literature review, achieved as follows: organization, quality process and quality and performance - under a management view or an economic and financial perspective. The determinants of this research were the following.

1.1 Determinants of investigation

The personal professional activity developed as a quality manager; the teaching activity concerning, as well, these quality issues, were the reasons responsible for the motivation of the research. The fact of living the quality process in an organization and the knowledge of this reality in other similar organizations, makes us think about what the literature may have to say about it.

- *Institutional theory*. Some authors say that organizations fulfill their duties because there are formal rules to obey which fits perfectly the quality process whereas it can be taken as a formal procedure. Isomorphism is undertaken when the organization is mimetic to the environment (O'Connor *et al*, 2004). Implementing quality procedures (as it will be considered further on in this article) is a kind of answer to the market – the environment of the organization. But even in these apparently very formal organizations, things are not equal nor can be compared. In some of them *decoupling* is a common situation. As an example of this, one may refer that sometimes organizations get the certification just for “show off”; they work hard, but just for the audits and are not deeply interested in

its benefits and advantages (Westphal e Zajac, 1994;Wiele e Brown,2002). Yet they are the first to boost that they are certified!- *Contingency theory*Differently from the institutional authors, others consider that the organization's activity depends on many factors – either internal or external (Wiio, 2003; Laats *et al*, 2005). Internal reasons are connected to the values and the culture of the organization and external factors refer to the outside environment – the market. Both factors are responsible for the quality certification of the organizations.

1.2 Research contribution

This research will follow many suggestions from the literature review. Different authors, from different places in the world reflected on this matter and inspired this investigation matter. Mainly, Kujala (2002) on a cultural perspective and Heras et al. (2008) contradicting the expected quality certification benefits. Findings from the pre-test analysis showed that management practices get much better after certification but as to the financial results we must see that the market has also a great responsibility. So, it is necessary to consider and isolate the impact of the market from the impact of the quality imposed by it. Relevant data, to be received from the organizations through a questionnaire and interviews will help to get sound and deeper conclusions confirming or not the literature ideas.

2 LITERATURE REVIEW

First of all, it is important to study the way the structure of the organizations may, or not, enable the implementation of a quality management system. This is the reason why the theme organization will be the first to be considered. Once therein, one must consider the quality scope of application, according to ISO norms. At last, the connection between this quality process as a bench of good practices and its influence on the management and on the economic and financial performance will be entitled quality and performance.

2.1 Organization

The way and explanations about the structuring of any type of organization will be focused on a dual perspective: on the one hand, the fundamental items associated to each author and on the other hand, their main assumptions (Table 2):

Table 2. Organizational structure

Author	Basis	Assumptions
Selznick (1957)	Merely administrative	Clear definition of goals and rules
Perrow (1973)	Open organization	Market is responsible for everything
Mintzberg (1979)	Operational, Strategic, hierarchy, techno structure, support staff	Interaction of these elements according to the type of activity and management
Quinn (1980)	Formal activity planning system	<i>Learning strategies</i> – <i>strategies</i> that can be moulded and adapted
Kanter (1994)	Lean and mean	Globalization process implies a lean and mean structure
Benson et al (1991)	External factors define the structure of the organization	Demand depends on quality and quality needs leadership and support and is connected to the structure of the organization
Germain Spears (1998)	Open system	The market shapes the structure of the organization and has effects on the quality management

It can not be said that there is a specific way of structuring an organization that is responsible for its success. It is a multiple mix of elements what may explain it. The organizations should be mean because its structure will ultimately depend on the market. This has been considered as an important element of analysis although considered under different perspectives. In the fifties Selznick (1957) considered an organization as something ruled by a formal system of goals and procedures: tasks and empowerment would be officially approved, by its management, apart from the structure of the organization which would emerge from social reasons. Almost twenty years later, Perrow (1973) said that the organizations hierarchical shape depends on factors like the market, competitiveness, the law, the workforce and the available technologies. Mintzberg (1979) adds to all these ideas the five essential elements belonging to any organization: operational, strategic, hierarchy, technostructure and support staff. The activity of the organization depends on the interaction of these parts and its definition seems quite important for the design of the appropriate structure. This structural evolution is relevant because the implementation of any quality process crosses it. Something seems to be true as we move around this structure: the decision-making process must have power and particular characteristics that help define

a strategy. Pro-active decisions are inputs for any quality process. One can remember Quinn (1980) when he considered strategy as a learning process with an unpredictable scope adjustable to the unknown tomorrow. The construction of the decision-making process is considered, by many authors, as an accrual to the organization management. Yet it can not be considered as confusion or a kind of brainstorming - muddling as Linblom (1959) would call it. These authors' ideas are relevant to the present research because implementing quality certification depends quite on the decision-making process which is connected to the defined hierarchy of the organization (its structure). And this, many times, is connected and depends on the market. Benson et al (1991) considered it as a main reason for designing the context of the organizations. Kanter (1994) argues that they must be lean and mean in order to adapt themselves to its dynamics. Their structure must be able to mould and adapt itself to the changes motivated by market competitiveness. It is well-known that the strategic decisions will contribute to reach the organization goals for they are an important kind of glue that unites the structure of the whole hierarchy (Farhangmehr, 1997). Presently, when globalization is mentioned, the quality of transaction must be guaranteed. The quality of the global business must be considered as a continuous improvement living within the organizations and leading to the quality of management (Garvin, 1984). Germain and Spears (1998) sum up all these ideas and say that the quality of management involves not only the structure of each organization, but also the market which needs continuous attention, innovation and research.

The way the organization shapes its hierarchical context and adjusts it to good management practices may enable its success. The quality process associated to a certification may be of a great help when clearly understood by all the stakeholders.

2.2 Quality process

As previously mentioned, globalization implies competitiveness from the organizations. We see hairdressers, consulting entities, teaching institutions, manufacturing organizations, all of them being ISO certified. All the business players need a quality certificate to operate in the global market. To get this quality allowance, one must become familiarized with key words such as: standardization process, audits, corrective actions, failure cause-effect model. Together, these procedures, taken seriously within an organization, must enable some meanness and leanness of the process, thus, making the management more efficient and effective. Such is the quality process implemented according to an *ISO (In-*

ternational Organization for Standardization) norm. Presently this approach for quality has widened its scope. From the quality of the final product/service derived the management of the organizations having a definite goal of continuous improvement. Nominee gurus such as Deming (1991), Juran (1989), Ishikawa (1990), Crosby (1998) and Taguchi (1999) have referred this. All of them agree on the fact that quality is the secret for success and innovation and may become a competitive advantage (Porter, 1986). The principles and the assumptions ruling this process have some differences as can be seen in Table 3.

Table 3. Approach and rules of the quality process

Author	Approach	Rules
Garvin (1984)	Organization engagement	Quality emerges from the interaction of: performance, trust, conformity, time, design and clients' expectations
Imai (1986)	Kaizen – continuous improvement	One day after the other, improving every day – a cultural revolution from the top of the organization
Juran (1989)	Quality is achieved through communication	Three words for quality: planning, controlling e improvement
Ishikawa (1990)	Cause – effect relation	Fishbone diagram connects the main failures of the process and their effects in order to make the right decision
Taiichi** (1990)	Leanness of the process	Kanban System and Just-in-Time as methodologies to make the operative process more efficient
Deming (1991)	People's involvement and the culture of the organization make quality	14 principles for quality including leadership, philosophy improvement and constant personnel training
Feigenbaum (1991)	Quality depends on the client and the market	Evaluation of quality: costs of prevention and costs of failure
Hammer and Champy (1993)	<i>BPR – business process re-engineering</i>	The organizations must be ready to face the change through the dynamics of their process
Crosby (1998)	Quality is “nill defects”	It is cheaper to do well the first time
Taguchi* (1999)	A very technical perspective of quality: quality control may show off line situations or a loss of operational capacity	Quality has three stages: system design, evaluation of its assumptions and their variation

* this author is mentioned by Ferguson and Dale

Source: own

** this author is mentioned by Womack et al

All these suggestions are responsible for the success of a quality process either placed in the manufacturing or in the services sector. As mentioned before, any quality process looking for certification will be achieved according to a standard form - which can be filled out in any part of the world - named ISO 9001. Its main chapters – below identified with numbers 5,6,7,8 – were conceived in order to grasp the entire organization. It is a common quality practice to fit these issues in the hierarchical context of the organization and to define the procedures that rule it.

Table 4. Quality process: *inputs/outputs*

<i>Input 0</i>	5 Management commitment Vision, Mission, Strategy	<i>Output 0</i>
<u>8 Measurement, analysis and improvement</u>	6 Resources Human Material	<u>8 Measurement, analysis and improvement</u>
<i>Input 1 (output 0)</i>	7 Product/Service	<i>Output 1</i>

Once the quality management system is installed, the item number 8 - *measurement, analysis and improvement*, is the chapter responsible for the quality process maintenance and consists of the auditing the process. This audit cycle is the light of the quality: all the measurement, analysis and improvement is audited at a precise moment. Consequently, the non-conformities therein detected should be resolved and abolished. Next step of auditing shall return to this moment and will include the verification of the effectiveness of the suggestions and corrections of the process. This is the continuous dynamics of the quality process - the output of a process is the input of the next one (output of moment 0 is the input of moment 1). If seriously considered by the top management it will be somehow responsible for the performance of the organization.

