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DETECTION OF A COMPANY'S PREFERABLE STRATEGY TYPE

By Sense & Respond Methodology

Master's thesis in
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SYMBOLS AND TERMS

BCFI | Balanced Critical Factor Index, the modified CFI index which more properly and reliably detects the most critical factors affecting the overall company's performance.

CFI | Critical Factor Index (Ranta, Takala, 2007), is a supporting tool for the strategic decision-making, which is concerned in detection of the attributes affecting the business performance.

MSI | Manufacturing Strategy Index – it is the method of detection of the preferable strategy type proposed by Professor Josu Takala et al. (2007). The method implies the key elements of RAL model and derives the proportions of importance between Quality, Cost, Time and Flexibility.

OP | The abbreviation of the questionnaire called Operations. The one of possible questionnaire forms for (B)CFI analysis arrangement.

RAL | Responsiveness Agility Leanness Model, which unites four key parameters affecting the business performance – Quality, Cost, Time and Flexibility (Takala, 2007).

S&R | Sense & Respond (Bradley, Nolan, 1998) is a scalable managerial framework developing ability to adopt improvements.

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ABSTRACT:

The key attention of the study is given to the stage of the strategy detection as an important step of the strategic analysis. The main goal of the thesis is creation of a method for the strategy type detection through utilization of Critical Factor Index analysis (Ranta, Takala, 2007).

The development proposition has a strong theoretical basis connecting together different approaches like Manufacturing Operations Strategy, RAL model and Sense & Respond methodology into the solid core, with its nucleus represented by Miles & Snow topology (1978).

The study demonstrates further validation of the developed method with four case companies and concludes with the statement about its durability and applicability.

KEYWORDS: Critical Factor Index, strategic decision-making, strategy detection, process management, business performance, method validation.

VAASAN YLIOPISTO

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TIIVISTELMÄ:

Tutkimuksen tarkoituksena on hyödyntää startegianresussilähtöistä tunnistamista osana strategista analyysiä. Tutkimuksen päätarkoituksena on hyödyntää Critical Factor Index kriittisten resurssien määrittämistyökalua. (Ranta, Takala, 2007).

Kehitetyllä strategian tunnistamisen ja resurssiallokaation vastavuoroisella tarkastelulla on vahva teoreettinen tausta, joka liittää toisiinsa erilaisia lähestymistapoja mm. valmistusstrategian, RAL mallin ja Sense&Respondmetodikan, jotka luovat yhtenäisen teorian, jonka valmistusstrategialuokkien osalta on esitellyt Miles&Snow (1978).

Tukimus esittelee ensimmäistä kertaa ja vahvistaa kehitettyä metodia neljän eri caseyrityksen avulla, ja yhteenvetää tutkimuksen johtopäätökset, luotettavuuden ja validiteetin tarkastelua unohtamatta.

1. INTRODUCTION

Strategy is one of the most important components of the modern corporate environment, which is, in most cases decides upon surviving or bankruptcy of companies and organizations. Strategy is a gate for any organizational development, modernization or competitive activities arrangement, as well as the key to the competitive advantages and reliability achievement. Therefore, strategy may lead to prosperity or cause the bottleneck situation. In 1980th the strategy concept was defined as:

"The pattern or plan that integrates an organization's major goals, policies and action sequences into a cohesive whole. A well-formulated strategy helps marshal and allocates an organization's resources into a unique and viable posture based upon its relative internal competences and shortcomings, anticipated changes in the environment, and contingent moves by intelligent opponents". (Quinn, 1980)

Currently, the strategy definition has been changed sufficiently and involving other factors (Grant, 2005). The attitude to strategy detection, choice and realization has been developed as well. Because of the rapidly changing business environment companies and organizations are coming closer to the idea that the strategic thinking and planning is the way to a long business life.

In the present work the main attention will be given to the stage of the strategy detection as an important step of the strategic analysis. The research aims at developing of the existing strategic decision-making tool – Critical Factor Index (CFI) (Ranta, Takala, 2007). The key target of the thesis is creation of a method for

the strategy type detection through utilization of CFI analysis, if being more exact, its better developed form - BCFI (Balanced Critical Factor Index). The further validation of the method is to be organized with the case companies.

As a result, the research can increase the BCFI's applicable scope as well as provide the companies with more data for strategic decision-making. In addition, the BCFI analysis can become a broad based method with bigger quantity of potential users. The potential application of the method in combination with the BCFI analysis is to get the clear vector of development for the company, supported with the knowledge about the most sufficient sides of business performance.

It is reasonable to state that the main limitation of the study is the little number of case companies analyzed with the method. Even though in the research four case companies took part, the validation field is not wide enough. Therefore the further deeper validation with different types and sizes of participating companies is necessary.

1.1. Scope of the thesis

The field of current research is relatively wide, as it touches theories from decision-making and strategic planning to strategy selection and performance improvement areas.

The paper aims at answering questions like: *Is there any theoretical model which can be used as a bridge between Manufacturing Operations Strategy and Balanced Critical Factor Index? What is the correlation between the strategy types and critical attributes affecting performance of the company? What is a better strategy to be implemented by a company in a way to achieve better performance?* Nevertheless, the thesis has strong bounds, and pays attention mainly to the methodological part of sensing the strategy type.

The method is highly depends on theoretical aspects, therefore a sufficient portion of paper takes theoretical overview. The conclusions are made in question supported by the validation of the case companies' results. In addition, the potential areas of the developed method application will be proposed.

1.2. Structure of the thesis

The main part of the thesis begins with overview of the necessary theoretical background - description of the used concepts, models and topologies. In other words, the chapter 'Theory and Research' makes reader familiar with theoretical basics, and further describes the core idea of the paper. The chapter contains also the detailed explanation of the proposed research methodology.

The following part 'Results' presents, describes and analyses the case companies one by one. The chapter consists of four sub-chapters – according to the number of

participating companies. The main role of the section is to support the proposed research method with exact figures and comparative analysis, which stands for validity and reliability of the thesis' key idea.

The concluding chapter 'Discussion and Further Studies' has a post-analysis role. It aims at explanation of the thesis' results in a more detailed view, moreover, it expresses the author's personal opinion regarding the research and contains the practical advice concerning the method implementation.

As a standardized form of graduation work, the current thesis has 'Introduction' chapter, with establishing a niche and research territory function and 'Conclusion' chapter, accumulating all the sufficient knowledge gained during the research. The list of used references is closes the thesis.

2. THEORY AND RESEARCH

The current chapter covers the most sufficient for the thesis theoretical aspects and describes the method used for the research arrangement. The explanation of the theoretical methodology is the valuable information for readers as it provides ones with the necessary knowledge for better understanding of the presented below analysis, its results and conclusions.

The chapter also describes the proposed development of BCFI, with its detailed methodological explanation. The information presented below will be further developed with the practical examples and the case companies' presentation in 'Results' section.

2.1. Theoretical overview

2.1.1. Manufacturing Operations Strategy

The sub-chapter concentrates only on one classification of the companies' behaviour based on strategy type - Miles & Snow Topology (1978). Mintzberg explains strategy as a future plan of the organization, a pattern of its performance, a position or niche in certain markets, a perspective (out-in as well as in-out) to

look its business and it is a ploy to overcome its competitors (Mintzberg, 1998). Strategic choices of an organization in certain market conditions determine its particular stance for business operations conditions (Miles, 1978).

The typology divides the business strategies into four groups, *Defenders, Prospectors, Analyzers and Reactors,* managers adopt one of these strategies at certain time, to be consistence facing the external environment (Daft, 2009), this adaptive capability broadens the opportunities that organizations can materialize.

There are three main factors, which drives the companies into this classification: Entrepreneurial, Engineering, and Administrative problems. Therefore the Strategic Topology (Miles, 1978) aims at finding answer to the main question: what strategic steps do companies utilize to solve their problems in engineering, administration and entrepreneurship (ibid).

The research clarified the following most common types of strategic behaviour among the companies:

- **Defender Strategy:** This strategy concentrates on a mature product or market operation; focus on efficiency and process improvement (Cost), organizations prefer not to take risks, strengthen efficiency and maintain their current costumers.

- **Prospector Strategy:** This strategy is dynamic and looks forward to new opportunities in market, and products; organizations take risks, innovate in processes and moreover focus their efforts to lead their industry. Quality is crucial point for the current strategy type.

- **Analyzer strategy:** The analyzer strategy is placed between the defender and prospector strategy, in this context, the organizations attempt to conserve a steady state in market or product but at the same time foster change and innovation.

- **Reactor strategy:** This strategy is a no-strategy, the absent of defined goals and objectives is the main characteristic. Decisions are taken to respond immediate problems or opportunities and there is no sense of direction. Therefore, the current strategy is not taken into account in the research and will not appear on the resulting graphics as a separate category.

2.1.2. Sense & Respond Methodology

General idea: 'Sense & Response' (Bradley, Nolan, 1998) is more than a desired behaviour; it is a scalable managerial framework for the ability to adopt improvements. This means that it is relevant to any leader, regardless of the size of his unit. The existing framework for most organizations is 'Make & Sell', what does not satisfy the highly competitive and constantly changing business environment any more (Ranta, Takala, 2007).

The main idea of 'Sense & Response' philosophy is the executing of the best practices in a dynamically changing environment by detecting changes (sensing) and reacting to them properly (responding), in other words, converting threats into opportunities, drawbacks into strengths.

Sensing earlier and responding better to what is happening at a moment requires a fundamentally different decision-making supporting model, therefore Critical Factor Index (CFI) methodology will be presented in the following part (Nadler, Takala, 2008).

