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**IMPLEMENTING SUSTAINABLE COMPETITIVE ADVANTAGE
TO THE PUBLIC SECTOR'S MANAGEMENT SYSTEM**

- By Sense and Respond Methodology in Facilities Services Unit's Preparedness

Master's Thesis in
Science of Economics and Business Administration

Industrial Management

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TABLE OF CONTENT

TABLE OF CONTENT	2
SYMBOLS AND TERMS	4
LIST OF FIGURES	5
LIST OF TABLES	6
1. INTRODUCTION.....	9
1.1. Background of the Thesis	9
1.2. Objective of the Thesis	10
1.3. Structure of the Thesis	12
2. THEORY.....	13
2.1. Sense and Respond -methodology	13
2.2. Analytic Hierarchy Process (AHP).....	14
2.3. Critical Factor Index (CFI)	15
2.4. Manufacturing Strategy Index (MSI)	17
2.5. Transformational Leadership with Technology Level.....	19
2.6. Sustainable Competitive Advantages (SCA)	22
3. RESEARCH	24
3.1. Case Study Research.....	24
3.2. A Brief Introduction to the Target Area	24
3.2.1. The Target Organization.....	25
3.2.2. Organizing Preparedness in the Management System	29
3.2.3. Proactive Preparedness	33
3.3. Survey Researches	36
3.3.1. The Critical Factors in Resource Allocations.....	37
3.3.2. Manufacturing Strategy	42
3.3.3. Transformational Leadership.....	46
3.3.4. Implementing SCA to the Public Sector's Management System	49
3.3.5. Dynamic Capabilities	52

4. RESULTS.....	55
4.1. The Managerial Implications	55
4.2. Operational application 1: NSCFI Threat Matrix	55
4.3. Operational application 2: Facilities Services OSCA-model.....	57
5. DISCUSSION	59
5.1. Validity and reliability test	59
5.2. General findings.....	60
6. CONCLUSION	61
6.1. Proposition for steering of preparedness.....	61
6.2. Further research	65
LIST OF REFERENCES	67
APPENDIX	78

SYMBOLS AND TERMS

AHP	Analytical Hierarchy Process (Saaty, 1980) helps to determine the relative importance of each performance indicator (in each criterion measurement) and the relative importance of each criterion (in the performance evaluation).
BCFI	Balanced Critical Factor Index (Nadler, 2008), the modified CFI index which more properly and reliably detects the most critical factors affecting the overall company's performance.
BSC	Balanced Scorecard presented by Robert S. Kaplan and David P. Norton (Kaplan, 1996).
CFI	Critical Factor Index (Ranta, 2007), is a supporting tool for the strategic decision-making, which is concerned in detection of the attributes affecting the business performance.
IPOCM	Incident Preparedness and Operational Continuity Management (ISO/PAS 22399:2007, 2007) within the context of societal security. IPOCM is a holistic management process that identifies potential impacts that threaten an organization and provides a framework for minimizing their effect.
ISO	(ISO) International Standardization Organization
MSI	Manufacturing Strategy Index – it is the method of detection of the preferable strategy type proposed by Professor Josu Takala et al. (2007).
NSCFI	New SCFI (Liu & Takala, 2012). More sensitive than the SCFI model. Unpublished.
RAL	Responsiveness Agility Leanness, RAL-model, which unites four key parameters affecting the business performance – Quality, Cost, Time and Flexibility (Takala, 2002).
SCA	Sustainable Competitive Advantages (Barney, 2001) suggest SCA as a resource-based strategy, which evidently is a very powerful business strategy today.
SCFI	Scaled Critical Factor Index. The SCFI model is developed by Takala et al. (2011) which adds trend research into the study.
S & R	Sense & Respond (Bradley, 1998) is a scalable managerial framework developing ability to adopt improvements.

LIST OF FIGURES

Figure 1. The objective of the thesis.	11
Figure 2. The Adaptive loop [11] (Haeckel, 1999).	14
Figure 3. AHP model of hierarchy structure.	15
Figure 4. Concept of incident preparedness [4] (ISO/PAS 22399:2007, 2007).	26
Figure 5. Competency-Based Control [36] (Vornanen, 2012).	27
Figure 6. Silos and horizontal levels of a city’s organization.	28
Figure 7. The target organization’s product lines in a Customer-Producer Model.	29
Figure 8. Preparedness Liaison Officer’s situation in the organization chart.	31
Figure 9. Development example of the involved counseling of preparedness.	32
Figure 10. Content of the strategic tasks for comprehensive security.	34
Figure 11. Example of Security Coordination [82] (Pihlaja, 2013).	35
Figure 12. Analytic Hierarchy Process for TL indexes.	37
Figure 13. Detection of the attributes for future competitiveness.	38
Figure 14. Normalized Past NSCFI values (Workers).	39
Figure 15. Technology IMPL.	41
Figure 16. Supervisors respond for Manufacturing Strategy.	42
Figure 17. Workers respond for Manufacturing Strategy.	42
Figure 18. Managers respond for Manufacturing Strategies (Past & Future).	43
Figure 19. Manufacturing Strategies of the Companies [85] (Golovko, 2012).	44
Figure 20. Manager’s view for Manufacturing Strategy Types (Past & Future).	45
Figure 21. Strategy Types of the Companies [85] (Golovko, 2012).	45
Figure 22. Outcome Index (OI) in Group PAD.	46
Figure 23. Resource Index (RI) integrating with Technology Index (TI).	47
Figure 24. Total Leadership Index (TLI) with Technology Index (TI).	47
Figure 25. Transformational Leadership Factors.	48
Figure 26. Implementation of SCA.	50
Figure 27. Balanced Scorecard’s priorities 2011–2014 (BCFI-SCFI-NSCFI).	53
Figure 28. NSCFI-model based BSC-findings for development actions.	56
Figure 29. Operational Application 1: NSCFI Threat Matrix.	57
Figure 30. Operational Application 2: Facilities Services Operational SCA –model.	58
Figure 31. Operational Application 3: Steering Processes for Vital Municipality.	62

LIST OF TABLES

Table 1. Example answer.	36
Table 2. Example of calculations for preferable strategy type.	37
Table 3. Comparison between BCFI, SCFI, NSCFI (OP).....	40
Table 4. SCA calculations of resource allocations.	51
Table 5. MAPE, RMSE and MAD.....	51
Table 6. Comparison between BCFI, SCFI, NSCFI (BSC).	54
Table 7. Abbreviations of the steering process (Figure 31).	62

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ABSTRACT:

The research aims to resource-based strategy to identify and implementing a sustainable competitive advantage in the public sector's management system. The study estimates empirical critical factors (BCFI, SCFI and NSCFI) identification of the applicability of the operational management. This is done by making use of strategic analysis, and deepening the study results and conclusions of interviews. The research is a case study and a two-stage survey, which was connected to the analytical hierarchy to the process based on the form and two Sense & Respond method based on the form. The survey was involved in three of the six City of Seinäjoki hierarchy level.

Public sector's manager finds the critical factors in performance best by NSCFI model. Based on the analysis, before and after the crisis, the proactive unit's most strongly affecting strategic type is prospector. Operational management point of view the supervisor's level critical factors are knowledge and technology. Experiences are not met with expectations. In order to achieve facilities services unit's goals the critical factors on the workers levels are the products, functions and processes of quality management. Research is an important. The development and the findings were confirmed by interviews. The results of transformational leadership provide a strong indication for preparedness and further research: Operational sustainable competitive advantage (OSCA).

KEYWORDS: OSCA, BCFI, SCFI, NSCFI, Sustainable competitive advantage, strategy detection, strategic decision-making, operational management, the strengthening of the method, preparedness, risk management.

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TIIVISTELMÄ:

Tutkimuksen tarkoitus on strategian resurssilähtöinen tunnistaminen kestävän kilpailuedun toteuttamiseksi julkisen sektorin hallintajärjestelmässä. Tutkimuksessa arvioidaan empiirisesti kriittiset tekijät (BCFI, SCFI ja NSCFI) tunnistamismenetelmän sovellettavuutta operatiiviseen johtamiseen. Tämä tapahtuu hyödyntämällä strategista analyysiä ja syventämällä tutkimuksen tuloksia ja johtopäätöksiä haastatteluin. Tutkimusmenetelminä ovat tapaustutkimus ja kaksivaiheinen kyselytutkimus, jossa oli yhdistetty analyttiseen hierarkia prosessiin pohjautuva lomake ja kaksi Sense & Respond menetelmään pohjautuvaa lomaketta. Kyselytutkimuksessa oli mukana kolme kuudesta Seinäjoen kaupungin hierarkiatasosta.

Julkisen sektorin esimies löytää kriittiset tekijät suorituskyvyille parhaiten NSCFI mallilla. Analyysin perusteella ennen ja jälkeen kriisiä, ennakoivan yksikön vahvimmin vaikuttava strateginen tyyppi on Prospector eli edelläkävijä. Operatiivisen johtamisen näkökulmasta lähiesimiehillä kriittisimmät tekijät ovat tiedon ja teknologian mahdollistamat edellytykset. Kokemukset eivät kohdanneet odotuksia. Saavuttaakseen ylläpitopalvelut yksikön tavoitteet kriittisinä tekijöinä työntekijätasolla ovat tuotteiden, toimintojen ja prosessien laadunhallinta. Tutkimus on tärkeä. Löydökset sekä haastattelut vahvistavat kehittämistoimet. Muuntavan johtamisen tulokset antavat vahvan viitteen varautumiseen ja jatkotutkimuksesta liittyen: operatiivinen kestävä kilpailuetu (OSCA).

AVAINSANAT: OSCA, BCFI, SCFI, NSCFI, Kestävä kilpailuetu, strategian havaitseminen, strateginen päätöksenteko, operatiivinen johtaminen, metodin vahvistaminen, varautuminen, riskien hallinta.

1. INTRODUCTION

1.1. Background of the Thesis

Research topic, implementing sustainable competitive advantage to the public sector's management system, is a combination of the author's work in the consolidation municipalities from 2002 and Industrial Management studies at the University of Vaasa's Faculty of Technology 2012–2013. The number of taxpayers has been reduced in the small 2000 people municipality several years from 2002 to 2006. The public servant's job challenge was to adopt the technical services to the descending operating economy. To change direction of the development the municipality and its neighbor decided to do a consolidation. The next municipality in 2006 was two times bigger with slow-growing population, there too Council decided to do a consolidation with the City of Center of Ostrobothnia region – even without common municipality border. In 2009, author moved to the current employer, the city of center of South Ostrobothnia region, where the consolidation has been done at the end of 2008 with three municipalities at the same time. In the above mentioned cases the aim of the strategic decision was to secure the investment capacity of welfare services. The latest case aims to e.g. sustainable development [1] (Seinäjoen kaupunki, 2009).

Municipal consolidations have been a number of different parts of Finland and there is also criticism against them [2] (YLE Uutiset, 2013). According to Katajamäki (2013) even the centers of the Ostrobothnia and the South Ostrobothnia region are too small alone in the competition at national level [3] (Katajamäki, 2013). The decade of the author's development works in the technical department related to the observations of the continuity in the municipalities. According to the preparatory work before consolidations, preparedness as a part of risk management for the succeed consolidation of municipalities is not included. The striking finding is that preparedness has not been a common built-in feature of public organizations operations. These cases in three regions have shown that mostly it relies on personal interest.

1.2. Objective of the Thesis

All organizations face a certain amount of uncertainty and risk [4] (ISO/PAS 22399:2007, 2007). According to the Hallberg committee's Preparedness and comprehensive security report (2012) the key challenges the public sector organization faces, lies in finding new ways of operating horizontally across various levels of administration and in cooperation with interest groups [5] (2012: 12). The public organizations have to monitor their situation in relation to these new expectations.

Kivelä (2013) criticized the Hallberg committee's strategy paper because municipalities' central role in the incident management is marginalized. Municipal expertise was not involved in the strategy work. After all, all incidents in the Finland occur only in the municipalities. [6] (Kivelä, 2013).

Unfortunately the lack and vagueness of common sub-goals, unclarities of priority of Law-Based tasks and, as Kivelä [6] describes, contradictions of Emergency Powers Act 1552/2011 [7] (Ministry of Justice, 2012) and Rescue Act 379/2011 [8] (Ministry of the Interior, 2011) forms a fog for operations in the municipalities and also limitations to the thesis work too. The focus of the thesis is in the preparedness development in the regional center of the South Ostrobothnia, the City of Seinäjoki, and its proactive operating unit in the Facility Management (Figure 1).

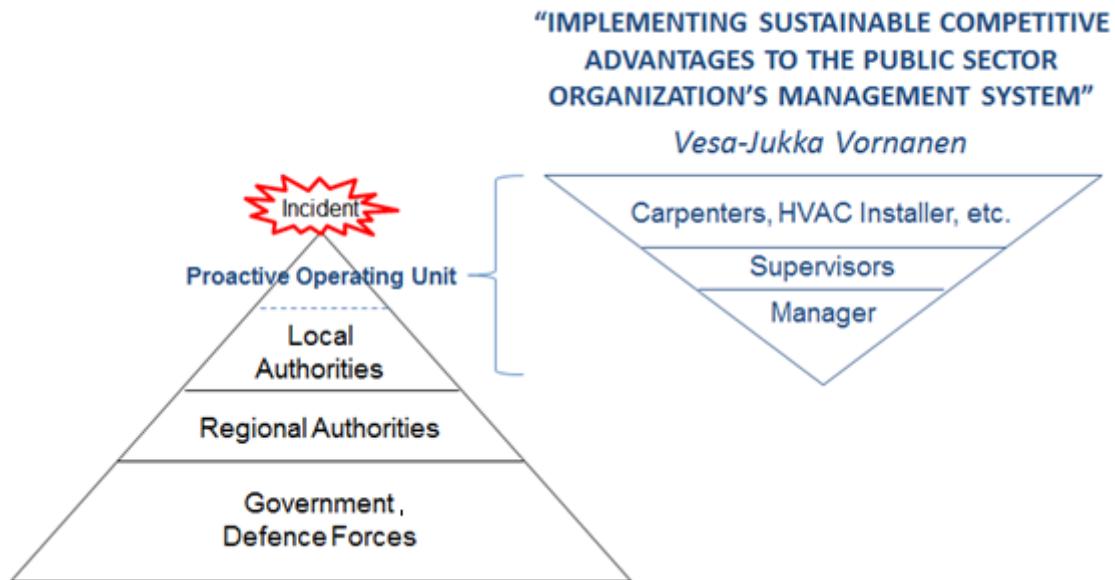


Figure 1. The objective of the thesis.

The paper aims at answering questions:

1. What is the strategy type of the target organization and how to ensure that the various levels of the organization are operating in accordance with a common strategy?
2. What are the preferable operations priorities for future development?

The master thesis’s development work mission is to find practical implications of implementing sustainable competitive advantage to the public sector organization’s management system. On the other words, integrate preparedness into operations to sustain competitive advantage after incident.

1.3. Structure of the Thesis

As a standardized form of graduate work, the current thesis has ‘Introduction’ chapter (1.), with establishing research territory function and ‘Conclusion’ chapter (6.), accumulating all the sufficient knowledge gained during the research. The thesis begins with a theory part (2.). It includes a short overview of the theoretical backgrounds, concepts and models. The chapter contains also the detailed explanation of the proposed research methodology.

The paper has a holistic approach. Therefore there is a case study chapter (3.). This part makes the reader familiar with the target organization’s operating environment in relation with the key challenges. The case study research includes interviews with Rescue Director, Audit Manager of City of Seinäjoki and two Preparedness Liaison Officer from different Rescue Departments. Second research is a survey. The field of survey research is wide. It touches theories of decision-making and strategic planning to quality control and risk management. The survey research part contains calculations of the theories, the analyses the case organization with exact figures and comparative analysis, which stands for validity and reliability by the thesis’ key idea.