2.3 QUALITY AND PERFORMANCE

The present research aims to identify the organizations looking for certification and its relation to their management performance and financial results. Many authors have considered this quality issue. It is curious to note that sometimes they agree on some ideas but other times they have completely different points of analysis. The literature review will comprehend the following geographical distribution: America, Europe, Australia, and Asia. America. Lau and Anderson (1996), when trying to connect quality to performance, considered a three-perspective approach: the cultural and philosophic, the strategic and performance. They concluded that the good performance of the organization would be reached only if some performance indicators were implemented and checked in a continuous feedback process. This process of quality, if seriously undertaken by the top management of the organization, will help define clear objectives thus allowing a successful strategy, as its inner principle is based on a continuous improvement philosophy that may result in some accrued benefits. Other authors decided to see what happened in the companies that were granted the quality awards. Wisner e Eakins (1993) studied the financial performance of the winners of the American "Malcolm Baldrige" award and came to findings that were somehow different from Lau and Anderson's. They say that the winners of the prizes have good financial results not only due to quality certification, but also because they have a good product or service. These organizations had some size and a good market share. Yet, in spite of it all, the authors agreed that quality programs are a way of showing some competitiveness enabling financial success. Quality ideas as expressed by gurus like Crosby (1979) Juran (1989) and Deming (1982) were perfect at the time. For the production boom of the forties, there was a direct relation between the quality and the product and it fit customers' expectations. Nowadays we have different perspectives. For instance Heras et al. (2008) argue that the companies awarding Quality Prizes were successful because they had previous good performances. A previous good financial performance will make a future good outcome possible. In the services sector, Chapan et al. (2002), based on a research of 20 studies, concluded that the connection between quality and product/service was a true assumption. In this particular case there is a much closer connection between the consumer and the supplier. This confirms the quality idea of the above mentioned gurus. Rust et al. (1994) agree, in general, with Chapan ideas: quality is associated to the financial benefits. Caruana and Pitt (1995), after considering a sample of 131 service organizations, concluded that quality had a positive effect on performance. One must stress that all these authors agree that the market is a real strength. Lakhali, Pasin and Liman (2005) studied the impact of the process of quality on management practices and on the performance of the organi-

zation. They considered a model of analysis based on the main literature ideas: management practice, main structures and basic resources, quality of the product, operational and financial performance. Their interesting findings were: a main reason explaining the good performance of the organization is top management engagement and commitment – through good management practices; another reason is the relation between the use of the installed capacity and the workers' motivation for a good financial performance.

Europe. In Spain Sanguesa et al. (2007) carried out a research in order to understand the reason for the choice of the appropriate Quality Management System for Hospitals and they concluded that ISO 9001 is the most representative tool - followed by EFQM and by the Joint Commission. This is explained by the easiness of implementation of an ISO compared to the other schemes. In order to measure the effects of the quality management implementation, Neergaard (1997) asked Danish companies how they managed quality. He concluded that most of them were very familiar with these matters despite not having written procedures. The author stressed that business planning should be compared with and checked against Quality planning. The interest from the organizations should be to identify the business goals with those of quality. This is a really interesting suggestion but, at this point of analysis, one should remember the cultural and globally applicable ideas mentioned by Lagrosen (2003) and Hofstede (2001). In countries that are less secure - according to cultural standards, the planning of the activity, if emerging from the quality department, would take some power from the other areas. This innovation would result in problems for the organization management. As to elaborate and difficult issues related to quality certification, we must quote Bachelor (1992) in England. Adversely to all the authors defending the certification, this one carried out a research in 600 organizations and concluded that only 15% of them had some advantages from it. Furthermore, he said that the benefits are internal, thus, not having any influence on the market share of the organization.

Australia. Far from Europe or America, in Australia, Terziovski et al. (1997) somewhat confirmed Bachelor's ideas. After a research carried out with 1000 Australian organizations, he concluded that there is no direct connection between quality and the financial performance of the organizations. They argue that certification of quality just exists for the market. These authors agree with Gore (1994) who says quite the same. In an anecdotal and drastic way, Seddon (1997) says that ISO has a negative effect on organizations.

Asia. In Turkey (Tutuncou and KucuKusta, 2007) a research considering the relationship between the organizational commitment and European Foundation for Quality Management (EFQM) business excellence, was done. The authors concluded that leadership, partnerships, policy and strategy, people development and involvement are the determinants of organization commitment. Far way, in China, authors Wong et al. (2006), on a more technical perspective, considered that

there should be a good connection between the accounting measures and the quality goals. In other words, one could say that if the organizations adopt Balanced Score Card (BSC) principles and if the accounting measures are ascertained with the quality process, the goals of the organization will be easily reached. Wu and Hung (2007) studied a causal model for linking performance measures and the strategic objectives of the organization and they considered a measurement criteria on performance under a marketing balanced scorecard perspective. In brief, this journey around the world shows that there are many ways to face quality. To sum up these ideas and focusing now on a historical country like Greece, we must quote Dervisiotis (2007) for he says that in this global competing business the only way for an organization to survive and succeed, as a social “species”, is to become adaptive to emerging innovative conditions – the new imperative for the 21st century. It seems management common sense for any organization to have a good quality control. This can become a competitive advantage, building an effective and efficient operational process, reinforcing the decision-making process. All these issues together will lead to a better labour performance and to reduced costs, thus, enabling better results and performance indicators (Heras, Casadesus, Dick, 2002). According to these authors these main ideas are (Table5)

Table 5. The analysis of certification advantages

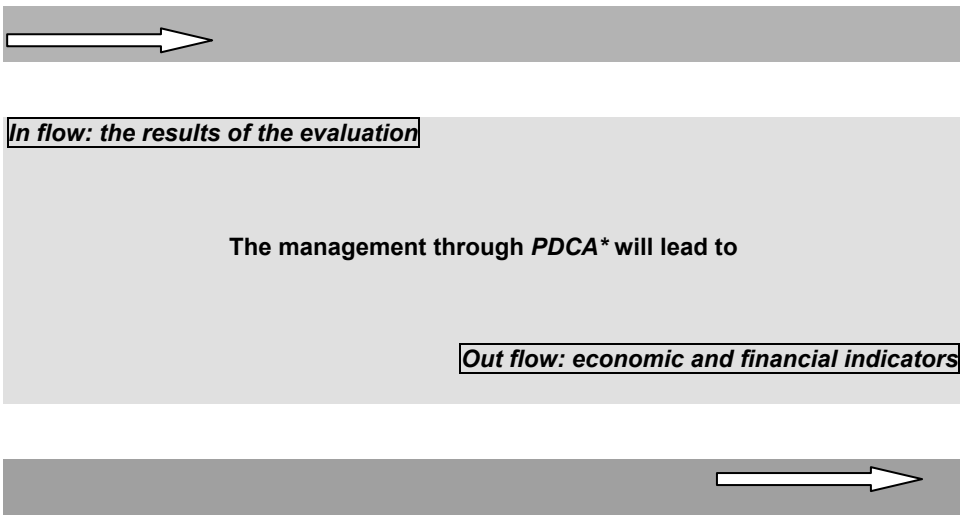
ISO certification	Quality Management System	Quality improvement	Business performance	Profitability
9000 Serie	Quality management system stresses the consistency of quality	Internal quality diminishes scrap and profits labour force	Reduced costs enable better competitiveness and sales opportunities	The cost of Sales falls and Profits increase

Source: Heras et al(2002)

Yet, in 2008, these authors replicated the above-mentioned study and got completely different conclusions. Their findings were that the good performance the organizations achieved after quality certification had to do with the fact that the organizations were previously profitable. Some years before, Jhones et al. (1997) had considered certification on its own, as a previous performance indicator. But these organizations show a stronger top management engagement what may enable better results than others. A significant number of authors dealing with quality say that quality certification is achieved just for the market.

Gore (1994) says that this option is minimalist once it has to be achieved through the lowest cost and the highest enthusiasm. The interest of this issue considered by the International ruling entities, should be stressed as well. *ISO - International Organization for Standardization*, has issued, in September 2006, the ISO 10014. It is addressed to the top management of the organizations considering the economic and financial benefits (in addition to ISO 9004 – the continuous improvement assertion). ISO 10014 is a detailed procedure for certified organizations and it identifies the steps to follow in order to get economic and financial benefits, according to the *Deming cycle Plan Do Check Act*. In sum, its process may be drawn as follows:

Table 6. ISO 10014: *inflow/outflow*



**PDCA – Plan, Do, Check, Act (Deming, 1982)*

ISO 10014 main assumptions are

- Definition of management principles
- Goals to be reached
- Deming cycle – *PDCA (plan, do check, act)* – associated

It was mentioned that the International Standard for Quality - ISO 9001- helps to install and keep the quality process. It is well known that, the quality management system must get performance indicators associated to this implementation. This new rule - ISO 10014 - has considered the connection between quality and

performance mainly dedicated to the top management. Table 7 shows some literature review about a few tools used in this scope of analysis like benchmarking, balanced scorecard and activity-based costing.

Table 7. Performance and Measurement

	Benchmarking	Balanced scorecard (BSC)	ABC Activity- Based Costing
Authors	Karlof and Ostblom (1994);Dale (1999)	Kaplan and Norton (1996)	Johnson and Kaplan (1987)
Assumptions	Continuous process of comparison among the best according to good practices – efficient and effective	Strategic objectives defined through performance indicators: financial, customer, process and growth	Accounting technique used to measure the activities through cost drivers. The ABC technique – <i>activity-based costing</i> needs ABM – <i>activity-based management</i>
Application	Environment: internal, functional and competitive	In the structure of the organization	Homogeneous activities with a clear output
Benefits	Evidence of weaknesses in order to overcome them – continuous improvement	Measure of performance as a measure of management	More accurate identification of the costs of activities enabling a better and easier profitability indicator