Operations Questionnaire (OP): Table 1 demonstrates the standard form of the questionnaire, used for (B)CFI calculation, proposed by Daniel Nadler and Josu Takala (2008). The questionnaire is filled out with some data just to give an idea of how it should look after the completion.

The OP questionnaire aims at detection of critical factors affecting manufacturing/production cycle, though the analyzed company can arrange attention and available resources in a better manner. There are twenty one attributes divided into four sections which help to evaluate the stated areas in the questionnaire.

The mentioned attributes are to be measured in different ways, for example, expectation and experience, comparison of the attributes to the existing competitors and evaluation of the company's directions of development. Expectations and Experiences should be marked with a number in scale from 1 to 10 to evaluate the planned and the actual condition of each attribute. The columns 'Direction of development' and 'Compared with competitors' reflect the overall business performance of the company.

Table 1. The standard form of the questionnaire.

ATTRIBUTES	Expectation (1-10)	Experience (1-10)	Direction of development			Compared with competitors		
			Worse	Same	Better	Worse	Same	Better
Knowledge & Technology Management								
Training and development of the company's personnel	5	3			b		s	
Innovativeness and performance of research and development	7	5			b			b
Communication between different departments and hierarchy levels	6	7			b			b
Adaptation to knowledge and technology	9	10		s				b
Knowledge and technology diffusion	8	7			b		s	
Design and planning of the processes and products	5	3			b			b
Processes & Work flows								
Short and prompt lead-times in order-fulfillment process	5	5			b	w		
Reduction of unprofitable time in processes	7	5		s				b
On-time deliveries to customer	6	7		s			s	
Control and optimization of all types of inventories	8	9			b	w		
Adaptiveness of changes in demands and in order backlog	9	10		s				b
Organizational systems								
Leadership and management systems of the company	8	9	w					b
Quality control of products, processes and operations	9	10			b		s	
Well defined responsibilities and tasks for each operation	10	9		s		w		
Utilizing different types of organizing systems (projects, teams, processes...)	9	9			b			b
Code of conduct and security of data and information	9	9			b			b
Information systems								
Information systems support the business processes	3	5	w				s	
Visibility of information in information systems	5	6		s				b
Availability of information in information systems	7	7			b		s	
Quality & reliability of information in information systems	8	9			b			b
Usability and functionality of information systems	5	10	w			w		

2.1.3. Critical Factor Index / Balanced Critical Factor Index

General idea: For the beginning, it is necessary to give a definition of what is Critical Factor Index (CFI) method, according to Juha-Matti Ranta and Josu Takala (2007):

"The CFI method is a measurement tool to indicate which attribute of a business process is critical and which is not, based on the experience and expectations of the company's employees, customers or business partners". (Ranta, Takala, 2007)

In fact, the CFI method is a supporting tool for the strategic decision-making. In the current business environment fast adaptation and development can be considered as one of the most important strengths. For being able to take deliberate strategic steps in a short period of time, there should be a reliable and relatively simple method of conducting and interpreting the existing tacit knowledge (inside or outside of the company). The CFI suits the stated requirements perfectly. The method aims at the detection of the most critical attributes affecting the business performance of a company both on a current moment and on perspective (5-10 years). The CFI method provides the company with the crucial strategic data for the approach development and correction. The following chapter describes Balanced Critical Factor Index (BCFI), which presents the modified CFI index which much more properly and reliably detects the most critical factors affecting the overall company's performance.

Building the method: The easiest way for the required data collection is the qualitative questionnaire, the example of which was presented in the chapter 2.1.2

(Table 1). The important characteristic is that the more respondents take place in the data collection, the more reliable the results are. After the data collection, the following indexes need to be calculated to finalize the analysis (Nadler, Takala, 2008):

- **Gap Index** – helps to understand the gap between the expectation and experience of a particular attribute, therefore to clarify if the company's expectations are correct and corresponding to the reality.

$$Gap\ Index = \left| \frac{(average\ of\ experience -\ average\ of\ expectation) * 1,3}{10} \right| - 1$$

- **Direction of Development Index** – demonstrates the actual positive or negative change of an attribute's performance. The index provides us with the information about the actual direction of the company's development.

$$Direction\ of\ Development\ Index = \left| \frac{(better\ \% -\ worse\ \%) * 0,9}{100} \right| - 1$$

- **Importance Index** – demonstrates the level of importance of an attribute among the others. The index reflects the actual expectations of the company regarding an attribute. Anyhow, the expectation may not correspond to the experience.

$$Importance\ Index = \frac{average\ of\ expectation}{10}$$

- **Performance Index** – reflects the value of an attribute's performance based on the actual experience of the respondents. In the result we can see either an attribute has performed well or not and make the conclusion about the attribute importance.

$$Performance\ Index = \frac{average\ of\ experience}{10}$$

- **SD Expectation Index** – reflects the fact if the respondents have similar or controversial meaning regarding all the attributes' expectations.

$$SD\ Expectation\ Index = \left(\frac{SD\ of\ expectation}{10}\right) + 1$$

- **SD Experience Index** – reflects the fact if the respondents have similar or controversial meaning regarding all the attributes' experiences.

$$SD\ Experience\ Index = \left(\frac{SD\ of\ experience}{10}\right) + 1$$

- **Balanced Critical Factor Index (BCFI)** – the most useful indicator in the current analysis as it helps to detect the most critical factors affecting the overall company's performance. Therefore, the company can reallocate resources in a way to maximize attention on the most critical factors.

$$BCFI = \frac{SD\ expectation\ Index * SD\ experience\ Index * Performance\ Index}{Importance\ Index * Gap\ Index * Direction\ of\ Development\ Index}$$

The results of BCFI calculations can be further presented in the graphical form that provides reader with the clearer representation of the criticality allocation among the attributes (Figure 1).
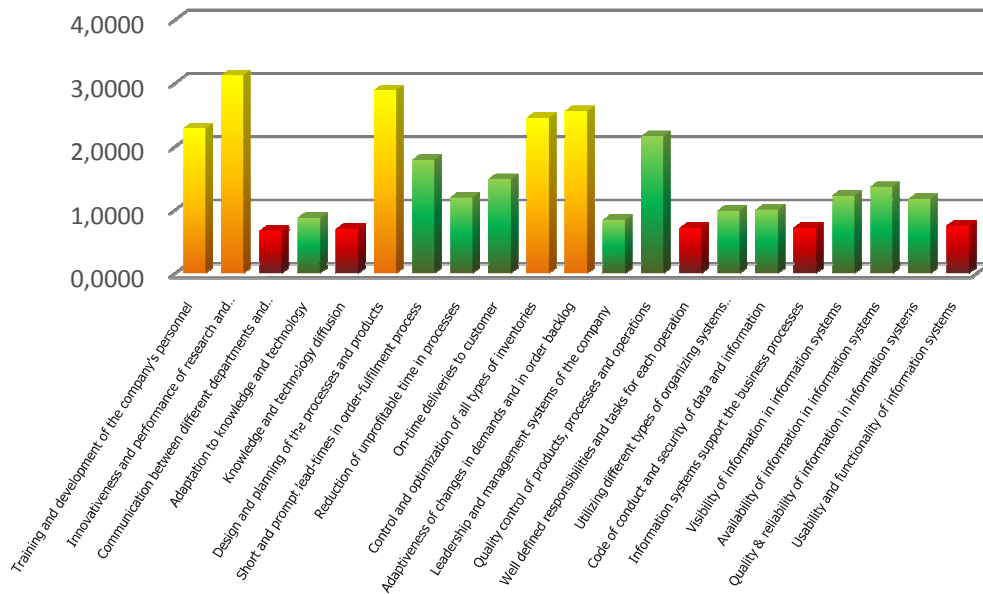

Figure 1. Example of the final graphic based on BCFI calculations.

The above stated figure clearly demonstrates us which of the attributes are critical at the moment (marked by red colour), those which may become critical in the nearest future (marked by yellow colour) and ones that non-critical at the moment (marked by green colour).

2.1.4. RAL Model relation with BCFI

Authenticity of the RAL Model (Takala, 2007) is to measure the success factors in logistics, has been successfully replicated for the manufacturing strategies as well as operational competitiveness of various organizations (Figure 1). RAL is abbreviated from Responsiveness, Agility and Leanness. An Organization achieves the optimization of the RAL model components (Responsiveness, Agility, Leanness) by prioritizing between cost, quality, time and flexibility. Balancing act between these four attributes reflects in the company strategy and can be tested by the mean of mathematical models proposed by Professor Josu Takala. (Takala, 2007)
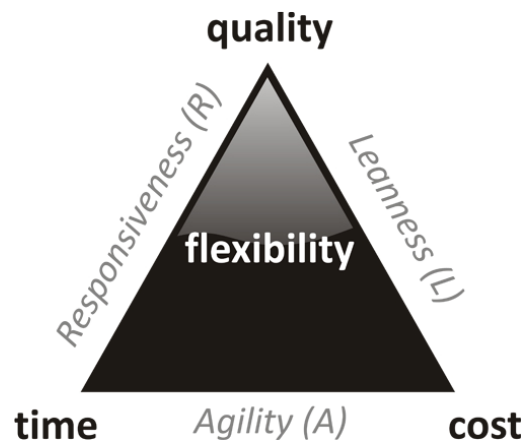

Figure 2. RAL Model *(Source: Takala, 2007).*

- **Responsiveness:** Responsiveness is the "speed by which the system satisfies unanticipated requirements". Organization Responsiveness is the ability to

purposefully react and fulfill its customer requests within the bounding of promised time and cost (Holweg, 2005). Thus responsiveness brings competitiveness to the organizations. The responsiveness of the organization is achieved through its sensitivity to respond environmental (market) demands and flexibility of its managers and leaders. (Gomez-Gras, 2009)