The paper should have high value in local proposals for enhancing proactive preparedness, development of the administrative structure of preparedness and development of steering of preparedness concerning several administrative sectors. Therefore the ‘Results’ chapter represents results of the development work, the managerial implications (4.). The concluding chapter ‘Discussion’ has a post-analysis role (5.). It aims at the explanation of the thesis’ results in a more detailed view. The list of used references closes the thesis.

Square Brackets Numbering, e.g. [1], is an assistant mark to explore the electronic version of the Master Thesis. By pressing `Ctrl + F` Windows-based operating system launch the Search -utility application. Write to the search field, e.g. [83] and the application automatically shows the use of source references in the document.

2. THEORY

2.1. Sense and Respond -methodology

“Sense & Response” [9] (Bradley, 1998) is a scalable managerial framework for the ability to adopt improvements. With the help of real-time sensors, e.g. contextual-QR [10] (Rouillard, 2008), the organizations can constantly research what kind of actions interest groups has and after that try to react those needs. Organizations have to be flexible and react to the changes happening in the environment as an opportunity and as well as threat.

Certain factors have to recognize. The flexibility of the organization means physical opportunities to act and ability to find out the suitable ways to the action. To be flexible the organization’s processes have to allow fast changes so that service unit can quickly respond to the demand of the situation. This means that processes have to be able to learn from the environment – as a linear sense and respond strategy. Adaptive loop represents what kind of action "sense and respond" - organization has to have. Therefore, it is important to examine what kind of rules management system is and how the structure and processes are described in relation to operational management needs. On the other hand, it is important to examine how management system flexibility and preparedness are shown, as well as how they are reflected in ensuring the quality of service.

The loop looks like a PDCA-quality cycle (Figure 2). [11] (Haeckel, 1999). Sense & respond survey was developed by Takala and Rautiainen in 2003 [12] (Takala, 2003). Further development has been made by Takala and Ranta in 2007 [13] (Ranta, 2007). At the University of Vaasa the method has been used in numerous business case studies, for example, metal, energy and paper industries as well as apartment rental companies [14] (Katajamäki, 2009).

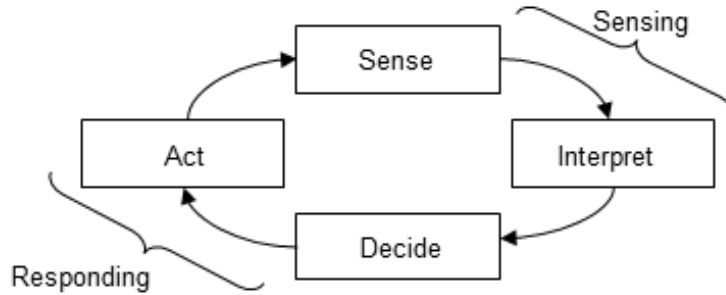


Figure 2. The Adaptive loop [11] (Haeckel, 1999).

2.2. Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) method is a multi-attribute decision instrument that allows considering quantitative, qualitative measures and making tradeoffs [15] (Saaty, 1980). The AHP is used in this study to deal with the empirical part, which includes analyzing questionnaires and calculating the weighting of the main criteria and sub-criteria. The inconsistency ratio (icr) is calculated to assure the internal validity of pairwise comparison results. Only matrixes with icr value of less than 0.10, and less than 0.30 in smaller groups with competent informants, can be used for reliable decision-making. Otherwise the answers are considered invalid and will not be used. The procedures for utilizing AHP in the case studies are as follows. The first step is to establish the model of hierarchical structure for the goal. In this study, e.g. the hierarchical models for the evaluation of manufacturing strategy from Takala et al. [13] (Ranta, 2007), [16] (Takala, 2002). The second step is the comparison of the alternatives and the criteria. They are pairwise compared with respect to each element of the next higher level. The third step is connecting the comparisons to obtain the priorities of the alternatives with respect to each criterion and the weights of each criterion with respect to the goal. The local priorities are then multiplied by the weights of the respective criteria. The results are summed up to get the overall priority of each alternative. (Figure 3)

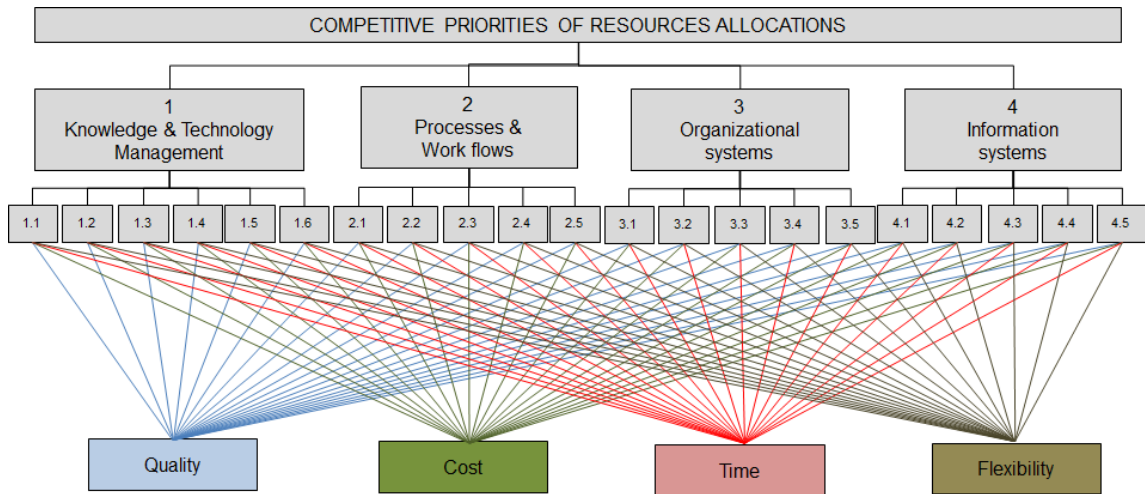


Figure 3. AHP model of hierarchy structure.

Mathematical software programs were made use of in the analysis of the research results. In this thesis used software is Expert Choice's EC11.5 AHP software program and Microsoft's Microsoft Office Excel 2010 spreadsheet software program. Expert Choice's EC11.5 AHP software program is a desktop-based application, which enables researchers to prioritize objectives, evaluate alternatives and achieve alignment by way of the AHP method.

2.3. Critical Factor Index (CFI)

In this study, the S&R model proposed by Ranta & Takala (2007), is used for the empirical research. [17] (Liu 2010a: 26). 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 [13] (Ranta, 2007).

In fact, the CFI method is a supporting tool for the strategic decision-making. The critical factors of knowledge intensive business in a globally competitive case company can be measured and dynamically developed by “Sense & Respond” methodology [9] (Bradley, 1998).

The identified CFIs will form the basis of the corrective actions used in order to improve and develop the organization or operation. The calculation of the dimensionless CFI values is based both on the measures of central tendency, i.e. the mean and the measures of dispersion, i.e. the standard deviation of the stakeholders’ experiences and expectations as can be observed from formulas (1), (2), and (4), as shown below. Moreover, the stakeholders’ views about the direction of development, as shown in formula (3), in terms of experiences and expectations form part of CFI formula (4).

$$(1) I_{Imp} = \bar{x}_{Ep}/10$$

$$(2) I_{Gap} = |(\bar{x}_{Er} - \bar{x}_{Ep})/10 - 1|$$

$$(3) I_{DoD} = |(C_B - C_W)/100 - 1|$$

$$(4) I_{CF} = \frac{s_{Ep} \times s_{Er}}{I_{Imp} \times I_{Gap} \times I_{DoD}}$$

Parameters

\bar{x}_{Ep} = Mean of expectations

\bar{x}_{Er} = Mean of experiences

s_{Ep} = Standard deviation of expectations

s_{Er} = Standard deviation of experiences

C_B = Better performance than expected

C_W = Worse performance than expected

I_{Imp} = Importance index

I_{Gap} = Gap index

I_{DoD} = Direction of development index, percent values

I_{CF} = Critical Factor index

Critical Factor Index (CFI), as well as its developed and stabilized form Balanced Critical Factor Index (BCFI) refer directly to the concept of “Sense & Respond” philosophy and represents easy in use tool for supporting the strategic decision-making which applicability has wide potential on various markets and types of organizations. Sense & Respond method measures criticality of company’s vital attributes in terms of resourcing and performance. Development needs of critical targets are evaluated after the completion of survey.

[18] (Nadler, 2008)

The survey consists of two forms, one evaluates the organization's daily operations, and the other one evaluates activities in a more general level. Operational form evaluates Knowledge & Technology Management, Processes & Workflows as well as organizational and Information systems. The questionnaire based on Balanced Scorecard evaluates the organization's External structure, Internal process, Learning and growth, Trust and Business performance.

2.4. Manufacturing Strategy Index (MSI)

Mintzberg (1998) describes several definitions for strategy: a future plan of the organization, a pattern of the organizations performance, a position or niche in certain markets, a perspective (out-in as well as in-out) to look organization’s business and it is a ploy to overcome organizations competitors [19] (Mintzberg, 1998). According to Miles (1978) strategic choices of an organization in certain market conditions determine its particular stance for business operations conditions [20] (Miles, 1978).

The typology divides the business strategies into four groups, *Defenders, Prospectors, Analyzers and Reactors*, managers adopt one of these strategies at certain times, to be consistence facing the external environment [21] (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 [20] (Miles, 1978) aims at finding answers to the main question: what strategic steps do companies utilize to solve their problems in engineering, administration and entrepreneurship (ibid). The research clarified the most common types of strategic behavior among the companies.

The analytical models for manufacturing strategy are used to calculate the operational competitiveness indexes of companies in different competitive groups, namely prospector, analyzer and defender [20] (Miles, 1978). According to Takala [12] (Takala, 2003), the responsiveness, agility and leanness (RAL) holistic model supports the theory of analytical models using four main criteria, i.e. quality, cost, time and flexibility.

The analytical models have been developed from research group based on over 100 case company studies in over 10 countries worldwide, the industrial branch of which varies from one company to another and the company size varies from big to small. However, they share one thing in common, which is that they all compete in a highly dynamic business environment. Therefore, such analytical models have good transferability.

According to Takala et al. (2007b), the manufacturing strategy index (MSI) is modelled based on the multi-criteria priority weights of Q (Quality), C (Cost), T (Time/delivery) and F (Flexibility), as a function $MSI = f(MSI(Q, C, T, F))$

The equations to calculate normalized weights of core factors are as follows.

$$(1) \quad Q' = \frac{Q}{Q+C+T}$$

$$(2) \quad C' = \frac{C}{Q+C+T}$$

$$(3) \quad T' = \frac{T}{Q+C+T}$$

$$(4) \quad F' = \frac{F}{Q+C+T+F}$$

Q = Quality; C = Cost; T = Time/delivery; F = Flexibility

The analytical models to calculate the manufacturing strategy indexes of operational competitiveness in each group are as follows.

The MSI model for prospector group:

$$(5) \quad MSI_P = 1 - (1 - Q^{1/3}) * (1 - 0,9 * T') * (1 - 0,9 * C') * F^{1/3}$$

The MSI model for analyzer group:

$$(6) \quad MSI_A = 1 - (1 - F') * \left(\text{abs} \left(\begin{array}{l} (0,95 * Q' - 0,285) * (0,95 * T' - 0,285) \\ * (0,95 * C' - 0,285) \end{array} \right) \right)^{1/3}$$

The MSI model for defender group:

$$(7) \quad MSI_D = 1 - (1 - C'^{1/3}) * (1 - 0,9 * T') * (1 - 0,9 * Q') * F^{1/3}$$

[17] (2010a: 20–21)

2.5. Transformational Leadership with Technology Level

The theoretical frame of the analytical models is based on the theory of transformational leadership [22] (Bass, 1997). A holistic but very simple model of a human being from resource allocations to behavior and finally to outcome directions and outcomes has been built based on psychic, social, functional, organizational and structural factors and put together according to the sand cone model and participation objectives in leadership of an organization [24] (Takala, 2005).

A modified sand cone model by integrating technology level into part of the resources is proposed in Liu & Takala, based on which the new analytical models have been developed. The model implies the idea that companies need to develop their performance in certain stages in order to achieve higher levels of competitive performance.

[17] (2010a: 21)

The conceptual model with sand cone has similar basic ideas for the model of deep leadership [24] (Nissinen, 2001). Technology is understood as the know-how of human competence, a relevant part of resource-based strategy, including all types of assets and resources, or strategic networking for collaborations by using partnerships [25] (Braun, 1998), [26] (Takala, 1997). Based on the analytical models for transformational leadership proposed by Takala et al. [27] (2008), these are further developed by integrating technology into resources for the evaluation of leadership indexes and outcomes of transformational leadership [28] (Liu, 2010b).

These models are the outcome direction index which balances the directions; the leadership behaviour index which measures deep leadership, the maximum passive and/or controlling leadership and the utilization of the cornerstones of deep leadership in different ways; and the resource allocation index which balances the utilization of human resources. Outcome index (OI) is based on weights of factors i.e. effectiveness (EF), satisfaction (SA), extra effort (EE), therefore OI is modelled as function $OI = f OI (EF, SA, EE)$. Leadership index (LI) is based on weights of factors i.e. deep leadership (DL), passive leadership (PL), controlling leadership (CL) and individualized consideration (IC), inspirational motivation (IM), intellectual stimulation (IS), building trust and confidence (BT), and therefore LI is modelled as function $LI = f LI (DL, PL, CL, IC, IM, IS, BT)$. Resource index (RI) is based on weights of factors i.e. people/technology/know-how (PT), processes (PC), information systems (IT), organisation groups/teams (OR) and technology level index, where technology index (TI) is based on weights of factors i.e.: spearhead technology (SH), core technology (CR), and basic technology (BS), therefore TI is modelled as function $TI = f TI (SH, CR, BS)$ and RI is modelled as function $RI = f RI (PT, PC, IT, OR, TI)$. The total leadership index (TLI) is still modelled as function $TLI = f TLI (OI, LI, RI)$ as in previous studies, however, the difference of the new definition of TLI in this paper is that TI has been considered to be integrated into transformational leadership as a special part of RI in leadership.

The analytical models for evaluation of leadership are as follow.

Without classification:

$$(1) \quad 1 - \max \left\{ \left| \frac{1}{3} - EF \right|, \left| \frac{1}{3} - SA \right|, \left| \frac{1}{3} - EE \right| \right\}$$

Prospector:

$$(2) \quad 1 - \left(1 - EE^{\frac{1}{3}} \right) (1 - EF)(1 - SA)SD\{EE, SA, EF\}^{1/3}$$

Analyzer:

$$(3) \quad 1 - (1 - SA^{1/3})(1 - SD\{EE, SA, EF\}^{1/3})$$

Defender:

$$(4) \quad 1 - \left(1 - EF^{\frac{1}{3}}\right)(1 - EE)(1 - SA)SD\{EE, SA, EF\}^{1/3}$$

where *EF* is the effectiveness; *SA* is the satisfaction; *EE* is the extra effort.

Leadership index:

$$(5) \quad DL(1 - \max\{PL, CL\}) \left(1 - \left|\frac{1}{4} - \max\{IC, IM, IS, BT\}\right|\right)$$

where *DL* is the deep leadership; *PL* is the passive leadership; *CL* is the controlling leadership; *IC* is the individualized consideration; *IM* is the inspirational motivation; *IS* is the intellectual stimulation and *BT* is the building trust and confidence.

Resource index integrating with technology index:

$$(6) \quad (1 - PT(1 - TI))(3 * \min\{PC, IT, OR\}TI)$$

where *PT* is the people, technology, know-how; *PC* is the processes; *IT* is the information systems and *OR* is the organization (groups, teams).

$$(7) \quad TI = 1 - \max\{|SH_{optimal} - SH|, |CR_{optimal} - CR|, |BS_{optimal} - BS|\}$$

where *SH* is the spearhead, *CR* is the core and *BS* is the basic.