Source: own

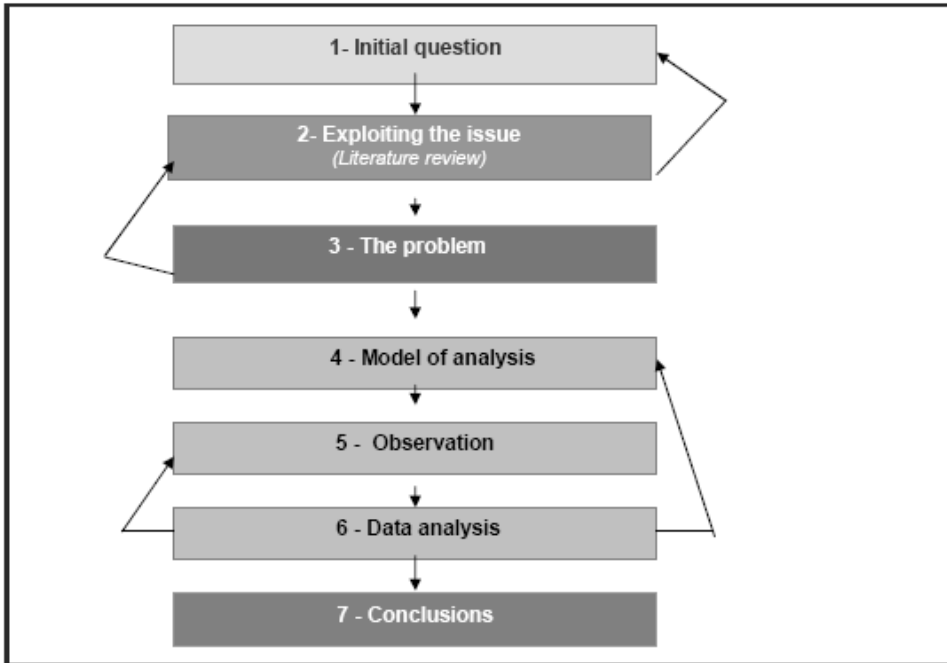
The goals associated to these techniques have different and particular meanings. Benchmarking principles are applicable to any organization, once it is believed that everybody is interested in doing more and in a better way (Karlof and Ostblom, 1994). Besides, Kaplan’s (1992) suggestions, summarized in the Balanced Scorecard (BSC), will fit this quality management policy perfectly. Its assumptions are based both on the strategies conceived to fulfill ‘shareholders and clients’ expectations and their connection to the business process. The excellence of the organization performance will be the outcome of this process (Kaplan and Norton, 1996). Any organization thinking about the implementation of a quality management system will consider these improvement factors. This issue of innovation and continuous improvement is a global one, traveling all around the world and pushing people all together around a common goal. That is the reason why specific and intensive personnel training as to quality matters should be a prior worry of the top management of any organization (Dillard and Tinker,

1996). The implementation of BSC will depend on the efficient and effective capability of the human resources capital, as well as any measure of performance will also depend on it. The ABC (Activity-Based Costing) costing technique, based on the cost of the activities through the identification of the cost drivers (Johnson and Kaplan, 1987), may be a precious help to the evaluation of the quality process and activities. Together, all these factors can help the organization to look for success and can make them applicants of the International Quality Awards. The European Model for Quality Management will translate the implementation of the Quality Management System (under ISO 9001 or 14001) into results for the organization (its success) and for the society. EFQM - European Foundation for Quality Management, in Europe, the Malcolm Baldrige Award, in America, and the Deming Prize, in Japan, are some good examples of good management practices emerging from the quality management system. These particular issues fit into the objective of this study which is to connect the quality process to the management performance and to its financial results. How and where to achieve it, will be considered in the methodology chapter.

3 METHODOLOGY

Quivy (1998) suggests the following schedule of investigation. This research aims to make the connection between the quality certification process and its effects on any organization. This will be the initial question contained - issue nr 1. After considering the literature review (issue nr 2) some authors raised very interesting questions enabling the positioning of the problem (issue nr 3) through some hypotheses of analysis. The above-mentioned model of analysis (in Table 7) will congregate the main ideas suggested by the literature (issue nr 4) and the observation (issue nr 5) will allow the collection of data (issue nr 6) able to reveal the findings for the investigation considered (issue nr 7).

Table 8. Investigation Process



Source: Quivy, 1998

3.1 Model of analysis

Most relevant literature quotations were used to build some analysis assumptions. From the chapter *organization* it was clear that the quality process seems to contribute, in some way, to a better hierarchical shaping of the organizations. Some hypotheses of analysis were constructed based on the relation of the structure to the quality process and a few questions emerged. From the chapter *quality process* the main ideas considered its scope of implementation and the benefits associated. Some hypotheses about the quality process implementation were defined and thereafter relevant questions were made. At last the connection between quality certification and the performance either on the management view or on the financial perspective was done. Again, another set of hypotheses of analysis were defined aiming to connect quality to performance. From these, some questions arose. Gathering all these questions and organizing them un-

der *ISO norm requirements*, an inquiry was prepared. According to Yin (1994) this is a means of analysis able to grant adequate information for the proposed research. Quivy (1998, 2008) suggests that such an analysis should be able to give an answer to questions like: what? who? and how? Following the literature review and as a main conclusion of it, two major parts of analysis shall be considered: the non-financial (qualitative) and the financial (quantitative).

Non-financial (qualitative) analysis

The non-financial part (nf) will follow the structure of norm *ISO 9001* and will represent 50% of the total score including:

nf1 -Quality Management System (point nr 4 of *ISO 9001*) nf2 - top management involvement (point nr 5 of *ISO 9001*) nf3 - resources (point nr 6 of *ISO 9001*) nf4 - product or service (point nr 7 of *ISO 9001*)nf5 - measurement, analysis and improvement (point nr 8 of *ISO 9001*)

Its component issues have a specific weight (%) of importance (nf1..nf5) that were calculated according to a mathematical model constructed based on the Deming and Malcolm Baldrige Prizes.

Financial (quantitative) analysis

The financial part will represent the remnant 50%. These will consider the evolution of some indicators responsible for the financial measures and were taken from the literature (Altman, 1996, Beaver e Scholes,1970, Strickney 1990, Hendricks and Singhal 2000, Chow-Chua, 2002, Donnely et al,1998). They consist of: sales growth - f_1 ; Net profits / Sales - f_2 ; Net Profits / Equity (ROE) – f_3 ; Net Profit/Assets-(ROA) - f_4 ; Equity /Total Assets – f_5 . Their combined percentage of incorporation will be equal for all, 20% each, thus, not influencing the final value (Walsh, 2006). The sum of the two parts (totaling 100%) – non-financial (50%) and financial (50%) will enable an indicator named ROQ – return on quality constructed on an EFQM basis. This indicator will be:

ROQ = 50% NF + 50% F (as seen in table 7)

$$ROQ = 50 \% \sum_{i=1}^5 nf_i x_i + 50 \% \sum_{j=1}^5 f_j y_j$$

Where: x_i are non-financial variables and y_j are financial variables

nf_i are non-financial % weight and f_j are financial % weight - corresponding each \sum sum up to 100% (calculated according to Deming and Malcolm Prizes)

Table 9. Return on Quality (ROQ) - measured by Non-Financial and Financial factors

Non financial – NF		Financial – F	
%	50%	%	50%
12,5	Quality Management System	20	Sales growth
12,5	Top management involvement	20	Net profits / Sales
20,0	Resources	20	Net Profits / Equity: ROE
22,5	Product/Service	20	Net Profit/Assets: ROA
32,5	Measurement & Improvement	20	Equity /Total Assets

To give life to this ROQ indicator, data will be collected through an inquiry (questionnaire), on a five point Likert scale, to be sent to Portuguese quality-certified organizations. In addition, some structured interviews will be carried out in non-certified Portuguese organizations with good quality procedures and good performance.

3.1.1 Application of the Model of Analysis (Pre-test)

A pre-test case study was essayed in a Private Higher Education Institution – located in the North of Portugal, having about 3500/4000 students and 400 teachers. Here, the Certification Process, Documented Procedures and Process Interaction have been considered in three main areas – strategic, operational and support - to which, *KPI – Key Process Indicators* were associated.

Table 10. Certification Process and key Process Indicators

Processes	Contents	Key process indicators
Strategic (procedures)	Quality: documents-issue, revision, updating; satisfaction of stakeholders; financial activity planning; Quality Management Review	*Inquiry about stakeholders' satisfaction > *ROA >5% *Effectiveness
Operational (procedures)	Students inflow Structuring and development of education activity – planning, organizing, directing, controlling	*Nr Entries: year n > year n-1; *students and teachers' satisfaction, performance evaluation >75%
Support (procedures)	Library MIS (department) HRM (department) Financial (department) Maintenance (department) Quality (department)	Library - user's satisfaction >80% MIS: user's satisfaction as to the services of this department >80% HRM: nr of training hours year n > year n-1; effectiveness of this training Financial: acquisition orders response in accurate time to the need Maintenance: repetition of the same repair order year n < year n-1 Quality: rate of non-conformities year n < year n-1

MIS – Management Information Systems; HRM – Human Resources Management

To assure the maintenance of a quality management system, these indicators have to be evaluated, according to a planned schedule. At this stage one can remember the principles of the Balanced Score Card (Kaplan) and remember its applicability confirming recent literature - Wong (2006) e Wu (2007). For this pre-test, data was collected, in 2007, one year after the certification which had occurred at the end of 2006.

Table 11. Non-financial indicators

Non financial – NF		1	2	3	4	5
%	50%	Value				
nf1- 12,5%	Quality Management System	0,41				
nf2- 12,5%	Top management involvement	0,25				
nf3- 20,0%	Resources	0,64				
nf4- 22,5%	Product/Service	0,9				
nf5- 32,5%	Mesurement&Improvement	1,14				
NF	Final score value	50% x 3,34 = 1,67				

NF) Value for the Non Financial Measure = 1,67

Table 12. Financial indicators

Financial (fj) data: 2007		Activity: higher education institution				
%	50%	1	2	3	4	5
f1- 20%	Sales growth (2007/2006)	X				
f2- 20%	Net profits / Sales	X				
f3- 20%	Net Profits / equity	X				
f4- 20%	Net Profit/Assets	X				
F5- 20%	Equity /Total Assets	X				
	Final score value	50% x 4,4 = 2.2				

F) Value for the Financial Measure = 2,2

3.1.2 Findings from the Pre-test analysis

Findings revealed, for 2007, a final value of 3,87 as a “Return On Quality” indicator, composed by the sum of the non-financial measures and the financial measures (1,67+2.2). On a scale of one to five, this means a quality satisfaction rate (3,87 out of 5) of about 77%. If we apply the same questionnaire to 2005 (year previous to certification) we get the following values: non-financial values 0,9 and financial values 2,3, totaling 3,2. On a scale of one to five, this means a quality satisfaction rate (3,2 out of 5) of 64%. From this pre-test case, one may

say that quality had some real benefits on the management practices. In fact, the non-financial indicator improved, this may mean that the application of ISO 9001 helped the management function of the organization. At this point of analysis we must say that we agree with the literature namely – Heras et al. (2002) and Lau and Anderson (1996). As to the financial ratios, one can see that the quality impact did not result in the same way. It is well known that 2007 was a difficult year (in terms of crisis). The market had a good explanation on these results. As to this point of analysis we confirm literature ideas (Gore, 1994; Der-visiotis, 2007; Wisner and Eakins, 1993). It will be quite interesting to get data from all the other Portuguese companies and to analyze and discuss respective final findings. At that moment one will be able to isolate the effects of quality certification on the management practices and the other effects - the market and the financial ones, in order to explain company's performance. At last, the sustainability of this ROQ indicator may be a good explanation as a differentiation factor. This might mean that Quality may constitute a competitive advantage of the organizations in the global market. It would grant some depth of analysis, to get replies to this questionnaire from other countries, so that, the conclusions might have a meaning for the global competition we are in.