- **Agility:** Agility is the "speed by which the system adapts to the optimal cost structure". Agility is ability of an organization or organizational unit to succeed in a turbulent and competitive environment conditions. To be agile, organizations need to adopt and continuously improve the flexibility of their operations and processes. Agility of the processes leads to on time delivery to diversified customer demands for products and quality at optimal costs. (Yauch, 2011)

- **Leanness:** Leanness is to "minimize waste in all resources and activities". Leanness starts with the minimization of waste while negating it from the value chain of the product or project delivery systems. Minimizing the material waste or process wastes enables the organizations to deliver at desired quality with cost advantage over its competitors. Following Toyota the concept of leanness is widely adopted by the altering industries globally. In projects the waste starts from the designing the solution in form of revisions due to scope alteration and mistakes in design. Unnecessary inspections and quality checks are wastage of process time. While during the construction phase, poor material handling or wrong supply of items

again account for wastage. Adoption of the leanness can be an answer to deliver the quality projects at customer satisfied price. (Senaratne, 2008)

- **Flexibility:** Flexibility is the ability of any system to adopt the changing environmental conditions, in terms of cost, time, quality and organizational disruption. Anticipation of the environmental uncertainties is coped through flexibility in product mix, combination of processes and organizational activities, which eventually result in competitive advantage. The cost and time are the constraints of system which hinder the system response to fulfil customer demanded quality. Any system which transforms to a new state quickly and smoothly with the organizational disruption is called flexible system. More flexibility in the manufacturing operations enables the organizations to move with changing customer needs, respond to competitive pressure, and hence positive presence in the market (Slack, 2005).

2.1.5. Validity and reliability criteria

"Concepts of internal validity and external validity are valid in action research with constructive research approach, but reconsideration is still needed". (Takala, 2005)

Due to the fact that the current research is the qualitative one, the following modification in the basic criteria should be taken (ibid):

- **Internal Validity >** *Credibility*. The criterion depends on the inconsistency ratio among the responses in a certain group. The lower is inconsistency ration the more credible the result is.

- **External Validity >** *Transferability*. It expresses the value for responses from different groups of participants. The more separated groups of respondents we have, the better transferability is.

- **Reliability >** *Dependability*. The parameter says for quality of the answers and its dependency on qualification of a respondent. If a group of respondents has a high qualified member the dependability of the group increases, even in case when the number of groups' participants is relatively small.

- **Objectivity >** *Conformability.* The criterion underlines the importance in eliminating any possible dependency between the answers from various numbers of respondents. Independent responses coming from all the participants influence conformability positively and improve it.

The thesis aims at proposing a new method of the strategy type detection through utilization of Sense and Respond methodology and Balanced Critical Factor Index in particular. Therefore it is necessary to measure its validity and reliability with the described above criteria.

After the testing of the method with the case companies (the third chapter 'Results') it is proposed to build the resulting table where all the mentioned criteria

may be reflected and marked. For making the evaluation easier for visual perception, a grade from 1 (very low) to 5 (very high) will be given to every criterion.

2.2. Development proposition

The way to integrate Miles & Snow Topology (Miles, 1978) into Sense and Response methodology is to divide the attributes from OP (Operations) questionnaire between the general points of RAL Model. The deviation should be made according to the influence of an attribute on Quality, Cost, Time or Flexibility of the business performance process. From this point of view it is worth to pay attention to the key idea of the Analytic Hierarchy Process (AHP), firstly developed by Thomas L. Saaty (1980). According to Thomas L. Saaty:

"To make a decision we need to know the problem, the need and purpose of the decision, the criteria of the decision, their sub-criteria, stakeholders and groups affected and the alternative actions to take." (Saaty, 2008)

All of these can successfully help to manage the company perfectly and place it at a top level in the market. Although the system is firstly described for mathematics and psychology, nowadays it is used to make decisions in government, health care, education, business, and industry. AHP implies the following relation of sub-

criteria to their criteria (Quality, Cost, Time and Flexibility), what leads to better understanding of the basic elements of RAL Model (Table 2).

Table 2. AHP Competitive Priorities *(Source: Saaty, 2008).*

Goal	COMPETITIVE PRIORITIES OF MANUFACTURING STRATEGY																				
Criteria	Quality					Cost					Time					Flexibility					
Sub-Criteria	Low Defect Rate	Product Performance	Reliability	Environmental Aspects	Certification	Low Cost	Value Added	Quality Costs	Activity Based Measurement	Continuous Improvement	Fast Delivery	On Agreed Time	Right Amount	Right Quality	Dependable Promises	Design Adjustment	Volume Change	Mix Changes	Broad Product Line		

Following the general idea of the above presented table the BCFI attributes gathered in OP (Operation) questionnaire can be divided among the RAL Model elements in the similar manner (Table 3):

Table 3. Deviation of the attributes into four groups.

Quality
On-time deliveries to customer
Control and optimization of all types of inventories
Quality control of products, processes and operations
Quality & reliability of information in information systems
Usability and functionality of information systems

Cost
Innovativeness and performance of research and development
Knowledge and technology diffusion
Reduction of unprofitable time in processes

Leadership and management systems of the company
Code of conduct and security of data and information
Time
Communication between different departments and hierarchy levels
Design and planning of the processes and products
Information systems support the business processes
Visibility of information in information systems
Availability of information in information systems
Flexibility
Training and development of the company's personnel
Short and prompt lead-times in order-fulfillment process
Adaptiveness of changes in demands and in order backlog
Well defined responsibilities and tasks for each operation
Utilizing different types of organizing systems

The listed above attributes definitely have influence on more than one key category of RAL model, but they are secondary and less sufficient. In the current thesis the attention is given to the most crucial effect after the attributes.

Further, BCFI value is proposed to be the basis to calculate the separate results for Quality, Cost, Time and Flexibility, as we need to judge upon the importance of an attribute for one of RAL Model elements. The following step is summarizing of values of BCFI separately per group (Quality, Cost, Time and Flexibility) in accordance with the formula: $SUM = \sum x_{BCFI}$, where x_{BCFI} is values of the attributes related to Quality, Cost, Time or Flexibility. As a result we get the certain numbers, which do not tell us anything yet (Table 4).

Table 4. Example of summarized BCFI values per group.

Quality	Cost	Time	Flexibility
8,4500	5,9540	8,1700	9,9900

According to Miles & Snow topology (1978) the strategy type can be detected depending on fixed proportions between RAL Model elements. For example, Prospector Strategy has definite focus on quality; Defender Strategy aims at achieving advantage in cost and Analyzer Strategy is balancing between quality, cost as well as time. The following formulas developed by J. Takala (Takala, Kamdee, Hirvelä, Kyllonen, 2007) transforms the above mentioned into mathematical language (Table 5):

Table 5. Formulas for the preferred strategy type detection *(Source: Takala et. al., 2007).*

Prospector:	$\phi \sim 1 - \{(1 - Q\%^{\frac{1}{3}})(1 - T\%)(1 - C\%) \times F\%^{\frac{1}{3}}\}$
Analyzer:	$\lambda \sim 1 - \{(1 - F\%) \times (ABS(\Delta Q * \Delta T * \Delta C))^{\frac{1}{3}}\}$
Defender:	$\varphi \sim 1 - \{(1 - C\%^{\frac{1}{3}})(1 - T\%)(1 - Q\%) \times F\%^{\frac{1}{3}}\}$
Reactor:	$1/2 * (Defender + \Pr ospector)$

As a result, the biggest value will show the most preferred strategy type by the analyzed company (Table 6). The table declares that by BCFI values utilization, the analyzed case company most probably prefers Defender strategy type.

Table 6. Example of the finalized calculation.

Quality	Cost	Time	Flexibility
8,4500	5,9540	8,1700	9,9900
Prospector	**Analyzer**	**Defender**	**Reactor**
0,6283	0,6190	**0,7443**	0,6863

The method users may also be interested in understanding the proportions among the main strategy types preferred; therefore, for better visual interpretation of the results the following graphic may be built (Figure 3).
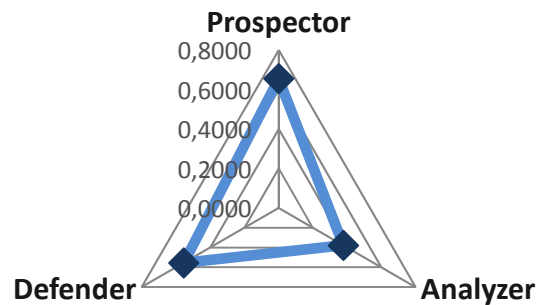

Figure 3. Example of the final graphic based on the strategy type calculation.

The following figure (Figure 4) gives reader a better understanding of the criticality allocation among the attributes in reference to the key elements of RAL model.