Combined total leadership index:

$$(8) \quad TLI = OI \times LI \times RI$$

The overall competitiveness index (OCI) is proposed to be modelled as function:

$$(9) \quad OCI = f_{OCI}(f_{MSI}, f_{TLI}) = f_{MSI} * f_{TLI} = MSI * TLI$$

According to analysis, in some cases OCI can be modelled as reduced function:

$$(10) \quad OCI = f_{OCI}(f_{MSI}, f_{TLI}) = f_{MSI} * f_{TLI} = MSI * OI * TI$$

This is because that the OI of transformational leadership is the key factor to direct the strategic goal of manufacturing strategy and MSI is the driving force of the company taking the effects of TI into account in which TI are evaluated as approximately constant factors before crisis, during crisis and after crisis. In such cases, OI is more decisive to overall competitiveness but other factors such as LI, RI and TI can be influenced also by government macro control.

[28] (2010b: 92–97)

2.6. Sustainable Competitive Advantages (SCA)

According to Kay (1995) sustained competitive advantage in organizations obtained through relational architecture, reputation, innovation and strategic assets [29] (Kay, 1995). Kay pointed out the strategic competitive advantage of strengthening the informal and implicit ways the organization generates advantages through forming multiparty alliances or networks of relationships. At the core of Kay's model is the resource based theory of the firm [30] (Barney, 2001).

Kay's suggest managers in both public sector and private sector firms should focus on sustainable competitive advantage, using the resources and capabilities of their organization and their coordination and application. Unfortunately Kay does not give attention to the paradox where the purpose of the public organization is to create knowledge and services and give them away for the public good rather than maximizing private profit. [31] (Matthews, 2005)

Public sector organizations are created to develop and deliver service for the benefit of the populace. Public agencies are often created under the guise of addressing market failure and are maintained to contribute to the common good. In the case of public sector R&D, their role is also to contribute to the development of industry, and the creation of markets.

[31] (Matthews, 2005)

According to Liu (2010) identifying and implementing SCA make it possible to compare in a global context the operational competitiveness of companies with foreign competitors that are highly competitive in, e.g. dealing with the crisis, and evaluating the performance of new strategy adjustments as to whether they are effective in dealing with the changing business situations. [17] (2010a: 27)

3. RESEARCH

3.1. Case Study Research

Case studies are detailed investigations of individuals, groups, institutions or other social units, which attempt to analyze the variables relevant to the subject under study. In the case study, the focus is on understanding the particulars of that case in its complexity. According to Stake [32] (Stake, 1995) case study focuses on a bounded system, so that the system can be understood in its own habitat. In the thesis empirical research is based on one unit of public sector organization from a highly developed country and analyzing it with existing analytical operations research models. In international comparisons by the World Economic Forum (WEF), Finland has been ranked sixth in terms of overall competitiveness in recent years, and often as first in terms of how well its institutions function. This indicates confidence in the functioning of systems and is consequently a good starting point in improving preparedness. [5] (2011: 12).

3.2. A Brief Introduction to the Target Area

As a Bright Future of Seinäjoki Region web-publication describes (2011) Seinäjoki region is located at the crossroads of five railway lines and six national routes. It is the logistical center of Western Finland and the capital of the South Ostrobothnia province. The main railway from Helsinki to Oulu and the Finnish national route 3 (E12) from Helsinki through Tampere to Vaasa pass through the Seinäjoki region. The railway line and national route 3 are part of Trans-European Transport Network (TEN). Seinäjoki region is an economic area of 208 000 inhabitants and the city itself has 60 000 inhabitants. Annual population growth is approximately 1,5 %. [33] (Lahti, 2011).

3.2.1. The Target Organization

The target organizations technology levels and preparedness are the basis for the mission to maintain City's real estates in every situation [1] (Seinäjoen kaupunki (City of Seinäjoki), 2009). The City of Seinäjoki has 605 buildings, approximately 420 000 m² from few square meters hut to thousands square meters service buildings which include e.g. school, sport hall, day care center, etc. The replacement value of the real estate property is approximately 456 Million Euros. The target organizations need for maintenance actions are over 8 Million Euros per year. The condition class index of the real estate property was approximately 75 % (2010-2011), which means Good (≥ 75 %). This index is based on the estimation [34] (Trellum Consulting Oy, 2011).

The assessments underline the fact of risk possibilities in several buildings. Heavy rains or other natural hazards, construction defects, wrong use, etc. may cause the need of unforeseen repairs on the buildings. A critical factor for indoor climate conditions and thereby building users too, is the water damage [35] (FiSIAQ, 2007). The challenge is in relation to where and when the incident is detected (Figure 4). Humidity exposure may prevent use of the premises for the time of drying and repairs.

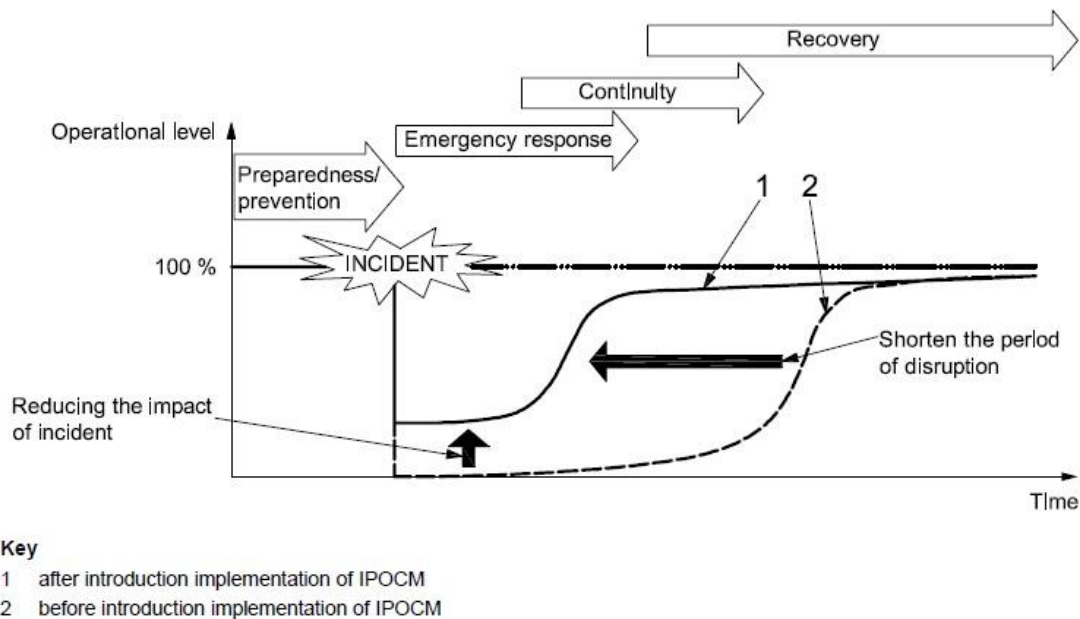


Figure 4. Concept of incident preparedness [4] (ISO/PAS 22399:2007, 2007).

For preparedness reason the facilities services unit has divided city's area for monitoring and strategic actions [36] (Vornanen, 2012). To achieving strategic goals unit's organization chart is also divided groups and teams (Figure 5) as same manners as the Rescue Department of South Ostrobothnia [37] (Setälä, 2012). Maintenance personnel have checked the risks buildings and they have ability to serve in the incident or emergency situation [38] (Kaukonen, 2005). Similarity of organizing operative units enchants comprehensive security. Usability of municipality's personnel in preparedness and preserve continuing readiness is based on the proactive operations unit 24/7 standby duty and centralized control room technology.

COMPETENCY-BASED CONTROL

Rescue Act 46 § Emergency Powers Act 12 §

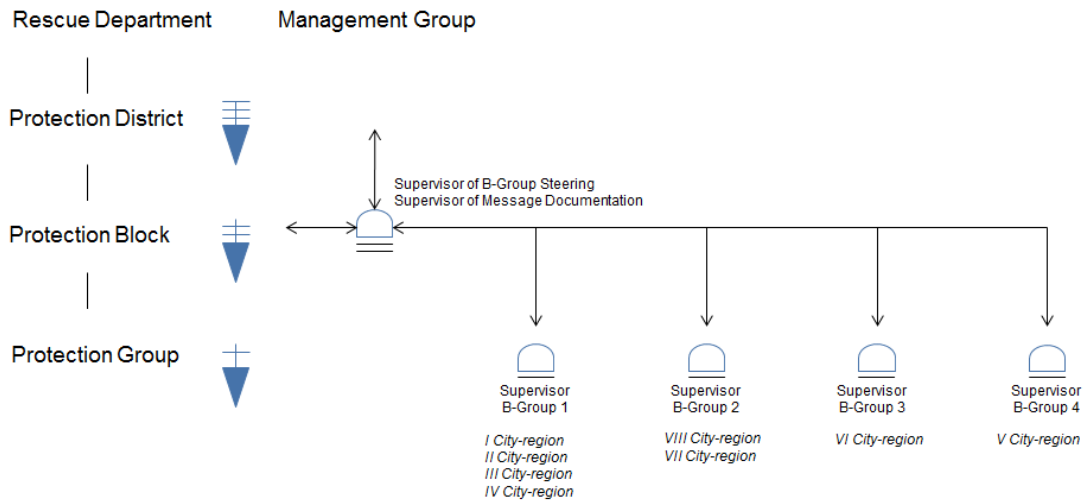


Figure 5. Competency-Based Control [36] (Vornanen, 2012).

Personnel work experience, direct contact with citizens/customers and new mobile technology applications [39] (David, 2011) will be most valuable to the assessment situation [40] (Kotler, 2007). This can compare to what Scandinavian Airways' (SAS) CEO Jan Carlson did. He turned his company on its head, giving people on the front lines much greater latitude for decision-making [41] (Laurie, 2003) and made middle management supporting instead of controlling. According to the Finnish Local Government Act (365/1995) local authorities shall strive to promote the welfare of their residents and sustainable development in their areas. Local authorities provide citizens with basic services, the most important of which relate to social welfare, health care, education, culture, environment, technical infrastructure and they working towards a competitive and social equitable Europe. [42] (The Board of the Association of Finnish Local and Regional Authorities, 2011), [43] (Ministry of Finance, 1995).

Seinäjoki City's organization is divided to four service centers. Figure 6 presents these centers as a silo with organizational levels: Social Welfare and Health Care (So- cial/green), Education and culture (Edu/orange), Environment and Technical Infrastruc-

ture (Tech/blue) and Town Hall (Adm/gray) [44] (Seinäjoen kaupunki, 2012). Traditionally a town hall provides supportive administration services to citizens and other service centers.

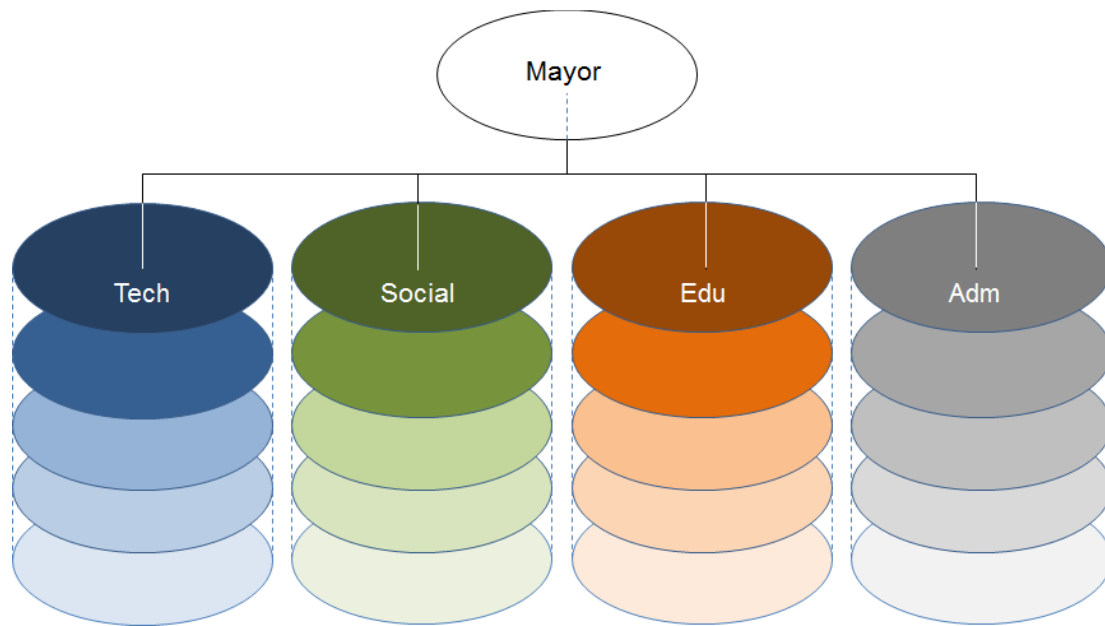


Figure 6. Silos and horizontal levels of a city’s organization.

The target organization is a part of a wider public sector organization – although is the one which can compare to producers in a Customer-Producer Model [45] (Kuntaliitto, 2006). There are many such models and criticism against them as well. To get more from reorganizing, a unit should be independent [46] (Kallio, 2006), [47] (Vesterinen, 2006). The target organization’s unit represents a local authority and is not separated from the division. The unit has competed and nowadays buys certain private sector services to the public sector. The unit secures services to the whole municipality area. Duality of the unit is based on the By-Laws and an inner role in the City of Seinäjoki, Facility Management division of the Environment and Technical Infrastructure Service Center (Figure 7).

The unit's operations strategy needs to be parallel with major stakeholders in the City of Seinäjoki, its Strategy's, By-Laws and Directives, e.g. City's continuity plan [49] (Seinäjoen kaupunki, 2007).

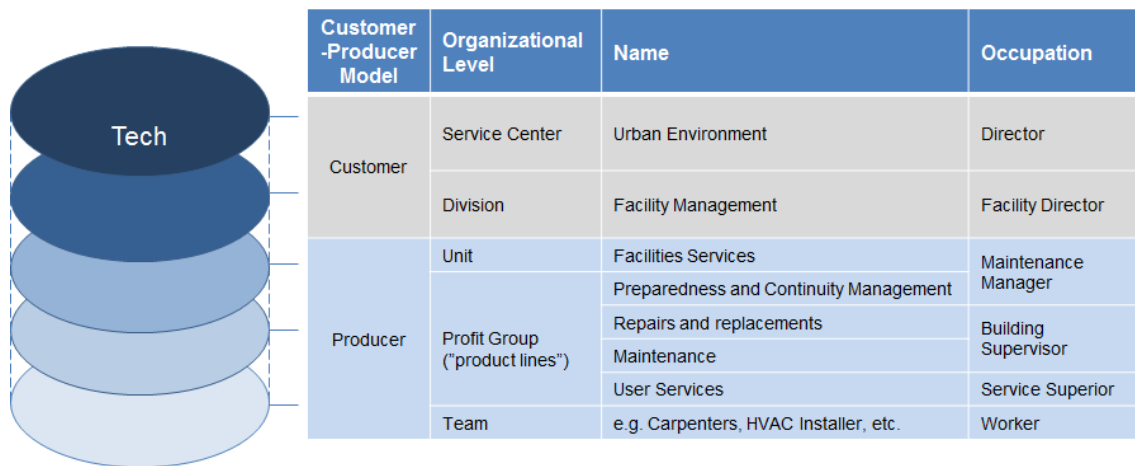


Figure 7. The target organization's product lines in a Customer-Producer Model.

3.2.2. Organizing Preparedness in the Management System

According to the Emergency Power Act's [7], [50] (2011/1552 & 1991/1080) municipalities shall ensure, by means of emergency plans, prior preparation of emergency operations and other measures, that their duties will be performed with the least amount of disruption also in emergency conditions [50] (Ministry of Justice, 1991). In order to do so, a public sector organizations practices. Commonly in the municipalities municipality manager has a supporting management group and the City of Seinäjoki is no exception. In normal, incident or emergency situation (e.g. Major accidents as flood, epidemic or other disturbances) other specialist (e.g. Police or contact officer from Rescue Department) may invite into the management group. [49] (2007a: 3)

What have been changed in 20 years, since 1991? Operations focus has been moved from extremely unusual emergency situations to common incidents in the normal situations [51] (Aine et al, 2010). According to Kivelä [6] (Kivelä, 2013) the State has:

1. Withdrawn from the strategic management and leadership responsibility in the region disturbances by closing the provinces.
2. Thinned its ability to incident management in the regional operational responsibility by regional government reform.
3. Diversified management of strategic and operational tasks to municipalities.