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COMBINING FUTURE ORIENTED KNOWLEDGE AND SUSTAINABILITY – A STARTING POINT OF COMPETITIVE ADVANTAGE CREATION AND INNOVATION PROCESS

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Combining Future Orientated Knowledge and Environmental Sustainability – A Starting Point of Competitive Advantage Creation and Innovation Process

The purpose of this paper is to explore the meaning of the utilizing future orientated knowledge – the earliest possible stage of the innovation leading to the product or service development with the environmental sustainability approach.

An empirical part of the paper presents a case study from the SME sector. The case company led the environmental sustainability from the customers' weak signals to the whole business concept, innovation system and product development practices and managed to create competitive advantage and growth.

Research limitations/implications – This study identifies a case promoter of environmental sustainability in the SME sector. Future research should involve larger sample that any model should be identified.

Practical implications – The paper discusses an approach for environmental sustainable value creation, based on the growing business opportunity to do well by doing good and to start before the competitors. The process should begin in the earliest possible stage – during the capturing of future orientated knowledge and weak signal management.

Originality/value – This paper contributes to empirical research body showing the importance of proactive, long term approach and an early stage involvement in the sustainability development process for the competitive advantage creation.

Keywords: competitive advantage, future orientated knowledge, innovation process, SMEs, sustainability

1 Introduction

The purpose of the study is to explore the current situation of the utilization of future orientated knowledge combined with the environmental sustainability as value creation factor in the earliest possible stage of the innovation leading to the product or service development with the sustainability approach. To combine the three dimension approach of sustainable business – the competitive advantage being achieved alongside social equity and environmental security - is a huge challenge for any company.

Recently the business world has also noticed that is possible to acquire competitive advantage by scanning and capturing valuable future orientated knowledge. It is self-evident that acting in right time frame is essential to get competitive advantage. Anyhow, when identifying the interesting future related information it should be analyzed from the sustainability perspective as well if the sustainable competitive advantage is targeted.

Literature research of the study focus on multiple discussions about future orientated knowledge, innovation, tacit knowledge and environmental sustainability. This is because in terms of contributing to sustainable competitive advantage, the future orientated knowledge is essential and acts as a starting point for the further development. Still, the innovation system itself is the most valuable to continue the next stages of the sustainability process.

In the study innovation as a definition is relating to a solution for a problem that could not have been solved in the past. This kind of novelty value may also stem from a new and useful combination of (existing) -technologies, applications and their use contexts (Kettunen et. al. 2008: 5).

But more often these innovations will not work within the existing business and therefore will not produce any tangible value, or, the innovations will never be launched in the market, because they have stayed in 'hidden in lockers' inside the company, or, not have been caught by 'blue sky thinking' or by weak signals. Innovation, whenever it appears, can be incremental and carry little risk, or it can be radical and carry more risk. The more radical the innovation is, the greater the potential impact and the greater its risk of failure are. The capacity to innovate requires a set of multiple skills, customer orientation, networks and processes.

Innovation, both radical and incremental, is an interactive process where the companies rely on information from and communication with different sources (markets, suppliers, R & D institutions etc.) and networks. Innovation emerges in

companies with an open-minded atmosphere favorable to innovation. 'Bubbles of innovation' can appear at any time and SMEs should be able to handle them. But why SMEs are so important? As the biggest part of companies in the Europe suits to the small and medium sized enterprises' (SME) category (European Commission, 2003), it can be assumed, that there is also a big potential for increasing sustainable business revenue and launching new innovations. In fact, there are more than 23 million SMEs in the EU, which represents 99% of European undertakings (European Commission, 2009).

On the other hand there is a poor empirical evidence that sustainability or any of its' dimensions is adequately anchored in the SMEs' business processes or concepts , although the environmental quality management and other sustainability related management has a growing attention.

The issues pointed out that there is an apparent synergy between innovation, sustainability, future orientated knowledge and competitive advantage within SME sector as well as in all business.

2 Literature Review

When searching research literature combined with one or more components of the theme, any review of the literature is hampered by the sheer heterogeneity of studies.

Innovation in much of the literature is seen as the engine driving continued growth and keeping and developing the competitive advantage of companies. Innovation research has been taken place about sixty years and it has presented various forms of innovation processes. Researchers have various opinions about the amount and characteristics of the stages and phases of the innovation process. In the 21st century future orientated knowledge and forecasting methods have re-emerged, but not as methods for identifying the problems associated with sustainability.

2.1 Angles of Information Capturing for the Innovation Management

Information for innovation comes from variety of sources rather than rather than from a single knowledge base, it is transferred in variety of ways and transfer is an interactive process involving the exchange of information rather than just its one-way flow from those who know to those who do not (Lybaert, 1998: 179; Macdonald et. al, 2007: 77-95). Absorptive capacity is a limit to the rate or quantity of scientific or technological information that a firm can absorb. The absorp-

tive capacity was introduced in 1990 (Cohen & Levinthal, 1990: 128 - 152). Zahra and George (2002: 185-203) extended the theory by specifying four distinct dimensions to absorptive capacity: acquisition, assimilation, transformation and exploitation. In SMEs, because of limited internal resources, absorptive capacity is likely to be as important as the capability to manage the company specific resources (Hutchinson & Quintas, 2008: 133).

The current literature also indicates, that the interdependencies of tacit knowledge and their effect on innovation output are not fully captured and there remains critical questions like what kind of descriptions and mechanisms can be accounted for the understanding the phenomena. If there is a formal absence of knowledge management in a SME, it does not mean that there is no knowledge management whatsoever (Hutchinson & Quintas, 2008:135), but some researches also underline, that if the information environment is very poor, managers are left isolated and innovation is stifled is not true in all cases (Hutchinson & Quintas, 2008:145, Dou & Dou, 1999: 403-406). Von Krogh et. al. (2000) underline, that from the inside perspective of the company, members of knowledge creation microcommunities are various kinds of people from different positions of the company and they can be customers, suppliers or other partners.

2.2 Tacit Knowledge – SMEs' Experience Based Knowledge

Knowledge and knowledge management have received relatively much attention in the academic and business literature and the aspect that knowledge has a role in innovation generation. The notion of tacit knowledge originates from the 1960s, when Michael Polanyi noticed that "it does exist things that we know but cannot tell". This is because tacit knowledge is highly personal, practical, context specific and is hard to formalize, describe and transfer. Tacit knowledge is reflected in action, routines, ideas, experience and values. Furthermore, tacit knowledge can be regarded as experience-based intuition (Nonaka et al., 1996: 57). Tacit knowledge is related to know-how, but, the crucial thing is, that tacit knowledge knows *how* to do something. Know-how can also be seen as the accumulated practical skill that allows one to do something efficiently (von Hippel, 1988: 76-77) and he also observed informal proprietary know-how trading behavior, which he can be characterized as an informal information trading network that develops between engineers (or other specialist groups) having common professional interests.

However, explicit and tacit knowledge are not completely separable but rather complementary; 'explicit knowledge without tacit insight will quickly lose its

meaning (Nonaka I & Teece, D., 2001:8). Company Xerox, for example, has a specific premises for the engineers, who normally discuss with each other through virtual communication tools and the organized arena offers them way to change tacit knowledge (Kikawada & Holtshouse 2001, 300-301). Bridge et al. (2003: 285) raise the question, that should small-firm intuitive behavior, which is at least equally effective than big company's formal behavior, be confused with planning. Johannesen et al. (2001: 15) concluded that over-emphasizing tacit knowledge may lead to the failure, as tacit knowledge on its own does not e.g. enhance innovation. Neither does it provide the necessary speed and availability of external information. Hence, in order to achieve sustainable competitive advantage, companies need to emphasize the total knowledge base of the company, i.e. the explicit-and tacit knowledge, both internally and externally.

Managing knowledge is challenging, but especially for the small and medium sized companies (SMEs). How to grow and managing knowledge is one driver of the growth and integrated in the innovation management as well as in many other fields of a company's actions. More likely, managers of SMEs have to be able to perform tacit knowledge, in comparison to the managers in big companies (Sadler-Smith et al. 2003: 47-67). Hutchinson & Quintas (2008: 132) criticize that the overwhelming majority of research publications refer to practices of big companies including such researchers like Nonaka & Takeuchi, Brown & Duguid, Davenport & Prusack etc. There have been research and methodology development to capture companies learning capability through tools like Buchanan's matrix (2008: 2-9) and knowledge integration mechanisms (KIMs) (De Luca & Atuahene-Gima, 2007: 95) by the approach that the more tacit the market knowledge is, the greater is the use (or need) of KIMs. It can be argued, that there is a lack of scientific research concerning the innovation and innovation and knowledge management practices of SMEs (Egbu et al. 2005: 18, Holm & Poulfelt, 2003:3, Skyrme, 2002: 19). Concerning SMEs, their position in a supply chain versus activity in sustainability issues still varies a lot. According to the findings of the report of Danish Commerce and Companies Agency (2008: 4), some of the most proactive SMEs, who have integrated social and environmental concerns into strategy and business operations, are able to act as role models by inspiring the other SMEs as well as their own customers.

2.3 Innovation Management Challenges

Among management weakness as a constraint on growth the lack of successful innovation was informed in 40% of companies, whereas the too small/too stretched management team was informed in 65% of the cases (Bridge et. al.,

2003: 284). Getz and Robinson (2003: 131) highlight the risky nature of innovation, citing a cross-industrial study that suggested the ratio of initial ideas to commercially successful products is of the order 3000:1, and noted that only 5 – 10% of US patents have any market relevance, with only 1% of them actually making profits. From the innovation output point of view it is also interesting, that there is a time/cost trade off or contradiction for innovation, in which development time is shortened but the development cost is increased. The relationship between development time and cost is like a U-shape as shown in the figure of Rothwell (1994:7-31) identified twenty-four factors in increasing development speed or efficiency or both and was one of the pioneers underlining the importance of the market and customers.