The practical sense of the figure is high, as it helps to understand which strategic behaviour may lead company to a better performance. In the current case, for example, the critical attributes refer to the following RAL categories: two of them are related to Time: *'Communication between different departments and hierarchy levels'*, *'Information systems support the business processes'*; two to Cost: *'Knowledge and technology diffusion'* and one attribute – to Quality: *'Usability and functionality of*

information systems'. The company should pay attention to the listed attributes as they have the most sufficient influence on its performance.
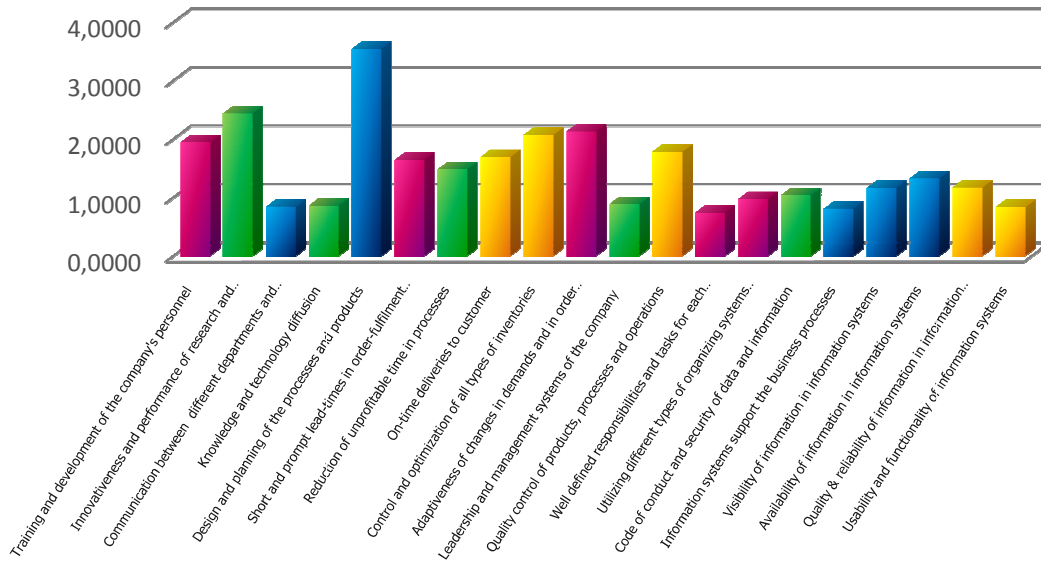

Figure 4. Visual representation of the attributes divided between the RAL model elements.

Based on Miles & Snow topology (1978), we can conclude that the company could achieve better performance if behaving like Analyzer (concentrating on Cost, Time and Quality).

3. RESULTS

The current chapter firstly describes the case companies which took part in the research and demonstrates the results of the analysis made per company. The basic information about the participants, their field of activity and number of respondents is necessary and forms a deeper understanding of the research area. Moreover, it may say for accuracy of the results.

The main role of the chapter is to show the way the method validation was organized as well as to present the results of the research. In other words, Results section provides readers with the empirical data and the practical experience gained during the research. Therefore a clear proof of the method reliability can be proposed.

The validation involves comparison of the MSI results (preferable strategy detection) with the developed BCFI results. The specific details of every case will be explained separately below.

The information represented in the chapter is confidential; therefore the official names of the case companies will not appear in the study. The names are replaced with abbreviations CC1, CC2, CC3 and CC4. Neither will the sources of the information related to the companies be shown in the reference list.

For the purpose of this paper, the information is verifiable to the supervisor, but will not appear in the published version because of security reasons. Nevertheless, only the companies' official websites and publication have been used.

The basic information about the case companies is represented one by one. Every company description begins with a 'check list table' containing the most important for the research information and continues with the results.

3.1. Case company 1 (CC1)

Table 7. Check list, CC1 *(Source: CC1's official website, 2012).*

Field of activity	Housing, real estate business
Analysis done	MSI, S&R (BCFI)
Number of respondents	10
Occupation field of respondents	Representatives of the main departments: Hosting, Management and Rent.
Validity & Reliability note	The questionnaires are filled out by the representatives from all the key sectors of the company; the quantity of participants is sufficient. The rank of reliability is high.
Mission	*"Sustain and improve well-being with housing means in Turku area. To be the most attractive and most significant housing provider in Turku area". (CC1's official website, 2012)*

|	
Vision	*"Is to be contract partners to well-being and satisfied people; to offer housing people desire to be responsible landlord and real estate owner; to work professionally and effectively, listen to the customers and develop housing and real estate long term and keep strong finance position in the company; to rent and develop homes for customers and add owners value in real estate". (ibid)*
Strategy	*"Operate according economic trend: selling during the boom and new production and during downturn and recession. Repairs also according the market situation." (ibid)*

CC1 is a real estate company in Turku. The company was established in 1944 and belongs to the city of Turku at the moment. The main field of the company's activities is leasing with wide variety of options, such as: row house apartments, block of flats, terraced houses and small sized private houses. It has about 11 000 apartments available for rent in Turku, what takes approximately 25% out of the rental housing market share there. (CC1's official website, 2012) CC1 may be considered as the largest individual dealer in Turku. CC1 employs 40 persons on their service activities and over 20 external house managers. (ibid)

The company focuses both on short-term and long-term goals, achieving them through utilization of different principles. Short-term goals are achieved by implementation of competitive rent and maintenance prices, good quality of the real estates, low vacancy rate, low change rate and good living communities (ibid). Long-term targets are correlated with the owners' value, fulfillment of the leasing demand and following the market trend (ibid).

Turnover of the company in FY 2011 was about 67 million euro's. Quarter of the company's apartments is renovated and annually CC1 renovates up to 300 apartments, what costs about 3 Million Euro. (ibid)

Based on the above data we may notice that quality is crucial attribute for the company, therefore preliminary it can be referred to the Prospector strategy type. The suggestion will be further checked with the proposed method. The next step is to compare the results of the previously made by the Departments of Industrial Management (University of Vaasa) research in Manufacturing Strategy (MSI) with BCFI derived results. The research was made for CC1 in 2010. It refers to the confidential information, therefore may not be publicly announced. The results which are valuable for the thesis development are represented in Figure 5.
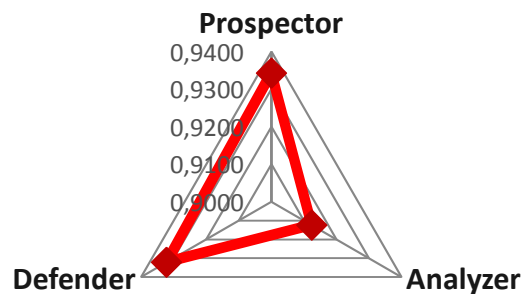
Prospector	Analyzer	Defender	Reactor
0,9343	0,9124	0,9322	0,9333

Figure 5. MSI results: CC1.

The MSI results (Figure 5) demonstrate clear dominance of Prospector strategy type above others. Secondary important is the sequence of dominance and in case of CC1 it is: **Prospector < Reactor < Defender < Analyzer.**

Figure 6 demonstrates the results derived from BCFI, based on the proposed method. The figure correlates CC1 with Prospector strategic category, what matches with the MSI results analysis. In addition, the sequence of dominance, shown on the figure below matches as well: **Prospector < Reactor < Defender < Analyzer.**

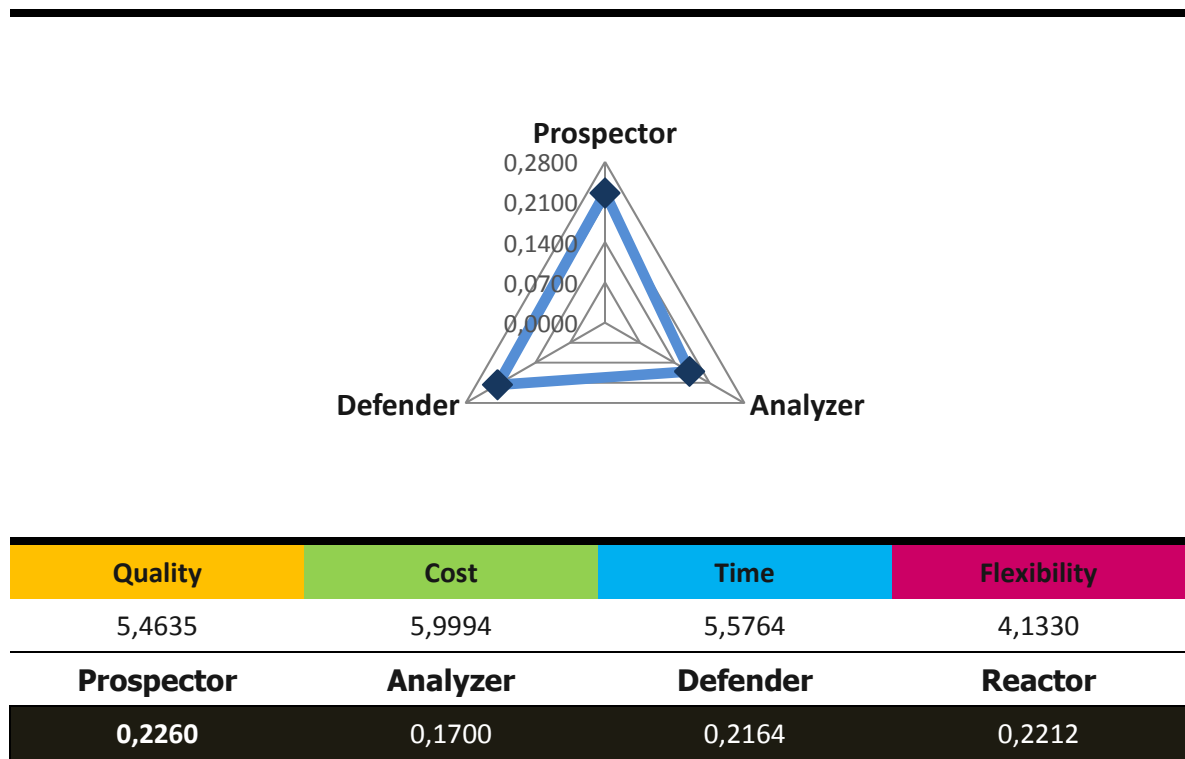| Quality	Cost	Time	Flexibility
5,4635	5,9994	5,5764	4,1330
Prospector	**Analyzer**	**Defender**	**Reactor**
0,2260	0,1700	0,2164	0,2212

Figure 6. BCFI derived results: CC1.

Table 8 demonstrates the utilization of the formulas for the strategy type detection and explains where from the results for Figure 6 were gained.

Table 8. CC1, calculation table.