After the reforms there are only two incident management players: Government and municipalities. [6] (Kivelä, 2013). Also demands for public services are complex, because the unit can not concentrate on a limited number of customers [52] (Viinamäki, 2008: 28–34). Restructuring of the public sector creates expectations for producing services and monitor service quality [53] (Sutton, 2011). Meaning and value of the “some other one’s task” is not same anymore either. According to Virta differences have to recognize and identify common [54] (Virta, 2013).

Figure 8 shows the City of Seinäjoki’s Preparedness Liaison Officer’s task is included in the facilities services and Maintenance Manager’s duty [49] (2007a: 7).

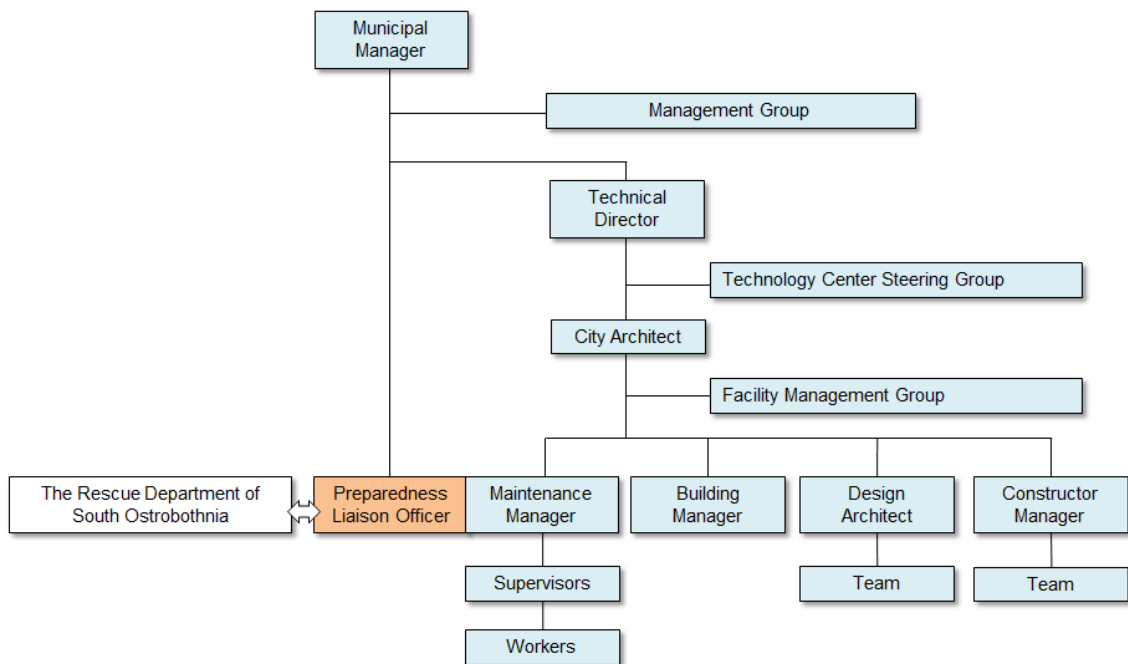


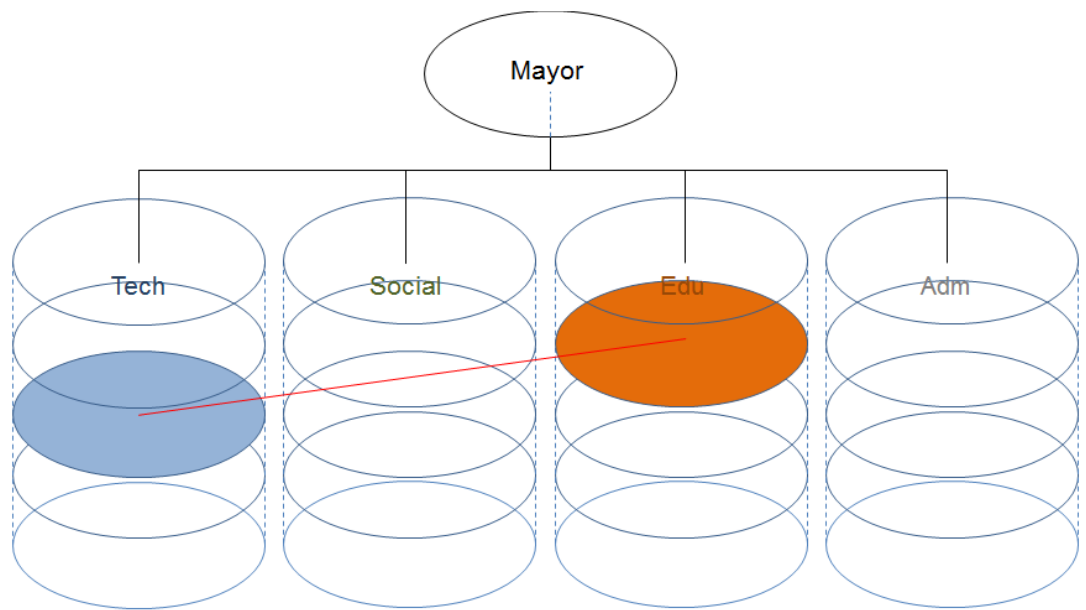
Figure 8. Preparedness Liaison Officer's situation in the organization chart.

This arrangement allows objective observation and operations strategy research. On the other hand, it forms a new kind of approach to Facility Management. [55] (Duff, 2008), [56] (Sarasoja, 2004), [57] (Lindholm, 2005).

According to the Seinäjoki City's Readiness plan Maintenance Manager is reserved for the City's Preparedness Liaison Officer's duty before the crisis [49] (2007b: 7) but the task during the crisis is not determined (2007b: 34–37). Resource allocation can affect at least the target unit's leadership because the process activities in the management system in different conditions are not defined. What cannot be measured, cannot manage.

There are challenges in communication between several operational levels [59] (Ministry of Finance, 2012), [60] (Hallikas, 2009). In the target organization Maintenance Manager participates to customer orientation in a part of the condition assessment and security guidance [36] (Vornanen, 2012), [61] (Vornanen, 2009), [62] (Seinäjoen

kaupunki, 2010). Managing the unit's service quality and the coordination of proactive preparedness conducts. Figure 9 shows a principle to steering of preparedness concerning several administrative sectors.



Participation to the Steering Group of the Quality Network of the Comprehensive Schools

Figure 9. Development example of the involved counseling of preparedness.

Organizational silos may cause another challenge in real time assessment of an incident situation [63] (Nikonov, 2008), [64] (Korhonen, 2010). Therefore municipality organization should have tools for monitor account of preparedness practices and planning [65] (Saltiola, 2013). On the other hand a preparedness liaison officer is a contact person for municipality manager in the preparedness issues [66] (Turkulainen, 2013). Person's duty is to be a coordinator in the field of comprehensive security and in the future the task will be more important [67] (Ministry of Interior, 2011), [68] (Pitkämäki, 2012).

The coordinator should work as a security secretary to enhance proactive preparedness [69] (Rasinmäki, 2012). Referring to the author's participation to the comprehensive security seminars [67], [70], and preparedness educations in the Emergency Services College [71], [72], [73], [74] (Emergency Services College, 2009–2013), the task placed varies with the municipalities organization. Depending of the person's substance know-how, the size of the organization or situation at the organization the person might have other tasks too.

3.2.3. Proactive Preparedness

Seinäjoki's strategy 2009-2016 implies the mission is to serve citizen of the city in all conditions to promote well-being, secure life and to achieve sustainable development, take responsibility for the well-being of province and specialize in creating competitive advantages for companies operating environment.

[1] (Seinäjoen kaupunki (City of Seinäjoki), 2009)

Strategy updating will be completed in the summer 2013.

[75] (Välimäki, 2013)

The target organization's supporting role is conducting to the city's strategy [76] (Oulasvirta, 2007), [77] (Nikander, 2007). The professional roles of maintenance manager and preparedness liaison officer together form advantage to develop comprehensive security (Figure 10).

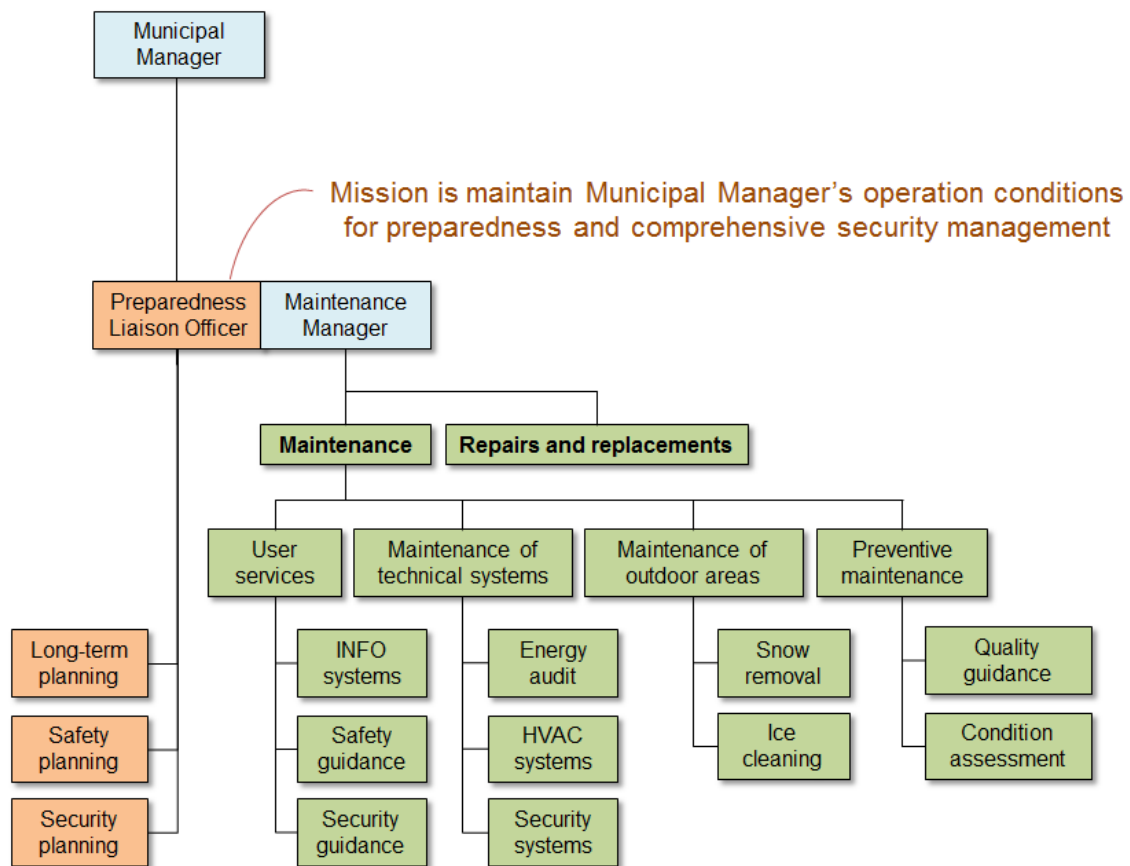


Figure 10. Content of the strategic tasks for comprehensive security.

Supporting tasks forms strategic mission to one of the unit's service process: maintain Mayor's operation conditions for preparedness and comprehensive security management by using different technologies [78] (Kamardeen, 2010), [79] (Lindholm, 2006), [10] (Rouillard, 2008), [80] (Sulankivi, 2012). On the other words the unit's mission is to maintain municipality's buildings and operation conditions in them [81] (Rakennustietosäätiö RTS, 2009) from the viewpoint and objectives of continuity of municipality. By above mentioned case maintenance manager should take part in Municipality's security coordination (Figure 11).

Local Government Act 325/2012 § 13 a) control and risk management criteria

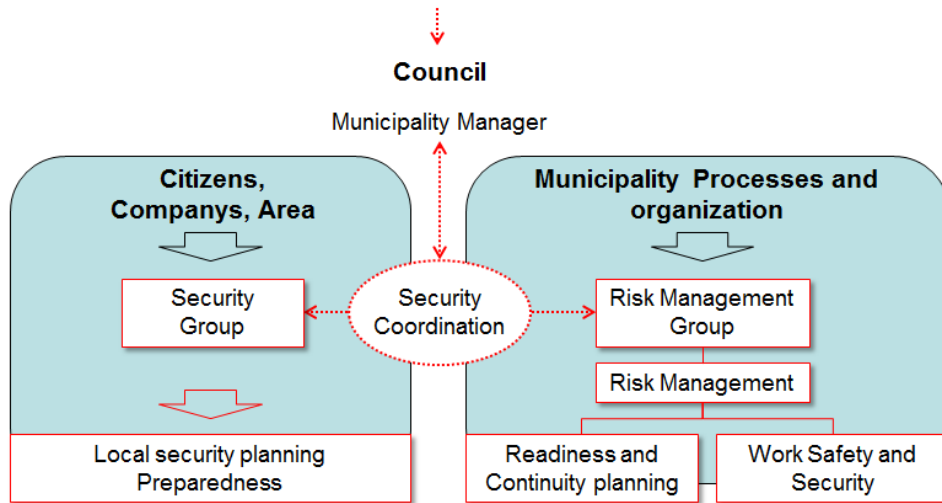


Figure 11. Example of Security Coordination [82] (Pihlaja, 2013).

From the risk management point of view public property owner should have the strategy of buildings and its asset management method. According to the Local Government Act § 68 the municipality's financial statements include the income statement, the balance sheet, the cash flow statement, the budget outturn comparison and the annual reports with attachments [43] (Ministry of Finance, 1995). Accounting entity should be "true and fair view of the financial position". A real estate's replacement value is an estimation about the amount of money which the municipality will need to build up again the real estates which they have. Facility Management has to have maintenance plans for maintaining property so good in every situation the replacement will be avoided too soon. Otherwise the replacement value will be a high risk for municipality's continuity.

There are some challenges. Public property owner cannot collect the money in the account to wait for planned maintenance operations – as a private company does. It could allocate enough money for annual maintenance by adapting its service network throughout the economy, sustain ability to take loan for a renovation investment projects, incorporate building property, its maintenance and pay the agreed rent or external-

ize them and pay the market rent – a few options for lifting up. Preventive maintenance, the proactive operating unit, is important for continuity of the municipality. The proactive operating unit preserves options.

3.3. Survey Researches

The survey research started at the end of winter 2012. The objective of the first study was to identify the critical factors as well as the preferable strategic type of the target organization. (Table 1 and 2).

Table 1. Example answer.

ATTRIBUTES	Scale: 1=low, 10=high		Direction of development, expectations (future)			Direction of development, experiences (past)			Compared with competitors			Knowledge/technology requirement		
	Expectations (1-10)	Experience (1-10)	Worse	Same	Better	Worse	Same	Better	Worse	Same	Better	Basic %	Core %	Spearhead %
External structure														
Customer satisfaction	8	7			x		x			x		20 %	60 %	20 %
Customer loyalty	9	7		x				x				40 %	50 %	10 %
Brand	10	8		x			x				x	25 %	60 %	15 %

The first survey was conducted by the University of Vaasa, Faculty of Technology, and its Industrial Management Unit [83] (Vaasan yliopisto, Tuotantotalouden laitos, 2012). Second research was made in the beginning of 2013 with same questionnaire. An only respondent from the management level was maintenance manager. The surveys were recalculated with the latest mathematic instructions of the theories. The results were gained by utilization of two types of questionnaire. Balanced Scorecards (BSF) questionnaire is targeted on strategic holistic resources, and Operations (OP) questionnaire is enquiring holistic operational resources to be measured in different manners. BSC questionnaire has 18 attributes to be measured, OP questionnaire has 21 attributes. As figure 12 shows the third questionnaire for Transformational Leadership has twenty-four attributes divided into seven sections.