Nonaka (1996: 31) and Hornsby et al. (2002: 3) highlight the importance of the middle management, because it faces daily and vertical and horizontal flows of information having access alternatives and middle managers do synthesize and integrate information. It is assumed, that the recent research lies on the approach that innovations are strongly connected with the performance of the middle managers (Hornby et. al. 2000: 3; Drucker, 2007) and CEOs role is even underestimated (Yadav et al. 2007: 84) and not seen very relevant. Zhang et. al (2006: 320) have managed to find that organizational learning within innovative SMEs is dependent upon the ability – often of the owner – to balance the acquisition of knowledge from external sources including the ability to share the knowledge with staff. Von Krogh et al. (2000: 148) pointed out, that middle managers can be activists in knowledge sharing and they can be instrumental in forming the microcommunities that share the tacit knowledge. Their success story examples, anyhow, are from the big companies' executives like Leif Edvinsson of Skandia and Helmut Volkmann of Siemens. All in all, innovation is central in terms of the strategic management of organizations (Koberg et al, 2000: 146).

Rothwell's Five Generations of Innovation model explains the transition of the innovation models during the decades. The Fifth Generation describes innovation as a multi-faceted process, which needs intra- and inter-firm integration through effective networking (1994: 7-31).

five generations of innovation

market	gen	strategic focus	operational characteristics
<ul style="list-style-type: none"> • black hole demand • economic growth • industrial expansion 	1	technology push <ul style="list-style-type: none"> • scientific breakthroughs • more R&D "in", more new products "out" 	<ul style="list-style-type: none"> • R&D seen as overhead, ivory tower, isolated / company • strategy of hope: "Hire good people, give them the best facilities that can be afforded, then leave them alone."
<ul style="list-style-type: none"> • market share battles • fierce competition 	2	need pull <ul style="list-style-type: none"> • project management • business as customer 	<ul style="list-style-type: none"> • cost-benefit analyses of individual projects • systematic allocation and management of resources • stronger connections between R&D and operating units
<ul style="list-style-type: none"> • rationalisation efforts • inflation • stagflation 	3	coupling model <ul style="list-style-type: none"> • product portfolio • consolidation 	<ul style="list-style-type: none"> • integrated marketing and R&D • structured processes, away from individual projects • cost control and cost reduction
<ul style="list-style-type: none"> • time-based struggle • economic recovery 	4	integrated process <ul style="list-style-type: none"> • product becomes a total concept 	<ul style="list-style-type: none"> • parallel and integrated nature of development processes • strong supplier linkages • close coupling with leading customers
<ul style="list-style-type: none"> • systems integration • unemployment • resource constraints 	5	systems integration and networking <ul style="list-style-type: none"> • company ecosystem • business ecosystem • process automation 	<ul style="list-style-type: none"> • strategic partnerships with suppliers and customers • using expert systems • collaborative marketing and research arrangements • emphasis on flexibility and speed of development • focus on quality and other non-price factors

based on: Roy R. Rothwell, *towards the fifth-generation innovation process*, International Marketing Review, 1994

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Figure 1. R. Rothwell's Five Generations of Innovation

Besides Rothwell's model,, Oosterwijk & Waarden (2002: 88 - 95) introduce other innovation models like Sarmiento-Coelho's Circular model, which represents the innovation process as circular process of conception, invention, innovation and diffusion phases, Parallel and integrated model and Improvisational model.

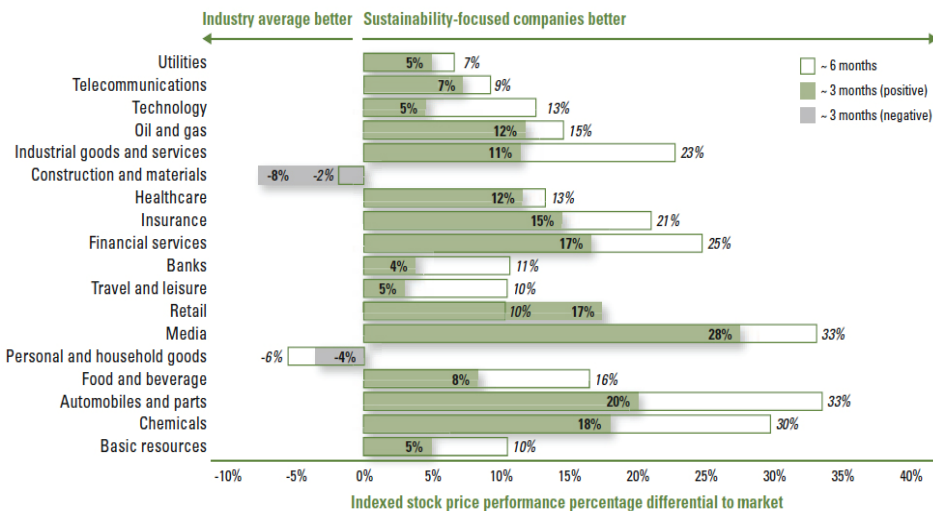
2.4 Sustainability as a Business Opportunity

The cleantech business is estimated to grow at a pace of 5 - 15 % per year worldwide. The growth is accelerated by people's increasing worry over their own living environment and the growing demands of sustainable use of natural resources. Finland is considered one of the most progressive countries in the world in terms of its cleantech expertise and the associated technologies.

Finland has around 1,300 cleantech enterprises, many of which operate internationally (Cleantech Finland: 2009).

The most sustainability focused companies may well emerge from the current crisis stronger than ever, underlines ATKearney Inc. (2009: 1) and points out that his analysis, which looked at 99 firms on the Dow Jones Sustainability Index and the Goldman Sachs SUSTAIN focus list of green companies and tracked stock price performance for six months through November last year. In 16 of 18 industries included in the review, businesses deemed "sustainability focused" outperformed industry peers over three- and six-month periods and were according to the author "well protected from value erosion". The other study of ATKearney (2009b: 4) points out, that if awareness of the environmental burden emerges in the future, mobile operator companies could point out the steps they have already taken even if the customer have, at least until recently, nearly showed disinterest for the sustainability issues. The third study of ATKearney (2009c: 58) foresight, that earnings will fall 13 – 31 % by 2013 and 19 – 47 % by 2018 if they do not implement sustainable strategies throughout their supply chain, so the businesses that do not account for the environment face earnings potentially slashed by a third within 4 years.

FIGURE: Sustainability-focused companies outperform peers



Note: Indexed stock prices at ~ 3 months = September 8, 2008 and ~ 6 months = May 19, 2008 to current date, November 24, 2008. Percentage performance differential calculated by taking the percentage point difference of averaged sustainability companies' indexed performance to the market indexed performance over the market indexed performance. Sustainability companies include DJSI World 80 2008/2009 + DJSI 2008 Supersector Leaders + Goldman Sachs SUSTAIN focus list for mature industries.

n=99 sustainability companies

Sources: Bloomberg; A.T. Kearney analysis

Figure 2. Sustainability-focused companies outperform peers (ATKearney, 2009)

Sustainable Development Technology Canada (SDTC) is a not-for-profit foundation that finances and supports the development and demonstration of clean technologies which

Sustainable Development Technology Canada (SDTC) is a not-for-profit foundation that finances and supports the development and demonstration of clean technologies which provide solutions to issues of climate change, clean air, water quality and soil, and which deliver economic, environmental and health benefits to Canadians. SDTC notifies in own web-pages (SDTC: 2009) that as a result of the breaks in the innovation chain and the particular problems faced by sustainable development technologies, promising Canadian companies face extreme difficulty in reaching the market. Hence the benefits of revenues and emission reductions are not realized. Furthermore, there are only a few diverse companies in this space. To develop sufficient critical mass of SD technology developers, manufacturers, and suppliers, there must be a reliable, available, and substantial commitment to funding this sector.

Paton & McLaughlin (2008: 77- 83) argue, that sustainable growth is based upon identifying, supporting and nurturing meaningful service exchanges that exploit, develop and embody value added knowledge transfer within and across industry. Because of as being the major source of external knowledge, skills and ideas the importance of the supply chain is underlined by them. Applying traditional physical and aesthetic driven research and development methodologies to this new world will not provide the sustainable advantage that developed economies require. Porter & Kramer (2006:92) argue that companies are neither responsible for the world's problems, nor do they have the resources to solve them all. Still a company can identify the particular set of societal problems that is best equipped to help resolve and from which it can gain the greatest competitive benefit.

2.5 Orientation for the Future to gain Competitive Advantage

Special procedures have been developed for strategic technology scanning and for its integration into corporate governance and strategy. Foresight involves the process and tools used to identify major trends and critical phenomena and issues that will shape the future. Foresight can become such a pervasive corporate culture that it influences not only overall strategy but also different functional areas like new product development, process refinement, and information technology innovation. Foresight can be regarded as thinking about the future(s) about a systematic, participatory, future intelligence gathering and medium to

long term vision building process aimed at present-day decisions. A methodology and set of tools may be the catalyst that will make innovation flourish and spread among companies (Munnecke, 2004:5). If foresight extends beyond sustainability issues to the recognition of weak signals and future trends at large, companies has the possibility to get competitive advantage.

As new technologies, new services and new consumer trends emerged, companies in many industries aim at creating an early-warning system for disruptions and a consistent forward view for their business environment (Rohrbeck & Gemünden, 2007:1, 3). In order to identify reasons for the lack of usage of strategic foresight tools and to identify ideas on how to increase its implementation, they identified some barriers and promotion mechanisms from participating multinational big companies in the research workshops. It will be seen if the same issues would arise among SMEs to be studies, which would be an interesting comparison.