Prospector:	$\phi \sim 1 - \{(1 - 5,4635^{\frac{1}{3}})(1 - 5,5764)(1 - 5,9994) \times 4,1330^{\frac{1}{3}}\} = 0,2260$
Analyzer:	$\lambda \sim 1 - \{(1 - 4,1330) \times (ABS(5,4653 * 5,5764 * 5,9994))^{\frac{1}{3}}\} = 0,1700$
Defender:	$\varphi \sim 1 - \{(1 - 5,9994^{\frac{1}{3}})(1 - 5,5764)(1 - 5,4635) \times 4,1330^{\frac{1}{3}}\} = 0,2164$
Reactor:	$1/2 * (0,2164 + 0,2260) = 0,2212$

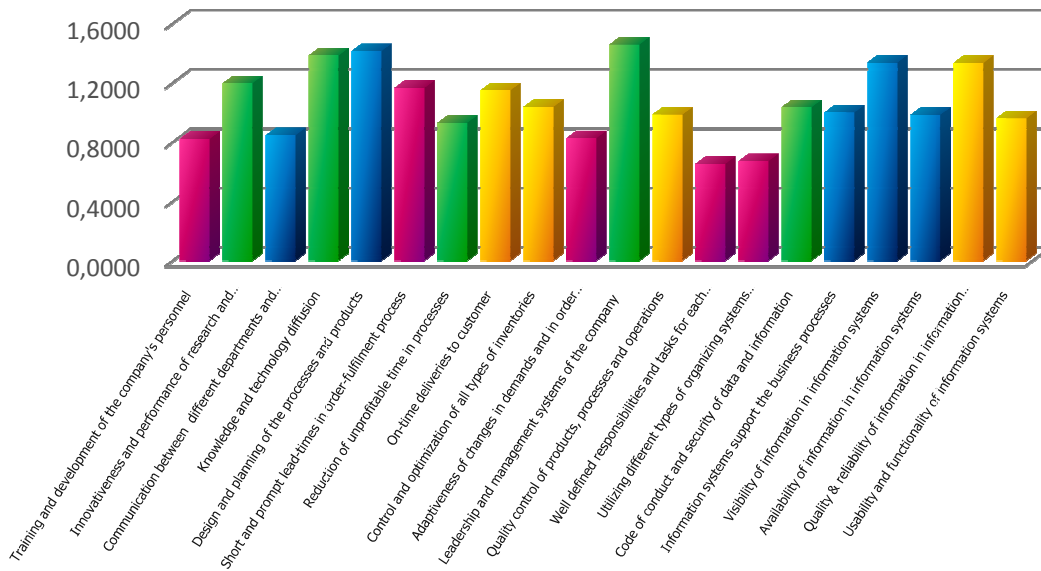Figure 7 demonstrates the application of the RAL divided attributes and BCFI.

Figure 7. Graphical form of CC1 results.

Based on Figure 7, the most part of critical attributes are referring to Flexibility group: *'Training and development of the company's personnel'*, *'Adaptiveness of changes in demands and in order backlog'*, *'Well defined responsibilities and tasks for each operation'* and *'Utilizing different types of organizing systems'*. Only one critical attribute refers to Time category: *'Communication between different departments and hierarchy levels'*. In other words, the company is lacking attention to flexibility.

The company needs to pay attention to the critical attributes in a way to achieve better performance. Perhaps the company could achieve better performance if behaving like Analyzer.

CC1 case study demonstrates matches between the MSI and BCFI derived results and states that the company prefers the most Prospector strategy type. Moreover, the sequence of strategy dominance is the same in both ways of calculation. The current case study positively supports the proposed way of BCFI development.

3.2. Case company 2 (CC2)

Table 9. Check list, CC2 *(Source: CC2's Annual Report, 2010).*

Field of activity	Project Management – Construction work in Russia.
Analysis done	MSI, S&R (BCFI)
Number of respondents	10

Occupation field of respondents	Project Management, Engineering
Validity & Reliability note	Respondents are representative of project management level; the quantity of participants is sufficient. The rank of reliability is high.
Mission	*"We provide lifecycle power solutions to enhance the business of our customers, whilst creating better technologies that benefit both the customer and environment ". (CC2's Annual Report, 2010)*
Vision	*"We will be the most valued business partner of all our customers". (ibid)*
Strategy	*"Company's strategic aim is to strengthen its leading position in its markets and to ensure continued growth by offering customers reliability and the best lifecycle efficiency available". (ibid)*

CC2 is the global leader in complete life cycle power solutions for energy and marine markets. The business core is divided into three nucleuses – 'Ship Power', 'Power Plants' and 'Services'. (CC2's official website, 2012)

'Ship Power': CC2 is the leader in the industry in the technology sense, exploiting its tacit knowledge and gained experience in a sustainable manner for bringing prosperity to the customers all around the worlds and themselves. (CC2's Annual Report, 2010)

'Power Plants': The flexible power plants provision is another point of the company's core competence. *"We offer truly competitive and reliable solutions for base load power generation, grid stability & peaking, industrial self generation, as well as for the*

oil and gas industry". (ibid) The value co-creation and technical support is the key cooperation point of cooperation between CC2 and its customers (ibid).

'Services': *"…supports its customers throughout the lifecycle of their installations by optimizing efficiency and performance". (ibid)* The wide range of the proposed services of high quality and competence is arranged through the broad network, what stands for the company's reliability and competitiveness. (ibid)

The core competence of the company is its state of the art reciprocating engine technologies for power plant and marine solution, with life cycle support for the end users. The products of CC2 are known world-wide, as well as world-wide competitive. (ibid)

The company employs more than 17500 employees and it operates globally in more than 70 countries (around 160 locations). The company's net sales were at the level of 4.6 Billion Euro in 2010. (ibid)

From the company's strategy it is possible to notice that keeping existing position on the market and increasing of the market share is the key target. Most probably CC2 strengthen its position through the cost optimization and flexible attitude to appearing challenges. Preliminary the company can be referred to Defender strategy type.

Following the stem of the research the next step is to compare the results of analysis arranged for CC2 by Henri Kinnunen in 2011 with BCFI derived conclusions. The research consisted of MSI and Sense & Respond analysis (BCFI). The research refers to the confidential information, therefore may not be publicly announced.

The results which are valuable for the thesis development are represented in Figure 8. The dominating strategy type according to MSI results is Defender. The secondary test is the sequence of dominance and in case of CC2 it is: **Defender < Reactor < Prospector < Analyzer.**
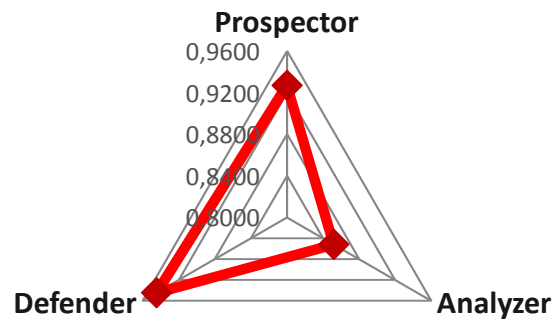
Prospector	Analyzer	Defender	Reactor
0,9271	0,8518	**0,9449**	0,9360

Figure 8. MSI results: CC2.

Figure 9 demonstrates the results derived from BCFI, based on the proposed method. CC2 belongs to Defender strategic category according to the method's results. It matches with the MSI results shown above. In addition, the sequence of dominance, matches as well (Figure 9): **Defender < Reactor < Prospector < Analyzer.**
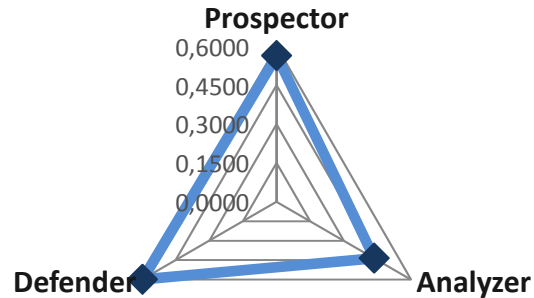
Quality	Cost	Time	Flexibility
7,5361	6,6903	7,6723	7,4095

Prospector	Analyzer	Defender	Reactor
0,5653	0,4354	**0,5987**	0,5820

Figure 9. BCFI derived results: CC2.

Table 10 demonstrates the utilization of the formulas for the strategy type detection and explains where from the results for Figure 9 were gained.

Table 10. CC2, calculation table.