Table 2. Example of calculations for preferable strategy type.

Normalised Scale				Prospector	Analyzer	Defender	Competitive Group
(Q%)	(C%)	(T%)	(F%)	Competitive Index	Competitive Index	Competitive Index	
0,638	0,061	0,300	0,102	0,9553	0,9744	0,9122	Analyzer
0,719	0,029	0,252	0,084	0,9656	0,8469	0,9173	Prospector
0,650	0,194	0,156	0,087	0,9579	0,8484	0,9334	Prospector
0,777	0,069	0,155	0,302	0,9562	0,8329	0,8973	Prospector
0,713	0,208	0,079	0,034	0,9739	0,8134	0,9561	Prospector
0,094	0,636	0,270	0,670	0,8456	0,9599	0,9152	Analyzer
0,658	0,050	0,291	0,108	0,9563	0,9226	0,9097	Prospector
0,728	0,035	0,237	0,084	0,9665	0,8323	0,9201	Prospector

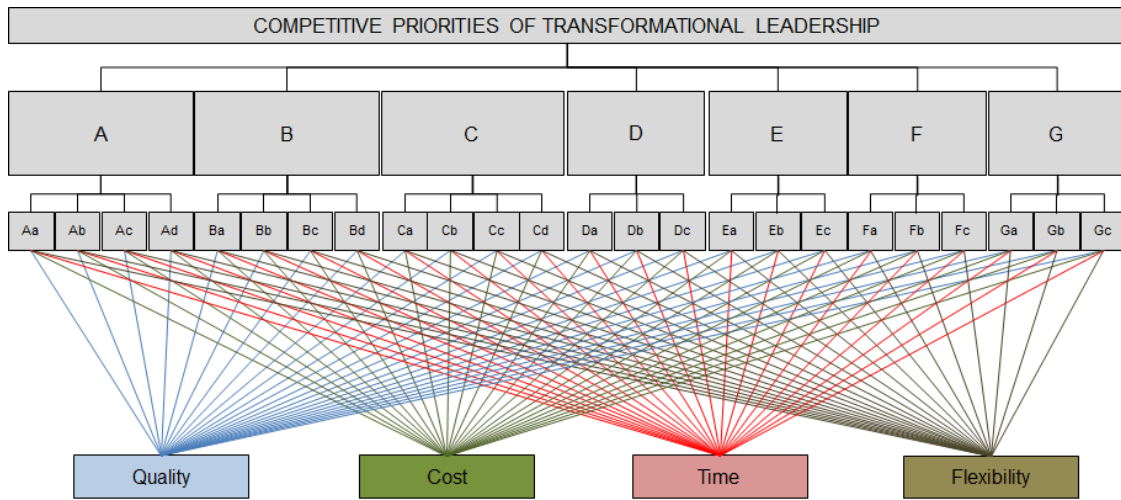


Figure 12. Analytic Hierarchy Process for TL indexes.

3.3.1. The Critical Factors in Resource Allocations

Figure 13 shows the comparison between the experiences and expectations of the respondents. The average levels of expectations are higher than the actual level of experiences, which means that the stated targets were not fully achieved.

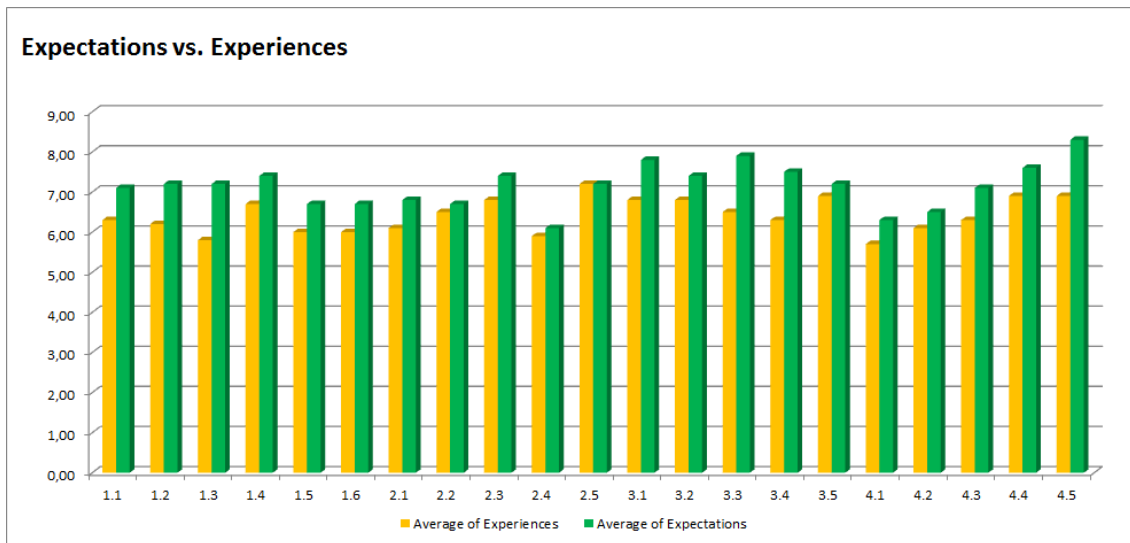


Figure 13. Detection of the attributes for future competitiveness.

The attributes with the biggest gap between experience (past) and expectation (future) are the strongest ones; e.g. (1.3) Communication between different departments and hierarchy levels, (3.1) Leadership and management system of the company, (3.3) Well defined responsibilities and tasks for each operation, (3.4) Utilizing different types of organizing systems (projects, teams, processes...) and (4.5) Usability and functionality of information systems. The results of the further calculations are indicated by “Traffic light bars” (Figure 14). Red indicates that the attribute is critical and needs a closer review. Green indicates that the attribute is in order. Yellow means that responses are scattered and the respondents have a different understanding. The triangle above the attribute (1.1, 1.2, 2.1, 2.2 and 2.3) shows the development direction.

The method of judging under resourced and over resourced attributes are as follow. An attribute falls between the range of 1/3 and 2/3 of average resource level is considered to be balanced, i.e. any attribute which is lower than 1/3 of average resource level is considered to be under resourced, and any attribute which is higher than 2/3 of average resource level is considered to be over resourced.

[84] Liu & Takala, (2012).

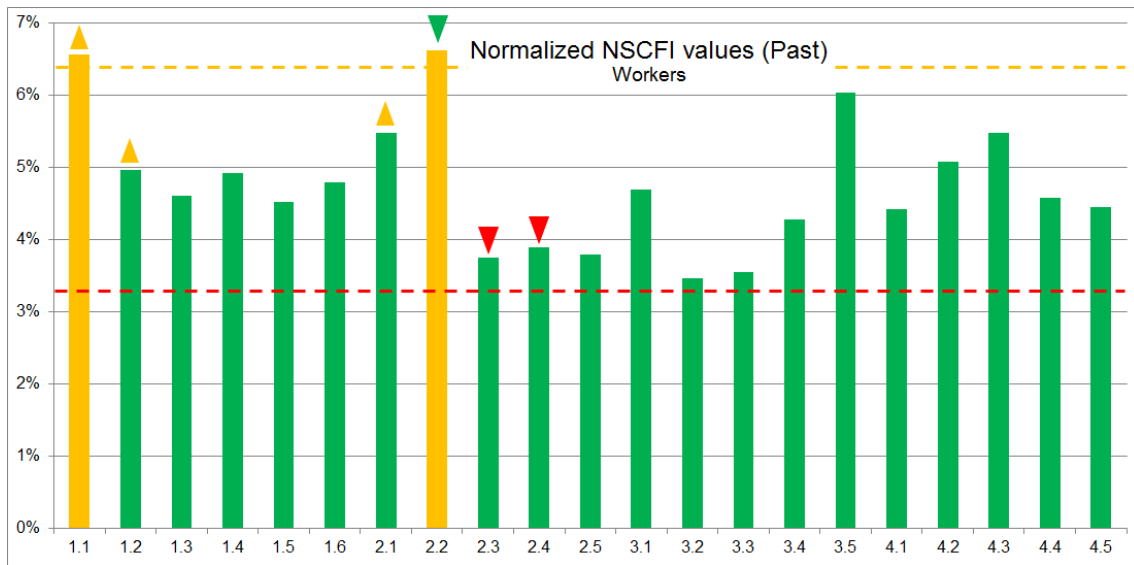


Figure 14. Normalized Past NSCFI values (Workers).

In this case the average resource level is $100\% / 21 = 4,76\%$, so the judging values are $3,17\%$ (the red dot line in the Figure 14) and $6,34\%$ (the yellow dot line in the Figure 14). That is, for any attributes lower than $3,17\%$ are under resourced and for any attributes higher than $6,34\%$ are over resourced.

Table 3 shows comparison results between past and future values using different S&R models BCFI, SCFI and NSCFI, in which the 21 attributes are analyzed one by one. Respondents are supervisors and workers.

Three different models of CFI calculation (CFI, BCFI, SCFI) is utilized respectively to compare with expert opinions to conclude which model is most reasonably reflect the real situation. The CFI is introduced by Ranta and Takala (2007) for the first time to interpret and evaluate the critical factors of strategic adjustment which can support the strategic decision-making phase. The BCFI model is developed by Nadler and Takala (2010) based on the principle of CFI model. The difference of BCFI model with CFI model is that it is developed the numerator of the CFI formula by changing Std{experience} index and Std{expectation} index into SD Experience index and SD Expectation index, and introducing performance index to the model. The SCFI model is developed by Takala et al. (2011) which adds trend research into the study.

The trend shows how the particular attribute changes from past to future. If both past and future values are good, the trend is considered to be no change and marked with “-“. If the values change from good to other, the trend is worse. On the contrary if the values change from other to good, the trend is better. If the values are both over or under, the trend still show their direction is going better or worse, for instance, over goes lower or under goes higher means better, while over goes higher or under goes lower means worse.

[84] Liu & Takala, (2012)

Table 3. Comparison between BCFI, SCFI, NSCFI (OP).

	P-BCFI	F-BCFI	Trend	P-SCFI	F-SCFI	Trend	P-NSCFI	F-NSCFI	Trend
1.1	3,60 %	1,12 %	worse	3,67 %	1,17 %	worse	4,52 %	4,36 %	-
1.2	4,48 %	2,09 %	worse	4,80 %	2,29 %	worse	4,91 %	5,00 %	-
1.3	9,16 %	2,19 %	better	10,20 %	2,49 %	better	6,03 %	5,26 %	-
1.4	2,87 %	1,19 %	worse	2,74 %	1,16 %	worse	3,90 %	4,29 %	-
1.5	5,96 %	2,10 %	worse	6,20 %	2,24 %	worse	5,26 %	4,96 %	-
1.6	4,58 %	1,10 %	worse	4,82 %	1,18 %	worse	4,95 %	4,32 %	-
2.1	7,94 %	5,70 %	better	7,93 %	5,81 %	better	5,84 %	6,73 %	worse
2.2	4,79 %	1,15 %	worse	4,20 %	1,02 %	worse	4,91 %	4,29 %	-
2.3	4,23 %	1,66 %	worse	3,77 %	1,51 %	worse	4,54 %	4,62 %	-
2.4	4,25 %	0,73 %	worse	3,98 %	0,70 %	worse	4,74 %	3,55 %	-
2.5	3,47 %	1,16 %	worse	2,70 %	0,92 %	worse	3,90 %	3,98 %	-
3.1	2,31 %	1,66 %	worse	2,41 %	1,77 %	worse	3,59 %	4,74 %	-
3.2	3,47 %	42,27 %	worse	3,49 %	43,45 %	worse	4,30 %	5,51 %	-
3.3	3,15 %	1,24 %	worse	3,59 %	1,44 %	worse	4,29 %	4,37 %	-
3.4	3,14 %	1,24 %	worse	3,65 %	1,47 %	worse	4,35 %	4,43 %	-
3.5	7,02 %	23,14 %	worse	6,18 %	20,80 %	worse	5,29 %	5,77 %	-
4.1	3,10 %	5,18 %	better	3,15 %	5,39 %	better	4,22 %	6,41 %	worse
4.2	3,86 %	0,92 %	worse	3,59 %	0,88 %	worse	4,61 %	4,02 %	-
4.3	6,80 %	2,04 %	worse	6,88 %	2,11 %	worse	5,63 %	5,16 %	-
4.4	6,49 %	1,17 %	worse	6,22 %	1,15 %	worse	5,26 %	4,25 %	-
4.5	5,32 %	0,96 %	worse	5,81 %	1,07 %	worse	4,94 %	3,99 %	-

The implementation index (IMPL) is used for evaluating the usability of the results from the AHP assessments and it is calculated by dividing the standard deviation of attribute assessment results by the value of the corresponding average value. The figure 15 shows the level of deviation between the participants' responses. The lower the value of an attribute the more reliable the result is. Respondents have most reliable knowledge about attributes 1.5, 2.4, 3.2 and 4.1 (an attribute per category).

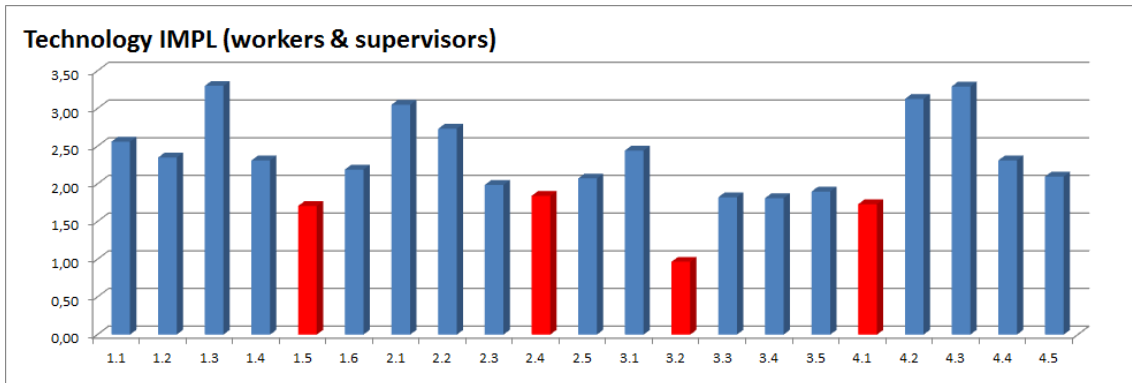


Figure 15. Technology IMPL.

Variance describes how far the values of a random variable typically lie from its expected value. The variances were calculated from the IMPL values of individual answers, and they were compared with the geometric mean index. The fact that the questionnaires were arranged in different groups of employees provides better reliability of the results, because more different opinions and points of view were shown regarding the organization's performance. At the same time it provides us with the chance to compare the responses of different groups and clarify what is more critical and important exactly for them. In the current part of the analysis all the responses were combined together to understand the overall trend of responses. This helps to avoid the influence of personal opinion of respondents and makes the results of the analysis more reliable and actual. As the result of BCFI-SCFI-NSCFI comparison and the Technology Implementation Indexes, there is the attribute 4.1 (*Information systems support the business processes*), which rises up as the critical factor of resource allocation. This critical attribute needs interpretation. According to author's work history and findings after 2009 municipal consolidation, the target organization is challenging to monitor and measure the quality of its services in an enlarged area of operations without a common information system – and it needs future attention.

3.3.2. Manufacturing Strategy

In the survey that has been done to Supervisors, the most important factor that affects to operations is quality (61 %). In daily jobs Supervisors needs to cooperate with other Facility Management units and several customers. They have to guide employees and, of course, supervise operations in facilities services. Figure 16 shows there are strong needs for flexibility to sustain quality. In the survey that has been done to the Workers the most important factor that affects operation is also quality, (68 %). The more strongly affecting factor is time (27 %) (Figure 17). Maintenance Manager did the same survey after the actual flood incident (Figure 18).