Table 1. Barriers of Strategic Foresight (Rohrbeck & Gemünden, 2007)

Cultural barriers	Institutional barriers	Operational barriers
Top management not serious about using future insights	Hierarchy prevents horizontal/ vertical dialogue	Frequent positions changes of supporting internal stakeholders (e.g. CEO, CFO)
No inclination/motivation to think about the future	No incentive to think about the future	Lack of resources
	Reward and career system that is hostile to foresight	
	Limited attention of internal stakeholders	
	Current controlling systems	

Table 2. Promotion Mechanisms for Strategic Foresight (Rohrbeck & Gemünden, 2007)

Institutional promotion mechanisms	Operational mechanisms
Design and use a performance indicator	Use alternative formats for insight communication (podcasts, videos, ...)
Make the CFO's strategists your ally	Bring top management to customer
Involve and integrate with external partners	Mirror organization against competitors
Build collaborative visions with engaged partners	
Change reward systems	
Change budget systems	
Propose SF methods to manage the company (e.g. Roadmapping)	

Will (2007: 234-242) introduces a step-by-step approach on corporate foresight to be adopted in small business. According to him, sustainability requires balancing short-term business interests and long-term development of society and business. Corporate foresight can be described as an information-based communication process aiming at vision-building on future markets, changes in society and customer needs. He assumes, that networking or formation of clusters of small business with regional players is important concerning sustainable development, as it requires broader alliances and new ways of thinking.

Burmeister (2004: 11) indicates the link of corporate foresight to strategic decision making and other areas of activity such as innovation. He introduces the 5C-Model for Corporate Foresight, and the introduction stage has already shown that success not only depends on methods and content questions, but also to an often underestimated extent on social and process factors. Schwarz (2006: 22, 42, 57) found in his Delphi-study among German companies that the methods used most in German corporations are environmental scanning, trend monitoring, trend research, strategic early warning and the scenario technique, fol-

lowed by quantitative forecasting and those methods for thinking creatively about the future.

Tilley & Fuller (2000: 151, 157) raise the importance of SMEs for the sustainability and point out that foresighting of sustainability can be also understood in SMEs as business plan, planning, strategy, strategic decision-making, forecasting and environmental scanning, as terms that refer to the way in which a small firm relates to its external environment, rather than the term 'foresight', but, whether explicit and codified or tacit and experiential, it helps to create *knowledge of alternatives*.

3 The Case Study Design

3.1 Type of Methodology Chosen Including a Justification of Methods and Techniques and a Selection of the Company

Case studies are used in social science research including economics as well as practice orientated fields like management science. Case studies are the preferred methodology when "how" and "why" question are being posed, when the researcher has focus on a contemporary phenomenon or events within some real life context. It should be underlined, that the case study does not represent a sample; it is an empirical inquiry that investigates a contemporary phenomenon especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2003).

In this respect this study has efforts to ensure that the gap between theory and practice is minimized, or more commonly, that theory and practice interact. Case study is an ideal methodology when a holistic, in-depth investigation is needed. Yin (2003) has identified the specific types of case studies: exploratory, explanatory and descriptive. Yin also points out that the case study method allows researcher to retain the holistic characteristics of real life – such as organization and management process.

Documents, artifacts, interviews and observations are the typical methods and techniques of the case study research. Interviews and observations are the methods how tacit knowledge is possible to capture. As known, an interview can take one of several forms: open-ended, focused, or structured. In an open-ended interview, the researcher could ask for the informant's opinion on events or facts. In this study the interview has intentionally been rather vaguely formulated in order to allow those aspects, which interviewees themselves consider

relevant. The questions have been formulated for the moments that the interviewee can be encouraged and remembered out to speak all key issues, but still the situation would attempt to stay as close as possible to the individual interviewee's personal interpretation of the situation. In addition, the related written material was decided to be collected, depending on the availability and relevance for the subject.

The analyses of the interview part and observation part of the study part have been done by causal mapping of the issues and description of company's information is. Mapping is not - in this research as not in any other research cases - without problems. It can be expected, that there will be found a lot of interdependencies between topics and pieces of information and it might be difficult to find out which of them really matter. The method does not establish a hierarchy as, for the laddering method, would do. The maps would, anyhow, offer a way to see the SMEs' internal 'logic' when there will be a bigger amount of interviews and case studies in the future.

In this study, individual persons working in the investigated companies, served as the main data collection source in the form of interviews and observations. Furthermore, written document was available.

Access was the main criteria for selecting the pilot company. We assumed that the pilot case company would participate in the study in the role of a laboratory, allowing for researcher to observe the issue from many different angles. The selection was made by sending an invitation for the SMEs, participating in the Lahti Region Environmental Cluster activities. The former cluster chairman company "A" was found for the investigation. The case study was made in July – September 2009.

4 Case SME and Discussion of the Findings

4.1 Company Overview

The case studied company "A" is based in the Southern Finland, exports more than 90 % of its production, mainly to the Central Europe and the USA. The company designs, manufactures and markets high-quality products for the field of environmental and earthmoving technology. The product range consists of various accessories for wheel loaders and excavators and the main products are screener crushers, stabilization systems and compacting plates. The home market still remains important for the company, but maybe not merely in terms of

sales, rather in terms of innovation and R & D. The turnover of the 2008 was 24,4 M€ and the company has now 50 employees and tens of sales agents. The company has daughter companies in the USA, the UK, France and Germany, sales offices in Argentina and China and sales agents in over 30 countries.

“A” was founded in 1985. In the beginning the company worked as an engineering company and import company without own production. “A” created the Screener Crusher method in 1991, during the previous economical depression in Finland. Nowadays, sales constitute over 80% of the world market for Screener Crushers. At the turn of the 21st century “A” was involved in several equipment engineering projects for mass stabilisation. In cooperation with the largest construction companies and research institutions, we developed reliable and effective equipment for processing soft, non bearing soils. As a result of this R & D effort, “A” has launched several products for mass stabilisation, such as a complete mass Stabilisation System.

“A’s” mass stabilization equipment is the first commercial application consisting of three devices. A pressure feeder dispenses the binder and feeds it to a power mixer, which mixes it into the soil. The third component for data acquisition and it controls and monitors the process. The company brought its mass stabilization system to market in 2003 and has sold dozens of them around the world.

Innovative operations demand close co-operations between range of experts, in businesses, R & D etc., as well as boldness and risk-taking ability. Without this kind of concept the new products would not have been created. Now “A” is developing the next generation mass stabilization system. The company has chosen “pioneering” as the strategic approach in its business and in own innovation development.

4.2 Questions Design and Conduction of Study

The case study protocol was a major way of increasing the reliability of study. It also guided the researcher in the process. The data has been tried to be triangulated as far as possible: the case study has been supported by more than a single source of evidence: brochures, annual report, company strategy and interviews. All in all, the issues to be researched were as follows: 1) Description of the Innovation process, phases etc. 2) How and where future orientated information is gathered? When these activities have been started? 3) How and when the future orientated knowledge became a source of innovative ideas? Connection to the strategy? 4) How company’s employees contribute to the innovation management? How the information and knowledge is shared? 5) How the business

has got benefit from a dialogue with the stakeholders? 6) How the business has got benefit from community activities and or public programs/projects? and 7) Has revenue improved having developed sustainable innovation? Estimations of the coming years?

A visit was made to the company headquarters and plant on September 2009. Face-to-face interviews were conducted. A semi-structured approach was taken in order to get a wide enough picture about the innovation activities and processes. The company permitted an access to observe the R & D team's meeting as well. A range of marketing material and company documents were also collected. They included marketing brochures, press releases and a strategy document. The content of annual report of 2008 was given orally by the CEO during the interview. Finally, the data was used by the author to conduct an analysis.

4.3 Discussion of the Findings

In this chapter the main findings of the study are reviewed and found models are illustrated. In general, the case demonstrates that a SME is able to be sensitive to future orientated knowledge and needs of customers. The case company has successfully led the environmental sustainability from information level and idea generation level to the product development and created competitive advantage of it. Since 1991, when the turnaround of the business concept was made – to become manufacturer of cleantech products besides engineering and import business - “A” has kept the leader position in own business segment.

4.3.1 Innovation Process

It was important to find out, that there are in-house practices for the innovation management, which support the successful performance and what are they and how to extend the time span of the innovation work to meet longer term vision and targets for the companies. Below the innovation process of the case company is introduced as a figure form:

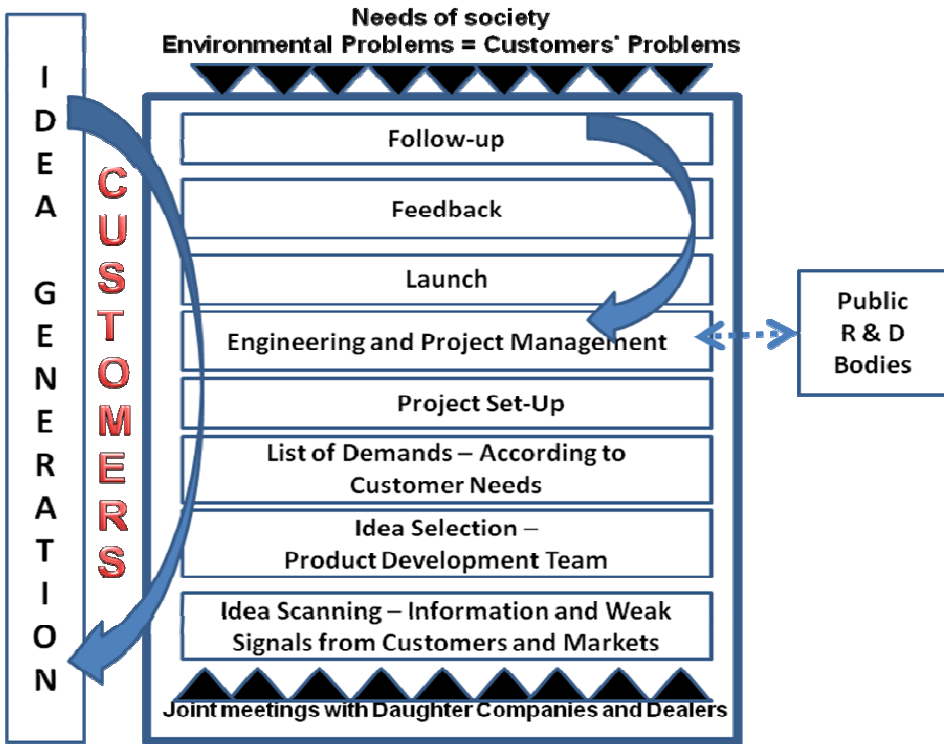


Figure 3 Innovation Process of the Case Study Company (Salmi A-M: 2009)

Figure 3. Case Company “A” - Innovation Process (Salmi, 2009)

To characterize the process in general, it is quite close Parallel and Integrated Model, at least nearer than other models like Rothwell’s model or Circular model. There are many interesting issues related to the “A”’s Innovation Process of which the pioneering style in all company’s doing is reflected also in the Innovation Process. The heart is customers’ voice and the innovation is still done as per request of customers. The role of other external organisation – if we see dealers as internal stakeholders – is without big importance, but the external experts from private sector have the bigger role in the process than public R & D bodies. This might be explained because of the fact, that in some special technologies the best knowledge in Finland is in private companies, not in R & D institutions.