Prospector:	$\phi \sim 1 - \{(1 - 7{,}5361^{\frac{1}{3}})(1 - 7{,}6723)(1 - 6{,}6903) \times 7{,}4095^{\frac{1}{3}}\} = 0{,}5653$
Analyzer:	$\lambda \sim 1 - \{(1 - 7{,}4095) \times (ABS(7{,}5361 * 7{,}6723 * 6{,}6903))^{\frac{1}{3}}\} = 0{,}4354$
Defender:	$\varphi \sim 1 - \{(1 - 6{,}6903^{\frac{1}{3}})(1 - 7{,}6723)(1 - 7{,}5361) \times 7{,}4095^{\frac{1}{3}}\} = 0{,}5987$
Reactor:	$1/2 * (0{,}5987 + 0{,}5653) = 0{,}5820$

Figure 10 demonstrates that the set of critical factors is the mix of attributes from different RAL categories. Two of them are related to Time: *'Communication between different departments and hierarchy levels'*, *'Information systems support the business processes'*; two to Cost: *'Knowledge and technology diffusion'* and one attribute – to Quality: *'Usability and functionality of information systems'*.
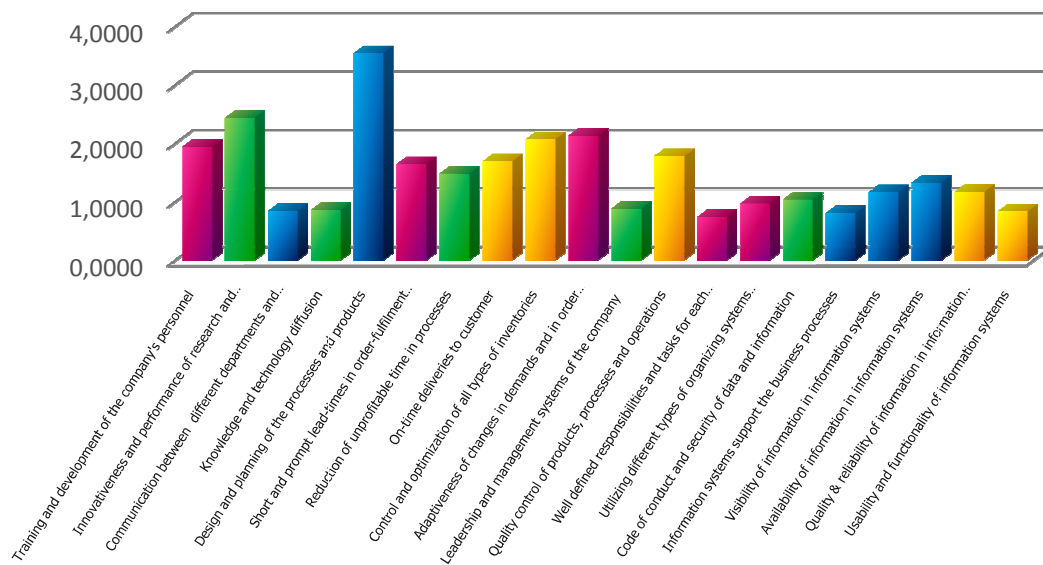
Figure 10. Graphical form of CC2 results.

To achieve a better performance CC2 should pay attention to the critical attributes. Perhaps the company could achieve better performance if behaving like Analyzer (concentrating on Cost, Time and Quality).

CC2 case study demonstrates matches between the MSI and BCFI derived results and states that, most probably, the company refers to Defender strategy type. Moreover, the sequence of strategy dominance is the same in both ways of

calculation. The current case study positively supports the proposed way of BCFI development.

3.3. Case company 3 (CC3)

Table 11. Check list, CC3 *(Source: CC3's official website, 2012).*

| Field of activity	Engineering, energy equipment production
Analysis done	MSI, S&R (BCFI)
Number of respondents	4
Occupation field of respondents	Design Manager, Product Line Manager, Usage and electrifying Manager, Sales Manager, Sales & Marketing Manager, R&D Manager.
Validity & Reliability note	The respondents are representative of the middle management level; the quantity of participants is low, but the quality of answers remains on high level. The rank of reliability is high.
Mission	*"With all-round competence and decades of experience in the energy sector, our mission is to ensure our customers' success and promote their sustainable growth." (CC3 brochure, 2009)*
Vision	*"… we remain close and in touch with our customers. For us, it is important to listen to the customer, to be flexible to their needs, and to be a reliable and responsible partner". (CC3's official website, 2012)*

Strategy	*"We continuously develop our operations to ensure we remain able to offer our customers ever more efficient, reliable and environmentally friendly products and solutions". (ibid)*

"We provide automation and electrification solutions for energy production, transmission, distribution and use to customers worldwide. We deliver turnkey projects and project components, design and engineering, procurement and supply, project management, installation, start-up and commissioning and user training. We also offer plant modernizations, maintenance, system updates and switchgears". (CC3′s official website, 2012)

With its subsidiaries in Russia, Sweden and Norway the company′s aims at cooperation with the energy producers from the following sources: Diesel and Gas Power, Hydropower, Thermal Power and Wind Power. Through its technological and business solutions CC3 cooperates with the key manufacturers in the field. (ibid) Currently CC3 employs more than 400 specialists, who support the idea of self-motivation and enthusiastic attitude to work. The company′s turnover in FY2009 was over 81 Million Euro (CC3 Annual Report, 2009).

Further it is necessary to compare the results of MSI research arranged for CC3 by the Departments of Industrial Management (University of Vaasa) in 2010. The work done by the department refers to the confidential information, therefore may not be publicly announced.

The results of MSI are represented in Figure 11 and demonstrate the reference of CC3 to Defender strategic category. The sequence of dominance for CC3 is: **Defender < Reactor < Prospector < Analyzer.**
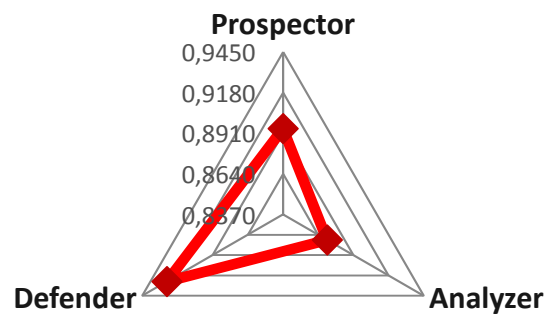
Prospector	Analyzer	Defender	Reactor
0,8941	0,8709	**0,9263**	0,9102

Figure 11. MSI results: CC3.

Figure 12 demonstrates the results derived from BCFI, based on the proposed method. The figure connects the case company with Defender strategic category, what matches with the MSI results analysis. In addition, the sequence of dominance, shown in the figure below matches as well: **Defender < Reactor < Prospector < Analyzer.**
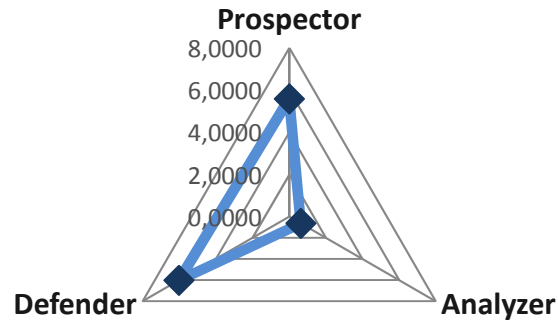
Quality	Cost	Time	Flexibility
16,1628	13,9045	21,7462	4,9609
Prospector	**Analyzer**	**Defender**	**Reactor**
5,5839	0,6371	**6,0369**	5,8104

Figure 12. BCFI derived results: CC3.

Table 12 demonstrates the utilization of the formulas for the strategy type detection and explains where from the results for Figure 12 were gained.

Table 12. CC3, calculation table.

Prospector:	$\phi \sim 1 - \{(1-16{,}1628^{\frac{1}{3}})(1-21{,}7462)(1-13{,}9045) \times 4{,}9609^{\frac{1}{3}}\} = 5{,}5839$
Analyzer:	$\lambda \sim 1 - \{(1-4{,}9609) \times (ABS(16{,}1628 * 21{,}7462 * 13{,}9045))^{\frac{1}{3}}\} = 0{,}6371$
Defender:	$\varphi \sim 1 - \{(1-13{,}9045^{\frac{1}{3}})(1-21{,}7462)(1-16{,}1628) \times 4{,}9606^{\frac{1}{3}}\} = 6{,}0369$
Reactor:	$1/2 * (6{,}0369 + 5{,}5839) = 5{,}8104$

Figure 13 demonstrates that the critical factors represent three RAL categories. Three of them are related to Flexibility: *'Short and prompt lead-times in order-fulfillment process'*, *'Adaptiveness of changes in demands and in order backlog'*, *'Utilizing different types of organizing systems'*; one to Cost: *'Reduction of unprofitable time in processes'* and one attribute – to Quality: *'Quality control of products, processes and operations'*.

To achieve a better performance CC3 should pay attention to the mentioned critical attributes. Perhaps the company could achieve better performance if behaving like Analyzer (concentrating on Cost, Flexibility and Quality).
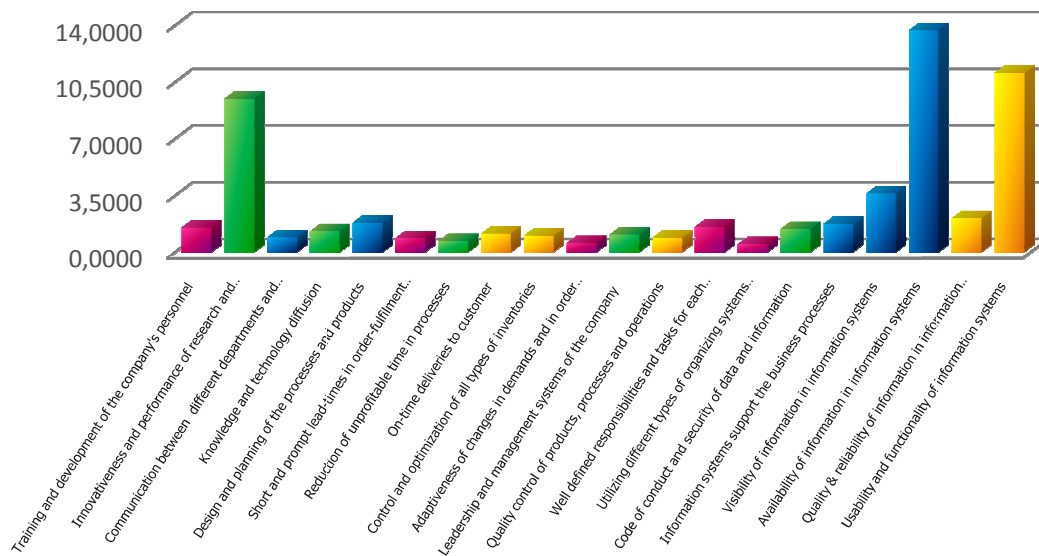

Figure 13. Graphical form of CC3 results.