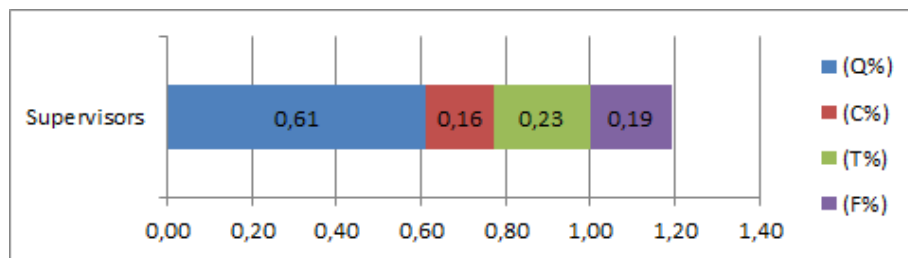


Figure 16. Supervisors respond for Manufacturing Strategy.

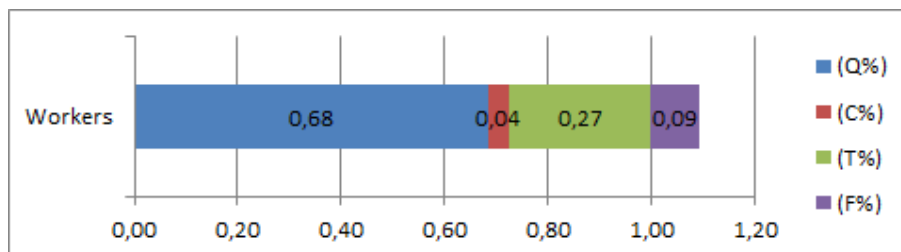


Figure 17. Workers respond for Manufacturing Strategy.

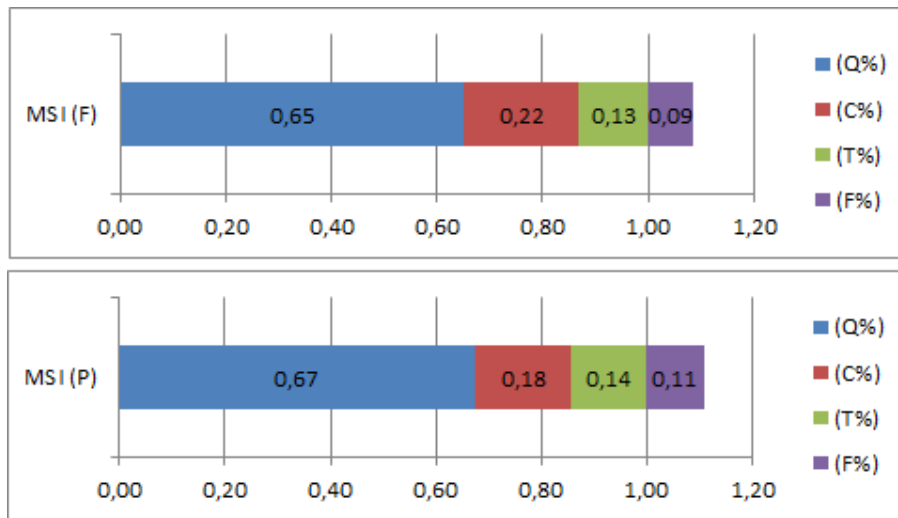


Figure 18. Managers respond for Manufacturing Strategies (Past & Future).

Comparing supervisors to workers significantly different factors are cost and flexibility. The content of the manager's tasks is shown in the results. Results show the most important factor that affects operation is quality (67 %) in the past and future (65 %). Manager & supervisors have responsibility for achieving key performance results (cost per square meter per month). Therefore maintenance manager and supervisors have the financial moment in the weekly meetings. The cost is the factor which is important for both.

Comparing with the manufacturing strategies factors of the unit and the manufacturing strategies of the companies which operate on the international market, there are similarities and differences. The most significance difference is the demand for quality in the public sector's facilities services.

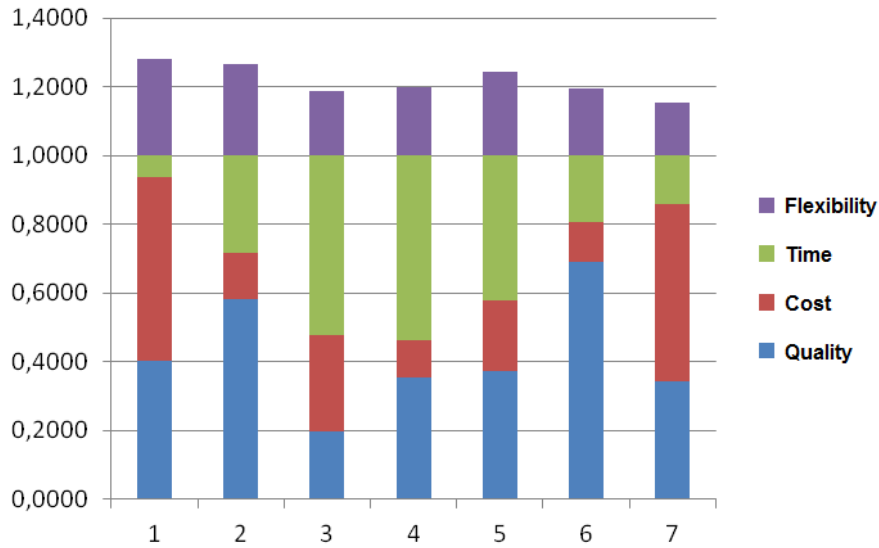


Figure 19. Manufacturing Strategies of the Companies [85] (Golovko, 2012).

The strongest affecting strategic type in all the target unit levels is prospector. In the future strongest affecting strategic type in the target unit's management level is prospector too (Figure 20). The dominating strategy type varies in the markets (Figure 21). Manager in the public sector has to evaluate dynamic capabilities too. Need for managing finances rises, because the demand for productivity rises. [86] (STT, 2012). The methodology to allocate preferable strategy type seems liable.

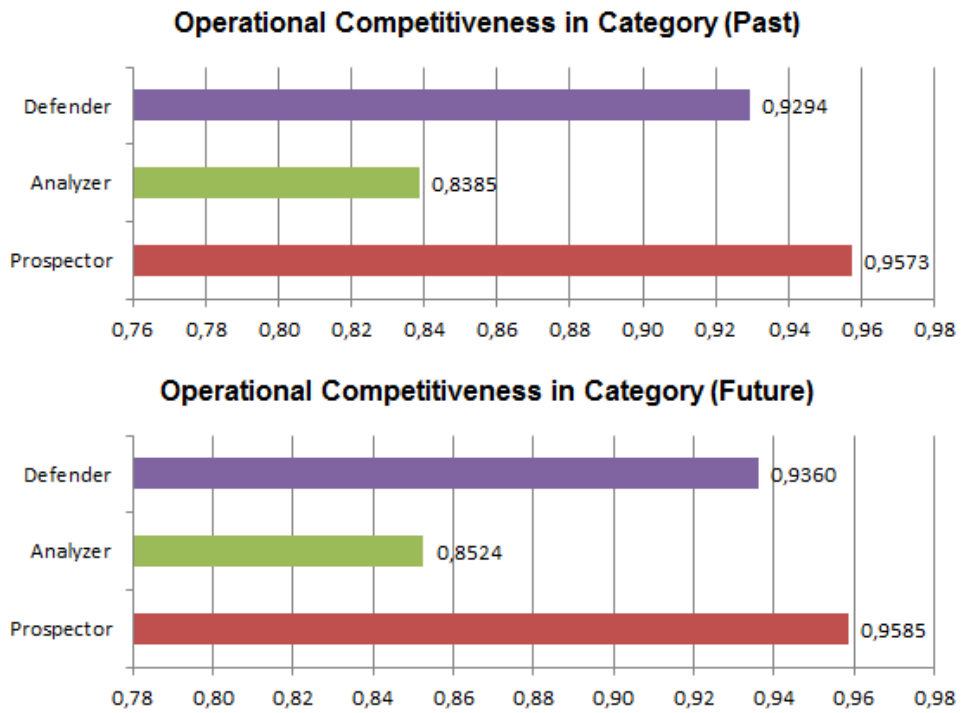


Figure 20. Manager’s view for Manufacturing Strategy Types (Past & Future).

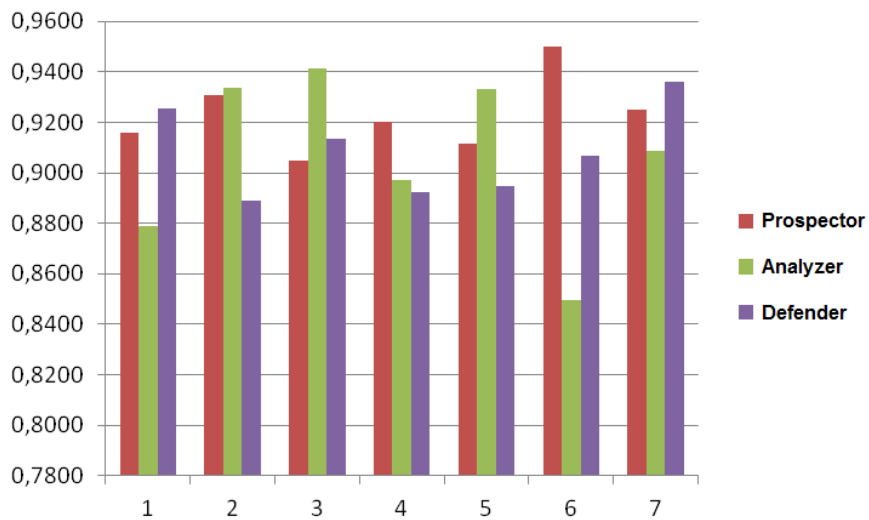


Figure 21. Strategy Types of the Companies [85] (Golovko, 2012).

3.3.3. Transformational Leadership

A long-lasting co-working between workers and supervisors shows in the outcomes. Job satisfaction results indicate rewarding and sustainable health-promoting leadership [87] (Mauno, S., T. Feld, U. Kinnunen & K. Perko, 2011). Informants gave parallel indication in the surveys. The results indicate a trustful relationship, good atmosphere in the unit as well as a unique example of integrated management system which allows a management team to create on a structure that can help to effectively and efficiently deliver an organization's objectives. For successful operations affection of the supervisors are essential. They design, change and supervise daily working processes and have been created working time and project schedule for years. The supervisor's deep leadership index should be much higher than unit's shorter time working manager as a result of the operation culture. Maintenance manager other task, Preparedness Liaison Officer, is showing at figures 23 – be prepared, detect risks, do future scenarios. According to the case study (page 31) resource allocation affects (Figure 24).

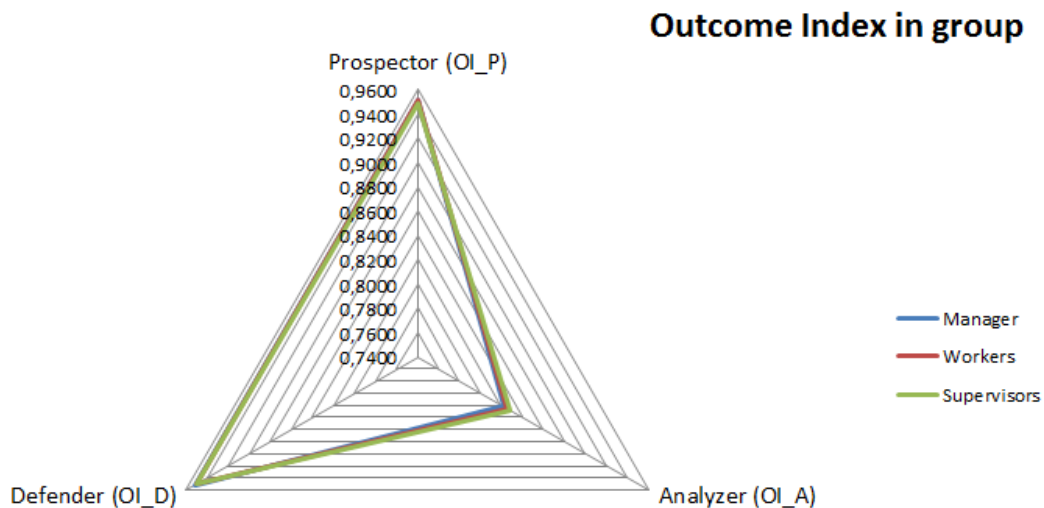


Figure 22. Outcome Index (OI) in Group PAD.

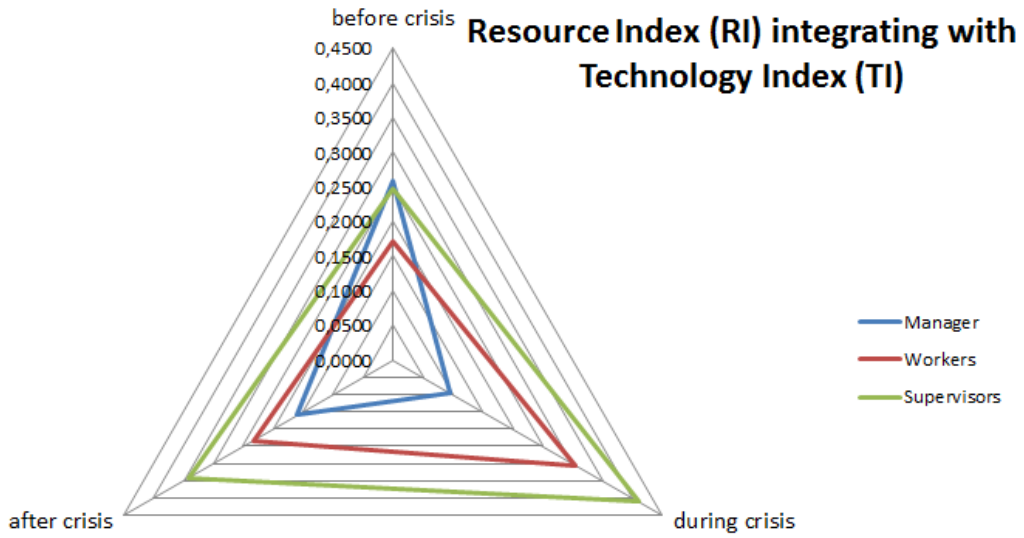


Figure 23. Resource Index (RI) integrating with Technology Index (TI).

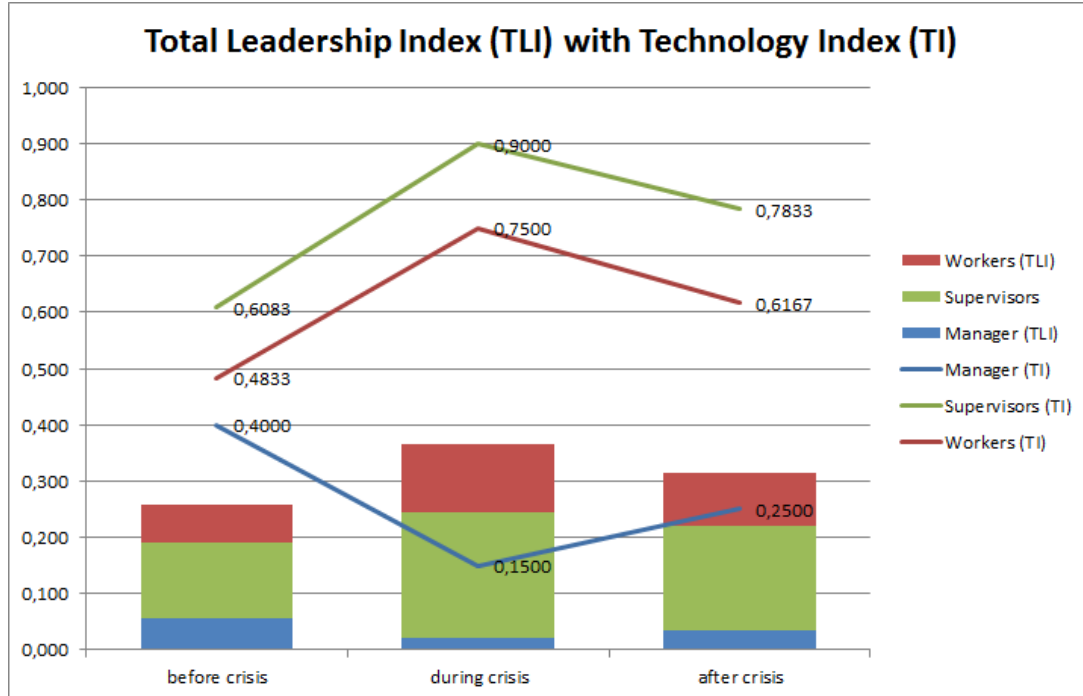


Figure 24. Total Leadership Index (TLI) with Technology Index (TI).