4.3.2 Absorptive Capacity of Future Orientated Information

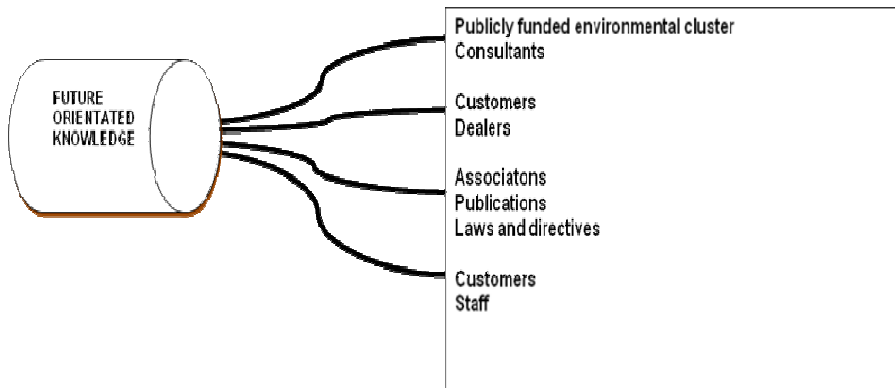
The information is gathered from various sources: general information of the current economic situation in different countries is essential and actual, but the company estimated, that it has survived relatively well, because of the business sector and/or the company recognized the coming crisis in time. This, like the whole innovation process, is based on “the customer based signal system” in over 30 countries.

It seems that once established, the co-operative networks with customers can be characterized by intensive communication and high level of trust. In practice, the exchange of knowledge between “A” and its’ sales networks and customers happens on-line in the innovation process. It may be concluded, that different knowledge-sets have been combined and it has been created a new, at least partially shared knowledge base. The potential for innovation synergy has been used efficiently and the balancing between differences and similarities is the continuous process within the innovation system and network.

The dialogue of staff with owner and customers is going on as on-line basis and has a high level trust. Whatever decision can be made during the same working day, if necessary, which makes the agility for the processes.

Certain external experts are also highly appreciated and the co-operation is intensive. The external experts’ know how is mainly related to the mass stabilisation issues. Towards other shareholders the dialogue is routine type of activity, even though its’ importance has been recognized. This part of the innovation process and generally in the company’s activities is not strong, but on purpose; it is seen in the company intensive enough.

There was a two years of period when the CEO acted as a chairman of the Regional Cleantech Cluster and this resulted as a R & D project, where, anyhow, the role of outside organisations of the company is not strong. The company has occasionally used the university knowledge in the engineering stage to check the validity of some calculations. In Finland does exist quite many specific fields, where the top knowledge is in companies and the case “A” belongs to those fields



Company A – Rake for Capturing Future Orientated Knowledge (Salmi, 2009)

Figure 4. Case Company “A” - Rake for Capturing Future Orientated Knowledge (Salmi, 2009)

A substantial amount of all kind of information - including tacit knowledge - transfer takes place all the time, all staff members and sales agents simply learn, imitate, and exchange knowledge while at work.

Information collection is supported by setting in the form of intranet, which enables to share information between staff members and sales agents around the world and also enables to capture tacit knowledge as well. A customer log, all contact data, negotiation situation, contracts, deliveries, feedback etc. customer related relative information is shared through the intranet. The strategy updates (might be several strategy updates annually, e.g. three updates during the year 2009) are also published trough this electronic platform. Anyone of staff members can make initiatives or suggest ideas and share them with each other.

The company organizes annual Daughter Company Days and Dealers Days, which serve as an essential part of the idea generation and as a basement of the innovation process in terms of new ideas from the customers and markets. The country specific information is shared not only in oral form; the written reports are also collected. The following figure describes “A”s main absorption line of the information – reflection of markets,

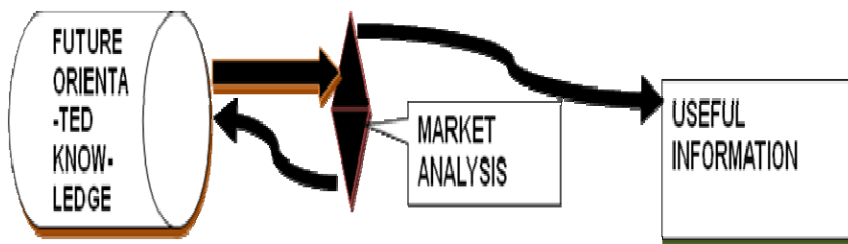


Figure 5. Company “A” – Absorption Future Orientated Knowledge (Salmi, 2009)

4.3.3 Revenue Development with Environmentally Sustainable Innovations and Foresight of Coming Years

The beginning of the current success of the company is based on the turnaround of the strategy in early 1990’s, when the engineering company and importer of technology changed the concept and began to create innovations and manufacture own products. The share of imported products is now about 15 % of the revenue. The strategic decision was made because of “the requests of the markets”; there was obviously a need for such machinery to be used in landfills and contaminated soil areas. Today the company holds the leading position in the markets in its’ own special segment. During the years 2000 – 2008 the turnover has grown six times bigger. The new plant and headquarters have been invested for the turnover of 50 M€, which is targeted to be achieved in coming ten years. From the innovation point of view the challenge is to find the third product group by replacing the current third product group of windrow turners. The new product should be launch in 2012 that the goals would be possible to achieve.

The relation of the future orientation with strategy is stated clearly: “Do not reinvent a wheel, invent a brand new”, could be defined as the glue of the strategy and orientation to the future. From that on the company has kept this strategic track, because “the environmental problems will not be solved by their own”, which was stated in the interview.

5 Conclusions and Future Research

5.1 Limitations of the Study

The study does not, realistically, try to make empirical generalization because of the limited amount of empirical data, but aims at finding out under what circumstances of interdependencies the results of their future orientated knowledge based innovation with sustainability can be successful.

The case study was exploratory, a wider sample, e.g. a bigger amount of case studies, would bring more valuable insights into how sustainable business are integrated into innovation process and utilizations of future orientated knowledge. Since this article is in the writing process, three others have been implemented and will soon be analyzed.

5.2 Conclusions

There have been recommendations in academic research to take a more multiple approach for the study of innovation. The study demonstrates the multi-dimensional and intangible characteristics of the innovation process with several angles.

Concerning the innovation management this case supports von Krogh's opinion, which underlines the importance of knowledge creation of microcommunities, which consist of various kind of people from the company and its' customers, partners etc. Cohen's & Levinthal's point of view concerning absorptive capacity, which is as important as the ability to manage resources, seems to be well adapted in the company. It will be interested how its' presence or absence will have an importance in the future case studies.

Nonaka has highlighted the importance of the middle management's role in the innovation management. In this case the innovation is in hands of the middle management: the product development team's leader is product development manager, whereas the CEO is an ordinary member of the team. Other team members are sales director, product manager and production manager, the domination of the middle management seems to be obvious.

Related to tacit knowledge, SMEs are often criticized about keeping much information undocumented. To capture and demonstrate of that knowledge in any form is challenging and time consuming. In the company "A" tacit knowledge is captured and the tacit knowledge is collected on purpose into the intranet lead-

ing to the assumption that at least the essential part innovation related innovation is seen important to keep documented. In fact, the knowledge collection system and innovation process are disciplinary planned and implemented and integrated to each other.

So far there has been poor empirical evidence how the sustainability is anchored in the business concepts of SMEs. In the next decade, as clean technologies will spread more and more, we will go through a new industrial and technological revolution. Sustainable business should be built on real actions, like in the case company, being also commercially useful. We assume that the case "A" is one of the most convincing examples of sustainable business built on tangible improvements, product or service performance and delivery to become a competitive advantage. As introduced case shows, besides large companies, SMEs will be big players of this global cleantech development and SMEs will have growing importance of all kind of innovations, related to the sustainability.

Finally, we would like to highlight some general issues related to the innovations in the SME sector, which have been identified in this case company. First, innovation is a continuous process/a set of processes of being modified by staff members over and over again, building on valuable insights gained in the up- and downstream as well as in horizontal phases of the process, with information from each stage moving back- and forth through the interdependencies. Second, innovation is also a matter of learning, and, knowledge generation experience and know-how are mutually reinforcing and cumulative. Third, in this case the main driver seemed to be utilizing customers resources as complementary resources for both efficiency, learning and for customer satisfaction.

5.3 Recommendations for Further Research

Quite an amount of environmental or other sustainability related problems we face are caused and can be solved by companies. It is evident, that SMEs cannot be held responsible for all of the problems, nor do they have resources to solve them.

Like mentioned before, the future orientated knowledge and its' relation to innovation and sustainability is comparatively under-research topic of SME field. It would be beneficiary that as a result of the several case studies about the SMEs innovation-sustainability-future orientated knowledge combination could be reflected by a model. **FOKSI** (**F**uture **O**rientated **K**nowledge and **S**ustainable **I**nnovation) Model will give a framework for the integration of several angles as one competitive sustainability business concept. Future research could also concen-

trate in a survey of different cleantech companies to provide basic insights into sustainability business concepts issues and how they are generally incorporated into companies' practices.

The research is also required in the area to understand the way in which foresight methods and generally utilization of the future orientated knowledge can assist the small firm in becoming more strategically aware and to understand how these skills can be applied and embedded within the small firm.