CC3 case study demonstrates matches between the MSI and BCFI derived results and relates the company to Defender strategy type. Moreover, the sequence of strategy dominance is the same in both ways of calculation. The current case study positively supports the proposed way of BCFI development.

3.4. Case company 4 (CC4)

Table 13. Check list, CC4 *(Source: CC4's official website, 2012).*

Field of activity	Energy production sector
Analysis done	MSI, S&R (BCFI)
Number of respondents	3
Occupation field of respondents	CEO, R&D Engineer, Data Administration Manager.
Validity & Reliability note	Respondents are representative of the top and middle management level; the quantity of participants is low, but the quality of answers remains on high level. The rank of reliability is high.
Mission	*"… produces energy at cost for its owners and manages the entire lifespan of power plants reliably, cost-effectively and in an environmentally friendly manner". (CC4's official website, 2012)*
Vision	*"…is the most competitive large-scale energy producer for its owners". (ibid)*

Strategy	*"Good business conduct, ethical principles and operating policies define the company way. The company's Board of Directors has established this operating model, which applies to everything we do at the company". (ibid)*

CC4 was founded in 1943, mainly due to the need in electricity supply. The first power plant of the company was based on hydropower. CC4 is an association of number of energy producers. (CC4's official website, 2012)

Due to the increasing demand in energy supply, CC4 developed in the following directions: Thermal, Wind, Hydropower and Nuclear power. Currently CC4 is owned by variety of shareholders from different companies and municipal energy utilities. The company's turnover in FY2010 was 1041 Million Euro, and the overall electricity supply achieved level of 23 TWt. (ibid)

CC4 is the constantly growing and developing organization:

"In association with the sale of the Nokia power plant on 25 January 2010, the company purchased all Nokian Lampovoima shares owned by Fortum (19.9%), making it the sole owner of Nokian Lampovoima shares. Hameenkyron Voima's operations began in December with the purchase of a share in M-real Oyj's Kyro mill power plant and the associated business operations". (CC4 Annual Report, 2010)

The group employs permanently in average more than 500 employees with total expenses for salaries and fees over than 27 Million Euro (ibid).

The company with such a wide specter of services and customers cares most, probably, about quality and time. Therefore CC4 should prefer the most behaviour of Prospector.

The MSI research arranged for the company by the Departments of Industrial Management (University of Vaasa) in 2010 can be the basis for comparison between MSI and BCFI derived results. It refers to the confidential information, therefore may not be publicly announced.

The information valuable for the thesis development is represented in Figure 14.
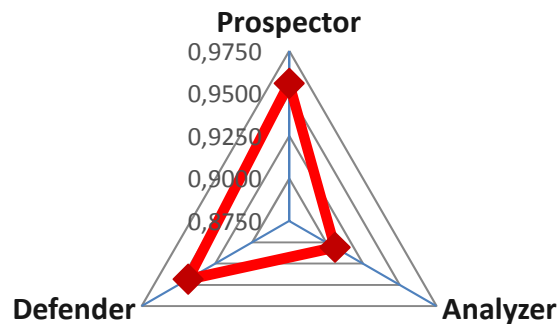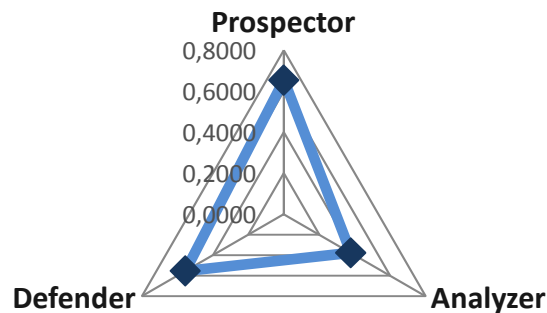

Prospector	Analyzer	Defender	Reactor
0,9560	0,9061	0,9437	0,9498

Figure 14. MSI results: CC4.

The Prospector strategy type is preferable for the company according to the figure. Secondary important is the sequence of dominance and in case of CC4 it is: **Prospector < Reactor < Defender < Analyzer.**

Figure 15 demonstrates the results derived from BCFI, based on the proposed method. The figure correlates CC4 with Prospector strategic category, what matches with the MSI results analysis. In addition, the sequence of dominance, shown in the figure below matches as well: **Prospector < Reactor < Defender < Analyzer.**

Quality	Cost	Time	Flexibility
6,9354	9,7369	6,6318	6,2767
Prospector	**Analyzer**	**Defender**	**Reactor**
0,6554	0,3783	0,5555	0,6054

Figure 15. BCFI derived results: CC4.

Table 14 demonstrates the utilization of the formulas for the strategy type detection and explains where from the results for Figure 15 were gained. The derived results determine the preferable strategy type already now, but will be further utilized for building the graphical interpretation of the sequence of dominance.

Table 14. CC4, calculation table.

Prospector:	$\phi \sim 1 - \{(1 - 6{,}9354^{\frac{1}{3}})(1 - 6{,}6318)(1 - 9{,}7369) \times 6{,}2767^{\frac{1}{3}}\} = 0{,}6554$
Analyzer:	$\lambda \sim 1 - \{(1 - 6{,}2767) \times (ABS(6{,}9354 * 6{,}6318 * 9{,}7369))^{\frac{1}{3}}\} = 0{,}3783$
Defender:	$\varphi \sim 1 - \{(1 - 9{,}7369^{\frac{1}{3}})(1 - 6{,}6318)(1 - 6{,}9354) \times 6{,}2767^{\frac{1}{3}}\} = 0{,}5555$
Reactor:	$1/2 * (0{,}5555 + 0{,}6554) = 0{,}6054$

Figure 16 demonstrates that the set of critical factors is the mix of attributes from different RAL categories. One of them is related to Time: *'Visibility of information in information systems'*; two to Cost: *'Knowledge and technology diffusion'*, *'Code of conduct and security of data and information'* and two attributes – to Quality: *'On-time deliveries to customer'*, *'Quality & reliability of information in information systems'*.

For better performance achievement CC4 should pay attention to the listed critical attributes. Perhaps the company could achieve better performance if behaving like Analyzer (concentrating on Cost, Time and Quality).
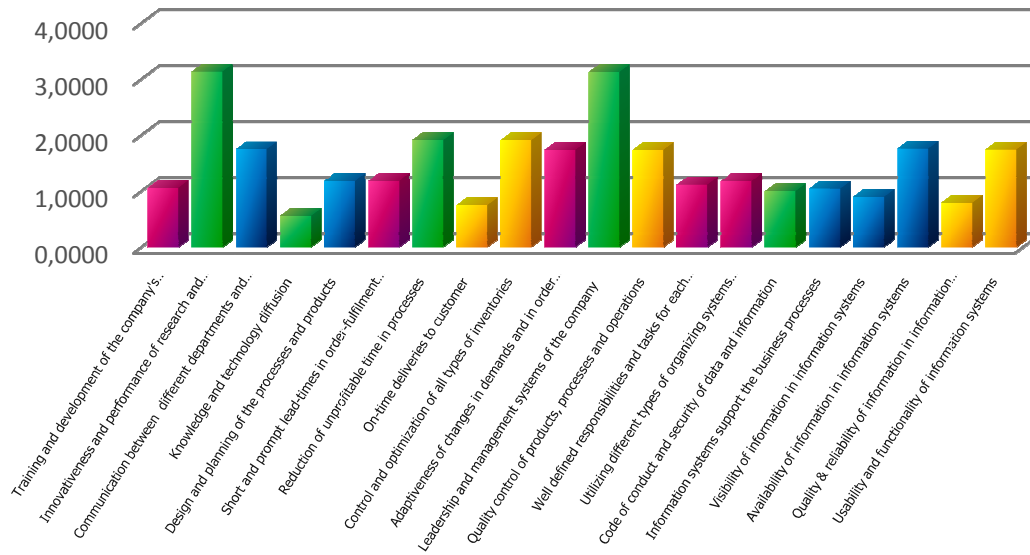
Figure 16. Graphical form of CC4 results.

CC4 case study demonstrates matches between the MSI and BCFI derived results and states that, most probably, the company refers to Prospector strategy type. Moreover, the sequence of strategy dominance is the same in both ways of calculation. The current case study positively supports the proposed way of BCFI development.

4. DISCUSSION

The Master's Thesis is a scientific paper which consists not only of a research work but of the personal (tacit) contribution made by the writer into the development of a chosen topic. The research part of the current thesis is represented by the chapters 'Theory and Research' and 'Results'. The purpose of the last chapter is mainly related to the expression of the author's opinion regarding the research, its organization and possible application.

The general findings gained out of the research in relation to the observed theoretical and practical areas will be also described. In addition, the weaknesses of the developed method will be mentioned in the section.

4.1. Validity and reliability test

The current chapter aims at presentation of the results gained from the validity and reliability test. The main role of the chapter is to confirm that the research was properly arranged, and the proposed method is applicable and durable.

Table 15 demonstrates the results of MSI and BCFI derived data per case company, the detected strategy type and how well the results by two methods match. In addition the validity and reliability grades were given based on the information

about the participating respondents per company (from the companies' check list tables). The criteria of the validity and reliability test were explained earlier in chapter 2.1.5.

Table 15. Resulting table.