The results indicate that workers and supervisors have experienced and they have sufficient knowledge about resource allocations to act during the crisis and knowledge about technology levels, e.g. weak real estate conditions foreseen unpredictable needs of repairs. Working on during the incident has been occurring and could happen in the future too. The role of the manager is in monitoring quality, steering processes according to the present strategy. The controlling leadership index is higher than other levels (Figure 25). This is parallel to the unit's strategic goal, to achieve change in operations culture from reactive maintenance to proactive maintenance, repairs and replacement.

The leadership index (LI) is based on the weighting of factors, i.e. deep leadership (DL), passive leadership (PL), controlling leadership (CL) and individualized consideration (IC), inspirational motivation (IM), intellectual stimulation (IS), building trust and confidence (BT).

[17] (2010: 22)

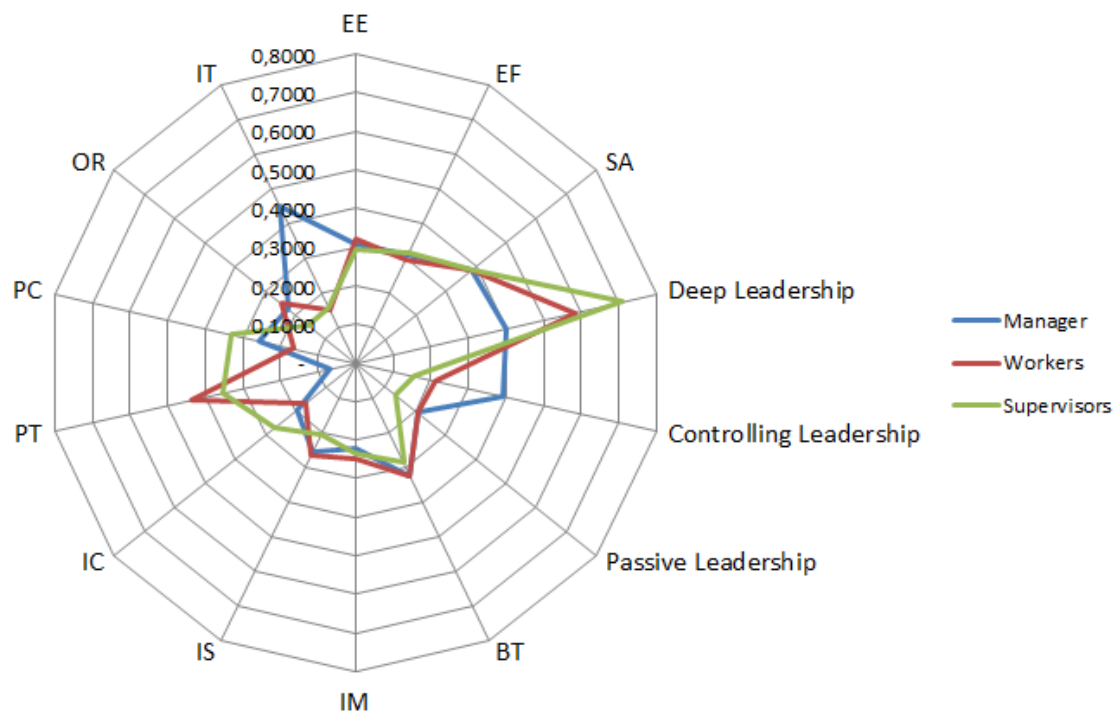


Figure 25. Transformational Leadership Factors.

Oulasvirta (2007) writes an interesting of her study was to determine how the upper level of the organization to provide a service is justified to assess. The conclusion of her dissertation underlines the lower level of the organizational point of view, is not sufficient to evaluate the upper e.g. quality award criteria. What is essential is whether the upper level successful in their own part of the work to support service end users. (2007: 125–143).

3.3.4. Implementing SCA to the Public Sector's Management System

Liu (2010) proposed that the overall competitiveness performance analysis in which to integrate the evaluations of manufacturing strategy, transformational leadership with technology level, and S&R together can all be connected to SCA. [17] (2010: 27). The key idea of implementing SCA is described in his dissertation (2010: 27–28).

The research question is how to ensure that the various levels of the organization are operating in accordance with a common strategy? Above mentioned methods and calculated indexes gives an answer to the question. To make improvements in the lower level foundations to achieve sustainable competitive advantage, preferable question would be, what are the most favorable improvement targets? The most favorable improvements targets can be tested optimal by balancing all the resources allocation factors alternately by leaving all other unchanged. These sensitivity analyses and the determination of the value of the information are important tools of the decision analysis.

To make improvements in the lower level foundations, measured indexes are shown in the Figure 26.

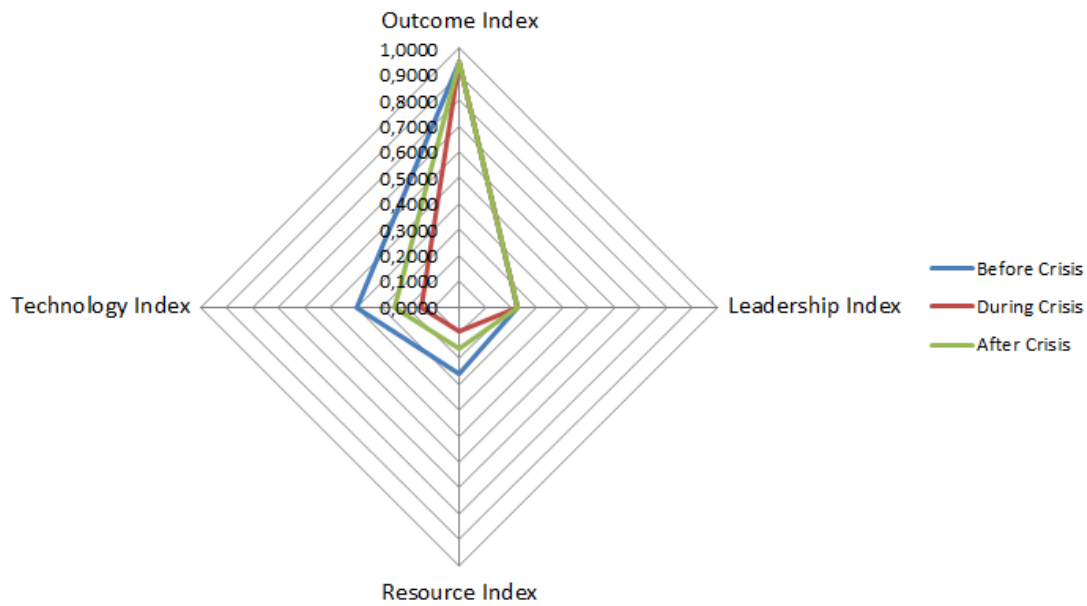


Figure 26. Implementation of SCA.

To start it is reasonable to clarify the key purpose of the current analysis and following steps. The operations research's answer to the question is not at the end of the linear Fault Tree Analysis in the case. The public sector has many special characteristics which affect essentially how it is suitable for taking account of developing the processes or products produced by the public organizations. When the systems development models of the operations of the private sector are adapted to the environment of the public administrations, attention must be paid to these special characteristics [88] (Kiviniemi, 1989). From the properties follows that communal objectives are central the public organization's operations and that the operation is directed by the needs of the whole society.

According to the measured indexes (Figure 26 above) outcomes should achieve in every situation by managing technology levels and reallocating resources. The table below shows single priority's SCA calculation.

Table 4. SCA calculations of resource allocations.

		Quality	Cost	Time	Flexibility	Check	P	A	D	α	β	γ	α Degree	β Degree	γ Degree	
	P-MSI	0,601	0,162	0,128	0,108	TRUE	0,9573	0,8385	0,9294	1,0005	1,1150	1,0261	57,32	63,89	58,79	
	F-MSI	0,596	0,199	0,120	0,085	TRUE	0,9585	0,8524	0,9360	1,0066	1,1080	1,0270	57,67	63,48	58,85	
Strategic priorities	BCFI-P															
1.1		1,302	0,405	0,130	0,124	0,341	TRUE	0,9285	0,9039	0,8916	1,0278	1,0510	1,0628	58,89	60,22	60,90
1.2		1,566	0,216	0,476	0,097	0,211	TRUE	0,9151	0,9160	0,9381	1,0546	1,0538	1,0331	60,43	60,38	59,19
1.3		2,459	0,482	0,090	0,356	0,072	TRUE	0,9512	0,8633	0,9216	1,0101	1,0940	1,0375	57,87	62,68	59,44
1.4		1,257	0,343	0,243	0,172	0,243	TRUE	0,9179	0,9560	0,9071	1,0555	1,0203	1,0658	60,48	58,46	61,06
1.5		2,381	0,216	0,112	0,350	0,322	TRUE	0,9010	0,9475	0,8819	1,0555	1,0120	1,0741	60,48	57,98	61,54
1.6		1,919	0,343	0,243	0,172	0,243	TRUE	0,9179	0,9560	0,9071	1,0555	1,0203	1,0658	60,48	58,46	61,06
2.1		2,707	0,515	0,114	0,161	0,210	TRUE	0,9439	0,8694	0,9046	1,0112	1,0824	1,0480	57,94	62,02	60,05
2.2		1,695	0,239	0,465	0,139	0,157	TRUE	0,9206	0,9340	0,9384	1,0569	1,0444	1,0403	60,55	59,84	59,60
2.3		1,480	0,312	0,127	0,280	0,280	TRUE	0,9132	0,9221	0,8863	1,0414	1,0330	1,0672	59,67	59,19	61,15
2.4		1,660	0,582	0,098	0,125	0,195	TRUE	0,9545	0,8304	0,9121	0,9940	1,1144	1,0332	56,95	63,85	59,20
2.5		1,500	0,356	0,124	0,194	0,326	TRUE	0,9184	0,9561	0,8846	1,0480	1,0132	1,0804	60,04	58,05	61,90
3.1		0,916	0,366	0,124	0,233	0,278	TRUE	0,9205	0,9425	0,8879	1,0436	1,0232	1,0748	59,80	58,62	61,58
3.2		1,304	0,497	0,100	0,191	0,212	TRUE	0,9412	0,8886	0,8997	1,0176	1,0674	1,0566	58,30	61,16	60,54
3.3		1,178	0,293	0,107	0,185	0,415	TRUE	0,9082	0,9597	0,8733	1,0518	1,0041	1,0857	60,26	57,53	62,21
3.4		1,236	0,249	0,123	0,439	0,190	TRUE	0,9172	0,9514	0,9004	1,0525	1,0207	1,0684	60,30	58,48	61,22
3.5		2,183	0,449	0,136	0,191	0,224	TRUE	0,9336	0,9091	0,9002	1,0290	1,0520	1,0606	58,96	60,28	60,77
4.1		1,313	0,263	0,126	0,273	0,337	TRUE	0,9039	0,9331	0,8806	1,0488	1,0213	1,0715	60,09	58,52	61,39
4.2		1,644	0,280	0,127	0,312	0,280	TRUE	0,9095	0,9221	0,8863	1,0437	1,0318	1,0661	59,80	59,12	61,08
4.3		2,659	0,271	0,191	0,120	0,418	TRUE	0,9035	0,9580	0,8903	1,0598	1,0091	1,0726	60,72	57,82	61,46
4.4		2,036	0,389	0,172	0,122	0,317	TRUE	0,9243	0,9245	0,8972	1,0387	1,0385	1,0644	59,51	59,50	60,99
4.5		1,708	0,241	0,527	0,102	0,129	TRUE	0,9284	0,9101	0,9478	1,0474	1,0647	1,0295	60,01	61,00	58,99
Combind W+S icr ok		0,594	0,177	0,143	0,087	TRUE	0,9579	0,8484	0,9334	1,0047	1,1097	1,0271	57,57	63,58	58,85	
1		0,388	0,157	0,249	0,205	TRUE	0,9261	0,9516	0,9010	1,0471	1,0236	1,0709	60,00	58,65	61,36	
2		0,421	0,171	0,178	0,230	TRUE	0,9292	0,9197	0,9028	1,0359	1,0448	1,0609	59,35	59,86	60,78	
3		0,357	0,119	0,242	0,282	TRUE	0,9192	0,9322	0,8862	1,0407	1,0285	1,0723	59,63	58,93	61,44	
4		0,306	0,236	0,169	0,289	TRUE	0,9107	0,9569	0,9021	1,0587	1,0159	1,0670	60,66	58,21	61,13	

According to Takala (2012) to achieve the necessary level of results reliability three methods of validation are proposed to be used: MAPE (Absolute Percentage Error), RMSE (Root Means Squared Error) and MAD (Maximum Deviation). Therefore, SCA is between 0 and 1, the more SCA resulting, the better. [89] (Takala, 2012)

Table 5. MAPE, RMSE and MAD.

MAPE	RMSE	MAD			
87,9 %	92,7 %	94,3 %	1.1		
88,4 %	92,3 %	94,5 %	1.2		
96,0 %	97,6 %	98,1 %	1.3		
82,1 %	89,2 %	91,5 %	1.4		
80,6 %	88,3 %	90,8 %	1.5		
82,1 %	89,2 %	91,5 %	1.6		
93,9 %	96,2 %	97,1 %	2.1		
86,6 %	91,4 %	93,7 %	2.2		
84,5 %	90,7 %	92,6 %	2.3		
98,6 %	99,0 %	99,3 %	2.4	2.4	Control and optimization of all types of inventories
80,8 %	88,4 %	90,9 %	2.5		
82,7 %	89,6 %	91,8 %	3.1		
91,0 %	94,5 %	95,7 %	3.2		
79,1 %	87,4 %	90,0 %	3.3	3.3	Well defined responsibilities and tasks for each operation
82,2 %	89,2 %	91,5 %	3.4		
88,1 %	92,8 %	94,3 %	3.5		
82,3 %	89,3 %	91,6 %	4.1		
84,3 %	90,5 %	92,5 %	4.2		
80,0 %	87,9 %	90,5 %	4.3		
85,6 %	91,3 %	93,1 %	4.4		
90,5 %	93,5 %	95,3 %	4.5		

As Oulasvirta describes key aspects of the multi-level organization's service production are access to information, levels of the organization are in relation to each other in the service chain and the upper levels of the organization support the lower [76] (Oulasvirta, 2007). According to communal objectives most favorable improvement target (attribute 2.4) seems to be one of the critical ones too (Figure 15, page 41).

3.3.5. Dynamic Capabilities

The Balanced Scorecard (Kaplan & Norton) recommends viewing an organization from four aspects, developing a system of standards, and collecting data and analyzing them, in order to predict business performance and the organization's future positioning. [90] (Kaplan, 1996). The Balanced Scorecard system is a framework that ensures that a strategy will be operationalized, and that the organization will be adapted to the strategy. [91] (Tomic, 2008). The purpose aims evaluation of the organization's business performance, relationships with customers, processes and possibilities for growth internally by opinions of employees from different levels of the public facilities services organization.