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EXPERIENCES OF USING A MOBILE RFID-BASED TRIAGE SYSTEM IN A MASS CASUALTY SITUATION: AN EXPLORATORY STUDY

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Abstract

A number of types of triage support systems which use Radio Frequency communication (RFID) have been introduced in recent years. This paper examines a mobile triage system, known as "mTriage". The purpose of this paper is to determine the applicability RFID technology and how well "m-triage" worked when simulated casualties came to during a military winter exercise in Finland during the 2006. This paper focused on medical personnel's opinion on this matter, answering the question: Are the medical personnel who use the system in the field satisfied with its performance ?

Several field medics were asked to complete a survey questionnaire. The results of the evaluation were mainly positive. The conclusion was that the mobile triage has the potential to contribute to the management of mass casualty situations.

Introduction

Triage is used daily by the emergency and health care workers around the world. It is an important tool when starting to process of categorising casualties (1). According to Szul (2) triage is an attempt to make order during chaos and to make an overwhelming situation manageable.

All pre-hospital triage systems have different documentation methods. Primitive types are based on paper tags and others on triage tags with RFID or other wireless "intelligent" tags. Most of the current systems still rely on a paper triage tags on which rescue and medical workers write the casualties' triage status and limited medical information (3, 4). Paper tags have serious limitations. The space for recording of medical information is very limited. The "tear-off" triage tags allow only uni-directional changes in the condition of any casualty's. Paper triage tags are not weather proof and are easily destroyed (5). According to Gao et al. (6) paper triage tags are difficult for responders to update the color designation easily, tags have little room for manual writing of the vital signs and complaints and reading tags can be difficult because casualty information recorded is poorly written. Baker (7) has written about how important it's to retriage casualties at every medical facility in their evacuation and how triage priority may also be altered by new findings.

Castren et al. (8) writes that triage tags should show who gave treatment to casualties, who made decisions about what kind of treatment of care to give, which unit transported the casualties and what treatment facility was used. This

is something that paper tags can not always do; because there is not enough room to write the required information.

Triage tags with radio frequency identification (RFID) or other wireless “intelligent” tags might be future systems for both identification and tracking the casualties (7). Real-time information is critical to overall management of field medical care (3).

Mobile electronic systems of triage have recently been introduced. These claim to deliver accurate and timely information on the victims and their triage status in the field (3). Medical command must coordinate the number of casualties and their needs with the known availability of resources, such as on-the-scene medical personnel, ambulance locations, and medical capacities. Real-time information is also critical to determining the appropriate patient destination, the type of injuries and the capabilities of the receiving facilities (5, 9).

According to the researchers working on the Finnish project, getting relevant information about casualty location, numbers and categorizations to the command centre has taken up to 24 hours in previous exercises.

Chan et al. (4) writes that level information technology used in emergency health care should be easy to use in a user level. Effective training should also be provided. Lack of adequate training has prevented deployment of many systems (10). Patient tracking devices need to be small, durable and rugged enough to withstand the environmental and manmade elements.

Background

RFID technology is already making its way to emergency health technology. A number of types of triage have been introduced in recent years. Technology has been combined with triage through the use of barcodes, tag readers, passive RFID tags, hand-held computers, and geolocation to collect data about the mass casualty events (11). Rapid triage with flexible data management is vital in response to emergency care. RFID technology is making its way into emergency health care to address emergency data management.

This article focuses on a RFID triage system, mTriage, especially on medical personnel’s opinion on whether the users are satisfied with the performance of the system.

mTriage

mTriage system is based on RFID technology, Nokia Field Force (NFC) Solution and Logica mTriage software. The medical personnel at the field use the triage system via Nokia 5140i phone and RFID mTriage tags. The system is specifically designed for triage and track casualties in the battlefield (12).

Medical personnel had their own RFID tags-B and casualties had their own personal tags-A; one per person. Instead of writing- and hand-collecting the triage information, it was transmitted to the system via nokia 5140i phones, used by medical personnel. When casualties were transported forward to medical facilities, the RFID tags carried the triage information (12).

Casualties were classified to four triage categories; immediate, delayed, minor and dead. It was possible to change the Triage tag if necessary by the medic or the medical personnel at the medical facilities (12).

Methods

This was a quantitative study, carried out as an observational descriptive study, based on data that was provided by the Finnish Defence Forces, Centre for Military Medicine (12). Data was collected using a survey instrument. After the users had completed their task, they received a questionnaire.

The usability of the new triage system was evaluated with a standard post-test questionnaire, with eight sections containing a total of 27 questions regarding the field medics' subjective confidence in personal use, general use and applicability of the system. Free comments were allowed to be made at the end of the questionnaire (12, 14).

The questionnaire was divided into five groups, each one dealing with a different aspect of the user experience: overall reactions to reading the tag, technology, time consumption, triage and training.

18 of the 45 field medics in the exercise were given a personal RFID tag and a Nokia 5140i phone with an integrated RFID reader/writer and mTriage software from a division of Logica.

Several medical facilities and 5 evacuation vehicles were equipped with the RFID tags and readers as well. (12, 14).

Data was available in a spreadsheet (MS Excel) and was analysed using advanced spreadsheet features to provide descriptive statistics and visualisation using bar charts and graphs.

The mock casualties included 130 randomly selected conscripts, each tagged with an injury card (including triage Tag) of their injury (12, 14). During the study in the field, medics treated casualties with paper triage tags or RFID-tags.

Results

The test took place during the Finnish military's Pyry 2006 exercise. Sub-arctic weather conditions gave the Finnish Defence Forces good testing fields to test medical technology (14).

Of the 18 field medics to complete the entire questionnaire, four failed to do so and were excluded from the study (14). These field medics had various professional backgrounds. One was a physician, four were college graduates, five had finished high school and two had graduated from a vocational school. Since we were especially interested in the reactions of the users who are not familiar with the RFID technology, none of these field medics had had RFID-triage experience before. Before the study started users were briefly taught the basic concepts needed to operate the system. They had 10 minutes of training in how to operate the equipment. Medics also had the chance to ask questions if they had any difficulties while using the equipment at the scene. The staff from the Finnish National Centre for Military Medicine were on the scene to provide support if there were any difficulties (12, 14).

The results of the evaluation were mainly positive and the medics had strong opinions in most of the questions, although they had never used the equipment before.

After the users completed their task, a questionnaire collected their subjective opinions concerning the usability of the system. As earlier mentioned the questionnaire was divided into five groups, each one dealing with a different aspect of the user experience. In this chapter all these five groups are looked closer.

Reading the tag

While using the equipment in the field medics felt that that RFID-tag reading was not difficult and was mostly successful. Most of the users strongly disagreed that reading the RFID-tag was difficult and only three found it to be time consuming.

When asked if the RFID-tag reading was slow; nine of the field medics disagreed only three agreed with that opinion. All medics agreed that RFID- tag reading was mostly successful.

Technology

Reader operation was mostly problem free and generally was not difficult. All users strongly agreed that the reader operation was mostly problem free. While using the RFID-reader all field medics disagreed or strongly disagreed that reader operation was difficult.

Questionnaire responses show also that field medics found application easy to use and stable. All field medics found the application easy to use. They also found the application stable.

Time

Seven of the users felt that RFID-patients required more time than normal patients, one had neutral opinion and four disagreed that RFID-patients required more time. Normal patient is here referred as a patient with paper triage tag.

Seven of the field medics disagree that RFID-triage took longer because of technology. Four agreed that RFID technology influenced they triage time, and RFID-patient triage took longer because of the technology. One medic had no opinion. Field medics find RFID-patient triage to be quick and reliable, all of the user agreed to that opinion.

Triage

Ten of the user disagreed that they viewed RFID-patients differently to normal patients, two agreed. Field medics did not find RFID –patient triage labour intensive. Eleven of them disagreed that RFID-patient triage was more labour intensive and one had no opinion. To question “normal patient triage was even more labour intensive” four of the users had a neutral opinion, six disagreed and four agreed.

Training

Most field medics agreed that they received sufficient training for the use of the RFID-technology and the use of the application. All medics agreed that they received sufficient training for the use of the RFID-technology.

While using the application, eleven medics strongly agreed that they received sufficient training and one had no opinion. Ten of the users disagreed that they have received assistance while using the device and application and two agreed that they have received assistance while using the system.

Conclusions

This study was about the implementation of the mobile triage in a military field exercise and evaluated medical personnel's opinion on this matter. The m-Triage system has many benefits over the current paper-based paper triage. The medics whom were unfamiliar with RFID triage quickly learned how to use it and found it easy-to-use.

Where this kind of equipment is used in disaster relief efforts, equipment should be quick and easy to repair and hands-on training should be routine (10). As the study shows, the training on site was effective and helped the use of the equipment.

While using the mTriage in the field medics did not found triage to be labour intensive, it was quick and reliable. The users in the field felt that application and device functioned well together while they were doing the casualty triage. mTriage also made it possible to change casualties triage category when needed, which is often done at the secondary triage point or during the transportation.

Mobile triage has the potential to contribute to the management of mass casualty situation; it also has potential for improving the quality of medical care. New information technologies, such as mTriage, will improve triage and patient tracking in the field. The mTriage has potential not only for military medicine use in the future. The system could also be adapted without any difficulties by the civilian sector. It could be used for management of mass casualty disasters, such as earthquakes, storms and multi casualty incidents.

All new technologies have limitations as well as capabilities. The RFID tags need some sort of human readable element (similar to the colour coding on traditional triage cards) to simplify the work of transport and field personnel who are not equipped with RFID readers (15).

Due to the nature of emergencies more studies need to be done on user satisfaction to evaluate the usability of the RFID triage in the field.

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The interrelationship between aspects of organisational orientation, innovation and company performance has intrigued researchers for centuries. The main reason for current interest in the innovation research is the widespread belief that innovation stimulates, in general, economic development and firm performance. In the case of dynamically continuous innovation such as the Internet, some change in behavioural patterns is created through its adoption. The management of innovation is not an easy task in the Internet age as there are several existing channels that customers may be using simultaneously.

This article compilation that ensued from the international conference "Beyond the Dawn of Innovation" organised by Laurea University of Applied Sciences in June 2009 contains six full-length papers covering a wide variety of innovation dimensions. All the published articles were subject to an international double-blind peer review process.

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