Case Company Name	Strategy Type	Sequence of Dominance	Do the results match?	Credibility	Transferability	Dependability	Conformability
Case company 1 (CC1)							
Manufacturing Strategy Index (MSI)	Prospector	P < R < D < A	YES	5	5	5	5
BCFI derived results	Prospector	P < R < D < A					
Case company 2 (CC2)							
Manufacturing Strategy Index (MSI)	Defender	D < R < P < A	YES	5	3	4	5
BCFI derived results	Defender	D < R < P < A					
Case company 3 (CC3)							
Manufacturing Strategy Index (MSI)	Defender	D < R < P < A	YES	5	5	4	5
BCFI derived results	Defender	D < R < P < A					
Case company 4 (CC4)							
Manufacturing Strategy Index (MSI)	Prospector	P < R < D < A	YES	4	4	5	5
BCFI derived results	Prospector	P < R < D < A					
			Average Value	**4,7**	**4,2**	**4,5**	**5,0**

The most valuable for the current research conclusion is that both methods of analysis (MSI and BCFI) show similar results, therefore, tested with four case

companies the proposed development of Balanced Critical Factor Index demonstrates high durability.

The overall test of the research validity and reliability demonstrates good results as well:

- **Credibility** – 4,7 points. The inconsistency ratio of MSI analysis has not reached the high value in any case study, but some slight mismatches were found (in case of case company 4). The responses of the participants demonstrate the clear logic and do not contain sufficient controversies. It means that the respondents took care of their answers and made them on purpose with understanding the task.

- **Transferability** – 4,2 points. The data collection was organized separately for every case company. Moreover, every case company interviews the representatives of different departments either employees with different duties. Nevertheless, there might be some slight dependency on or close correlation between number of respondents, especially in case of Case Company 2.

- **Dependability** – 4,5 points. The qualification of respondents, therefore the quality of the answers is high in all the case companies. Mostly in every group of respondents there is a senior member of middle or even top management. The overall mark was slightly reduced because in case of Case Company 2 and Case Company 3 some of the answers were influenced by the specific of respondents' duties.

- **Conformability** – 5,0 points. All the respondents were considered independently and were instructed to express their personal opinion in answering the questions. The questionnaires contain only the title of the respondents' position and do not include any private information and personal details, so the participants felt relaxed in a sense of expressing the own opinion.

4.2. General findings

The study demonstrates the correlation between the theoretical aspects of RAL model and practical application of Balanced Critical Factor Index. The deviation of the OP questionnaire attributes correspondence to the general idea of RAL model and its key elements. Therefore the bridge between Manufacturing Operations Strategy and BCFI methodology has been found.

Based on the validation with the case companies, the proposed method shows reliability and sufficient stability. The participating organizations are representatives of different business areas and industries, what reflects the wide area of potential application.

During the research the field of BCFI application has been increased, as now it provides companies with wide specter of valuable information for strategic decision-making.

The future validation with more participating companies of various kinds is necessary to detect the hidden drawbacks and regularities in the method. For achieving further development of the method it is important as well to take into consideration the found limitations:

- The study's main problem is the qualitative method of the research. In general it means high dependency on the personal opinion and professional qualification of the respondents. Insufficient knowledge by respondents may harm the whole research and cause high inconsistency ratio.

- Another limitation to be mentioned is that the proposed development has been tested only in reference to OP questionnaire. Therefore the effective usage is narrowed mainly to manufacturing companies. The following investigation should be targeted on how to make the method multifunctional and applicable to different forms of questionnaires.

4.3. Advice for implementation

According to the description of BCFI, the general purpose of the method is to find the critical areas of the business performance of a company. With the additional development proposed in the thesis the applicability of the method increases, as modification allows analyzers to detect the preferable by the company strategy

type. In combination with BCFI potential, one might derive at least three additional benefits:

1. Firstly, the analysis specifies all the critical attributes in relation to the elements of RAL model (Quality, Cost, Time and Flexibility). Therefore it is possible to see which strategy type may bring a better business performance for the company. With such additional information the company's management has a great opportunity to adjust the general strategy and take better strategic steps. The examples of the idea are shown in the chapter 'Results' when analyzed per case company.

2. Secondly, in case the analysis is arranged among different departments in a company the top management has the possibility to check either the departments follow the general strategy or not; which strategy is preferable per department; which attributes in the departments need to be adjusted to achieve a better correspondence with the general company's strategy.

3. Thirdly, with the adjusted questionnaire it becomes possible even to forecast the future strategy of the analyzed company supported by the future critical attributes affecting the business performance.

Balanced Critical Factor Index methodology returns to analyzer the set of critical for the company parameters describing the weaknesses and the strengths of the operating area. The proposed development brings to BCFI results the vector of development, which, saying in the language of Physics, transforms the static

situation into the kinetic (dynamic) one. The described above may be called as the main benefit out of the developed method application.

Nevertheless, for successful implementation of the method it is important to overcome the limitations, mentioned in the chapter 4.2.

The first step to take is getting a bigger sample of the respondents (more than 10) with high qualification and deep involvement into the decision-making process.

The second step is to provide the respondents with the complete information about the method and analysis in a way to avoid mistakes in filling out the questionnaire and eliminate possible misunderstanding of the tasks given.

The third step is to give a sufficient time for respondents to complete the task and arrange a pre-check analysis right after filling out the questionnaire, so the fixing of obvious mistakes is possible.

5. CONCLUSION

During the research the key focus was given to the stage of the strategy detection as an important step of the strategic analysis. The research has demonstrated a strong theoretical basis connecting together different approaches like Manufacturing Operations Strategy, RAL model and Sense & Respond methodology into the solid core, with its nucleus represented by Miles & Snow topology (1978).

Based on the found theoretical correlations the new method of the strategy type detection was proposed through utilization of Sense & Respond methodology and Balanced Critical Factor Index in particular. Therefore the key target may be considered as fulfilled.

With the developed method the BCFI's applicable scope has been increased in the direction of provision companies with more data for strategic decision-making. Therefore, BCFI gained possibility for being a broad based method with bigger quantity of potential users. In combination with the BCFI analysis the developed method provides a clear vector of development for the company, completed with the strategic information about the most affected edges of business performance.

The validation of the method was arranged among four case companies representing separated industries and business areas. The number of respondents, overall and per case company, was sufficient for making strong statements. Nevertheless, the further deeper investigation of the method with different types and sizes of participating companies is necessary. The testing was organized in a

form of comparison between the results of Manufacturing Strategy Index (MSI) and the results derived from Balanced Critical Factor Index (BCFI). The method demonstrated high accuracy, validity and reliability in detection of the preferable strategy type. The arranged comparison of MSI and BCFI results shows absolute match for every case company, moreover, the tested sequence of dominance (the ranking of preferred strategy type from the most to the less wanted) reflects similar results.

At the end of the research a set of practical advice for the method application was described, what represented the potential benefits out of it:

- A possibility to see which strategy type may bring a better business performance for the company.
- An additional opportunity to adjust the general strategy and take better strategic steps by operation with complementary information.
- A possibility to check either business units follow the general strategy or not (in case of separate analysis per unit); which strategy is preferable per unit; which attributes in the units need to be adjusted to achieve a better correspondence with the general company's strategy.
- An extended form of questionnaire brings the potential for forecasting the future strategy of the analyzed company supported by the future critical attributes affecting the business performance.

In general, the proposed method has a wide potential and sufficient practical value for strategic decision-making process and strategic analysis. With further investigation and validation it might become multifunctional and applicable to different forms of questionnaires and methods of research.

LIST OF REFERENCES:

Bradley S. & R. Nolan (1998). *Sense and Respond. Capturing Value in the Network Era*. Boston: Harvard Business School Press.

Daft R. L. (2009). *Organization Theory and Design*. Masson: Cengage Learning.

Gomez-Gras A. (2009). Measuring the organizational responsiveness through managerial flexibility. *Journal of Organizational Change , 22* (6), 668-690.

Grant R. M. (2005). *Contemporary strategy analysis*. Malden: Blackwell Publishing.

Holweg M. (2005). The three dimensions of Responsiveness. *International Journal of Operations & Production Management , 25* (7), 603-622.

Miles R. E. (1978). *Organizational Strategy, Structure, and Process*. New York: McGraw-Hill.

Mintzberg H. (1998). *Strategy Safari: a guided tour through the wilds of strategic management*. New York: Free Press.

Nadler D. & J. Takala (2008). *The Development of the Critical Factor Index Method*. Faculty of Technology, Department of Production, University of Vaasa, 65200 Finland.

Quinn J. B. (1980). *Strategies for Change: Logical Incrementalism*. Homewood: McGraw-Hill Higher Education.

Ranta J-M. & J. Takala (2007). A holistic method for finding out critical features of industry maintenance services. *International Journal of Services and Standards by Inderscience Enterprises Ltd.*, Vol. 3, No. 3, 2007, pp. 312-325, UK.

Saaty T. L. (2008). Decision making with the analytic hierarchy process. *Int. J. Services Sciences 1*, no. 1: 83 - 98.

Senaratne S. (2008). Lean Construction as a Strategic Option: Testing its suitability and acceptability in Sri Lanka. *Lean Construction Journal* , 34-48.

Slack N. (2005). The flexibility of manufacturing systems. *International Journal of Operations & Production Management* , *25* (12), 1190-1200.

Takala J. (2005). Management and deep leadership sand cone model for human resource allocation. *The 11th International Conference on Productivity and Quality Research*.

Takala J., Hirvelä J., Hiippala P., Nissinen V. (2005). Management and deep leadership sand cone model for human resource allocation. *The 11th International Conference on Productivity and Quality Research - ICPQR 2005*.

Takala J. (2007). Global Manufacturing Strategies Require "Dynamic Engineers?": Case Study in Finnish Industries. *Industrial Management & Data Systems* , 326-344.

Takala J., Kamdee T., Hirvela J., Kyllonen S. (2007). Analytic calculation of global operative competitiveness. *Proceedings of the 16th International Conference on Management of Technology – IAMOT 2007*. Orlando: International Association for Management of Technology.

Yauch C. (2011). Measuring agility as a performance outcome. *Journal of Manufacturing Technology* , *22* (3), 381-404.