According to Liu & Takala [84] (Liu, 2012), the data collected from the case organization, and the past and future CFIs have been calculated to illustrate the trend of how critical factors change and their development directions. Three different models of CFI calculation were utilized respectively to compare with expert opinions to conclude which model is most reasonable reflect the real situation. Figure 27 demonstrates the calculated S&R results of past and future values using different BCFI, SCFI and New-SCFI (NSCFI). As Liu describes SCFI mainly gets rid of the biased values from BCFI to improve accuracy and under certain situations they can be similar, but NSCFI improves more completely the whole data ranges.

The method of judging under resourced and over resourced attributes are as follow. An attribute falls between the range of 1/3 and 2/3 of average resource level is considered to be balanced, i.e. any attribute which is lower than 1/3 of average resource level is considered to be under resourced, and any attribute which is higher than 2/3 of average resource level is considered to be over resourced.

[84] Liu & Takala, (2012).

In this case the average resource level is $100\% / 18 = 5,56\%$, so the judging values are 3,70 % (the red dot line in the Figure 27) and 7,41 % (the yellow dot line in the Figure 27). That is, for any attributes lower than 3,70 % are under resourced and for any attributes higher than 7,41 % are over resourced.

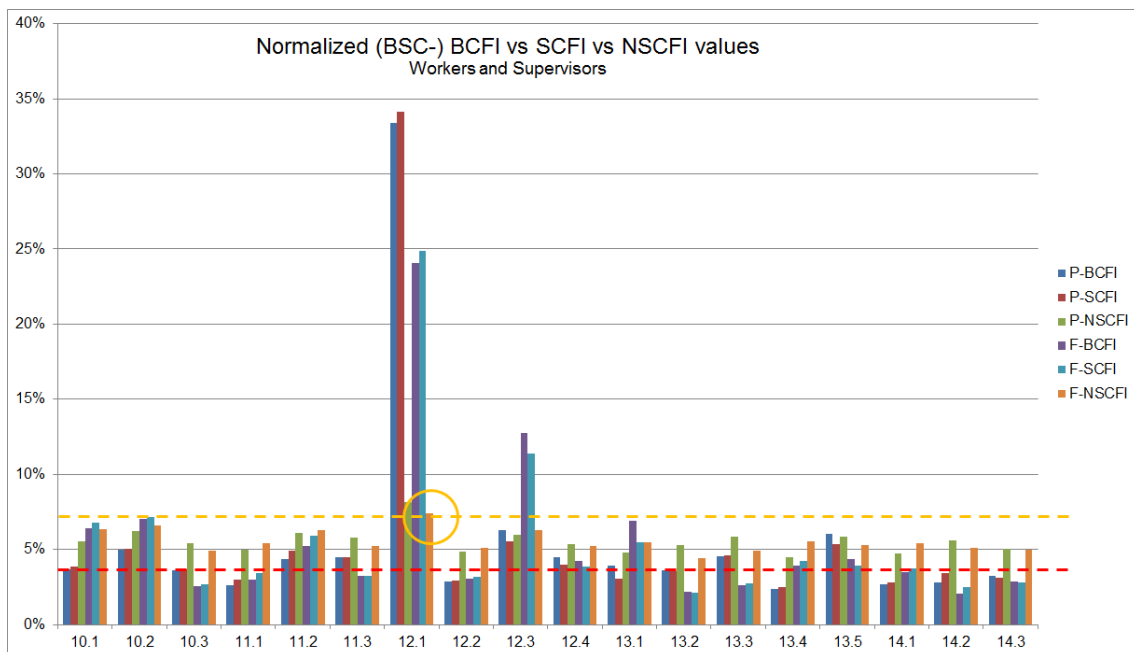


Figure 27. Balanced Scorecard's priorities 2011–2014 (BCFI-SCFI-NSCFI).

Table 5 shows comparison results between past and future values using different S&R models BCFI, SCFI and NSCFI, in which the 18 attributes are analyzed one by one.

The trend shows how the particular attribute changes from past to future. If both past and future values are good, the trend is considered to be no change and marked with “-“. If the values change from good to other, the trend is worse. On the contrary if the values change from other to good, the trend is better. If the values are both over or under, the trend still show their direction is going better or worse, for instance, over goes lower or under goes higher means better, while over goes higher or under goes lower means worse.

[84] Liu & Takala, (2012).

Table 6. Comparison between BCFI, SCFI, NSCFI (BSC).

	P-BCFI	F-BCFI	Trend	P-SCFI	F-SCFI	Trend	P-NSCFI	F-NSCFI	Trend
10.1	under	good	better	good	good	-	good	good	-
10.2	good	over	worse	good	good	-	good	good	-
10.3	under	under	worse	under	under	worse	good	good	-
11.1	under	under	worse	under	under	worse	good	good	-
11.2	good	good	-	good	good	-	good	good	-
11.3	good	under	worse	good	under	worse	good	good	-
12.1	over	over	worse	over	over	worse	over	good	worse
12.2	under	under	worse	under	under	worse	good	good	-
12.3	good	over	worse	good	over	worse	good	good	-
12.4	good	good	-	good	good	-	good	good	-
13.1	good	good	-	under	good	better	good	good	-
13.2	under	under	worse	under	under	worse	good	good	-
13.3	good	under	worse	good	under	worse	good	good	-
13.4	under	good	better	under	good	better	good	good	-
13.5	good	good	-	good	good	-	good	good	-
14.1	under	under	worse	under	good	better	good	good	-
14.2	under	under	worse	under	under	worse	good	good	-
14.3	under	under	worse	under	under	worse	good	good	-

The yellow circulated attribute, 12.1 (*Know-how*), belong to the BSC-aspect “*Learning and Growth*”. The aspect is a key element of the facilities services, e.g. material know-how is crucial for sustaining real estate’s quality in long term. The managerial implications are based on the use of analytical models.

4. RESULTS

4.1. The Managerial Implications

The survey researches indicate the affecting strategy type is prospector in past and future. Strategy type is in line with the unit's objectives: [1] Seinäjoki City's strategy 2009-2016, the [92] Security Strategy of Society 2010 and the vision of the City of Seinäjoki. According to the Security Strategy of Society (2010) the implementation of strategic tasks entails a number of other measures to be taken by actors who is involved in society's preparedness and the management of disturbances. Relevant plans and arrangements must regularly be reviewed and always when major changes take place in society or in the security environment [92] (Ministry of Defence, 2010). Therefore, as a result of thesis, the author suggests next described operational applications.

4.2. Operational application 1: NSCFI Threat Matrix

Security and Defence Committee has awarded the 2012 Diamond Award, the Rescue Department of the South Savo. The Diamond Award to be presented annually in an exemplary operation, development or innovation, to promote the safety of society. [93] (Etelä-Savon pelastuslaitos, 2013). A key idea was Excel-based matrix which conducts Security Strategy's threat scenarios to the organizations in achieving the common goal. Excel-based matrix's single cell contains a link to an operating card.

The above mentioned operational application is useful for operational development purposes too. Critical factors that have been found in BCFI/SCFI/NSCFI-method (Figure 28) and the strategic threat scenarios should be linked basically in the same way in the matrix.

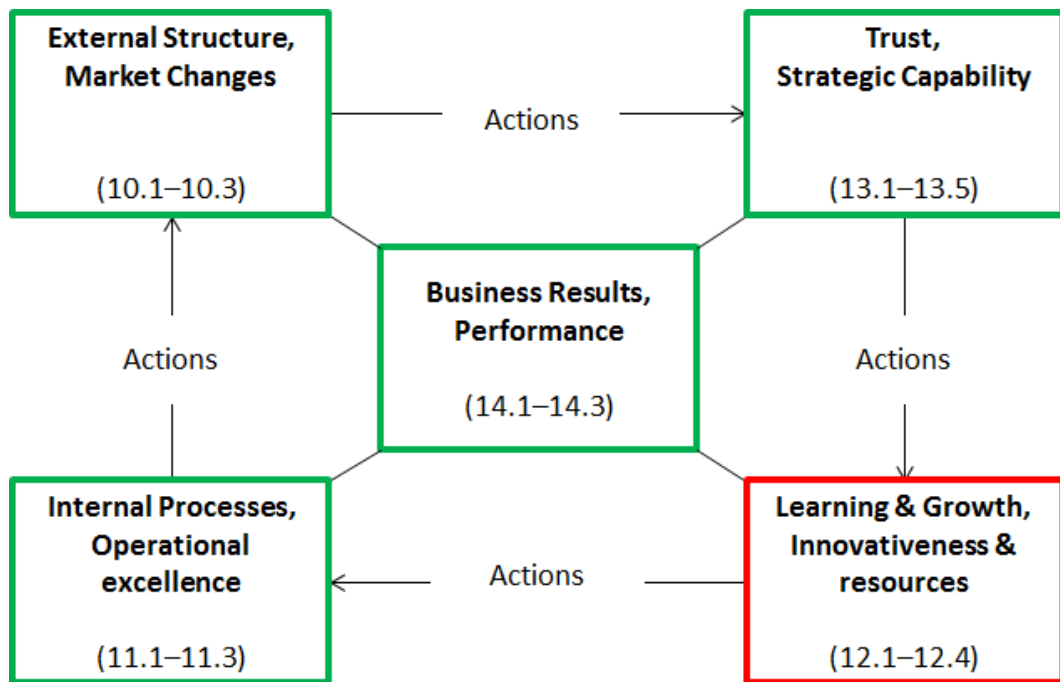



Figure 28. NSCFI-model based BSC-findings for development actions.

By conducting S&R Operations Priorities to the threat scenarios of the Security Strategy of Society forms a matrix (Figure 29). Organization's managers can intensify single level readiness and as a whole organization's proactive preparedness. Figure 29, 30 and 31 show principles for further development tools, which are the key result of the thesis for a target organization (Figure 1, Page 11).

NCSFI Threat Matrix			Threat scenarios and disturbances of the Security Strategy of Society 2010				
			1	2	3	...	13
Sense & Response (Operation Priorities)	Training and development of the organizations personnel	1.1	link	link			
		1.2	link				
		...					
	Usability and functionality of information systems	4.5					



 Link to the Evaluation and testing Card

Figure 29. Operational Application 1: NCSFI Threat Matrix.

4.3. Operational application 2: Facilities Services OSCA-model

Managing resources: finances, facilities and technologies are essential parts of preparedness [94] (Turvallisuus- ja puolustusasiain komitean sihteeristö, 2012), [59] (Ministry of Finance, 2005). Testing the target organization's NCSFI Threat Matrix produce the Operational SCA-model to the Facility Management. The unit divides the real estate property in three different categories (Class I-III) depending on the risk type of use, customers, citizens and continuity management (Figure 30).

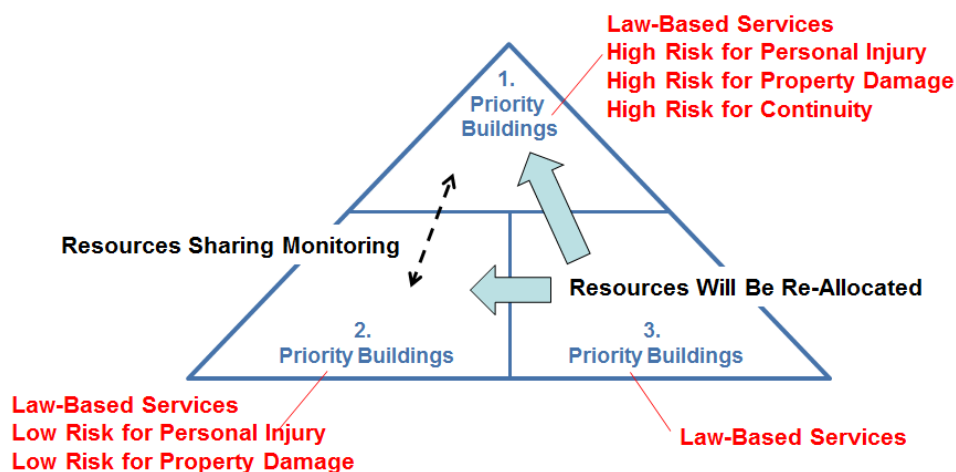


Figure 30. Operational Application 2: Facilities Services Operational SCA –model.

According to City of Seinäjoki financing, city's annual budget and financial plan this classification has to be active and follows the annual usage rate of the buildings. Class I buildings need to be safety and their usability should be secured in every circumstance because of high risk of personal injury, property damage and/or for continuity. The use of SCA implementation makes managerial implications, the matrix and model, proactive. Monitoring and re-allocation of the resources starts before the crisis. Class III's real estate maintenance could be re-targeting to the Class I and II. In regard to the resources the most critical factors are the preconditions made possible by information and the technology, the quality management of the products and functions and processes, clear task divisions and responsibility divisions at separate stages of the process, utilizing of different organizing methods. For the general operations, in regard to the resources some of the critical factors are the developing, information technology, cooperation of processes and customers. These factors show right direction in the customer orientated actions. The unit carried out a customer satisfaction inquiry to the whole organization of the City of Seinäjoki in the summer and autumn of 2011 [95] (Kosonen, 2011). The responding rate was over 16 % (n=509). Maintenance Manager produced the Quality Guidance Handbook to the unit conducting of the results [36] (Vornanen, 2012).

5. DISCUSSION

5.1. Validity and reliability test

The study of implementing sustainable competitive advantage to the public sector organization management system is essential – it uses the Sense and Respond methodology for finding critical factors in experiences and expectations in different organizational levels. It checks do the all aspects efforts or not. The thesis presents methodology which ensures that the various levels of the organization are operating in accordance with a common strategy. Even so, the results bring out the affection of the different situation only in the management level. Some of the survey's results need critical attention.

The respondents have been working together 20–30 years. Maintenance manager has been working four years in the target organization. The results form “right”. Commonly the most important criterion “quality” could be seen in material choices, in the know-how and identification of malfunction mechanism in the building. The result is also parallel with the expected value of the stakeholders. The quality of construction, building or maintenance affects the value of the real estate property.

In the end, the results from different levels, their validity and reliability are intelligible. Taking care of the occupational safety, the carefulness and the exactness of the craftsmanship are the factors of the quality in the working level. The quality work shall need time in the right place. The quality has been defined at several department meetings for the workers: much more important is considered euro per lifespan like an unconsidered euro per hour.

5.2. General findings

The target organization is one of the many units of the public sector in Finland. All those units and their strategic private partners form a chain for the goals of the Society Security Strategy. The value of the methodology is in its ability to make the structure of the organizations and strategies transparent for developing actions [96] (Rechenthin, 2004).

There are three kinds of general findings: 1) the key attributes lifted up, 2) applications for development of readiness and proactive preparedness and on the other hand, 3) use of the Sense & Respond -methodology to the case study at the same time. The target organization NSCFI-model was particularly useful. Target point for development actions is the personnel ICT ability. The development work is an importance of information technology for the target organization and transformational leadership for proactive preparedness.

Use of the method to the case study at the same time means the chapter 3 formed as a self-assessment tool. The sub-chapter 3.2.2. *Organizing Preparedness* (pages 30–34) goes through the main official documents, which are controlled activity under various situations in the public sector. The sub-chapters from 3.3.3. *Transformational Leadership* to 3.3.5. *Dynamic Capabilities* (pages 40–55) indicates responds from different levels of the organization before, during and after a crisis.

These general findings lead to the proposition for trend-assessment and therefore future research too.

6. CONCLUSION

6.1. Proposition for steering of preparedness

Society's preparedness for the last few years has shifted in exceptional circumstances to usual fault and special situations. [6] (Kivelä, 2013), [64] (Korhonen, 2012), [50] (Aine et al, 2010).

The key challenge is catching up the gap between imagination of readiness and reality before the worst case scenario is realized. On the other hand preparedness and comprehensive security are a part of the municipality's security policy and citizen's comprehensive well-being. New preparedness plan should approve by the City Council as other policies [97] (Korhonen, J. & M. Ström, 2012).

Monitoring and evaluation of the objectives of preparedness plan are essential. [70] (Pitkämäki, 2012). Plans should be carried out annually as a result of processes [98] (Väliniemi, 2013). It would be suitable to link the steering of the prevention actions to the annual budget and financial plan as a Trend Assessment (Figure 31 and Table 7).

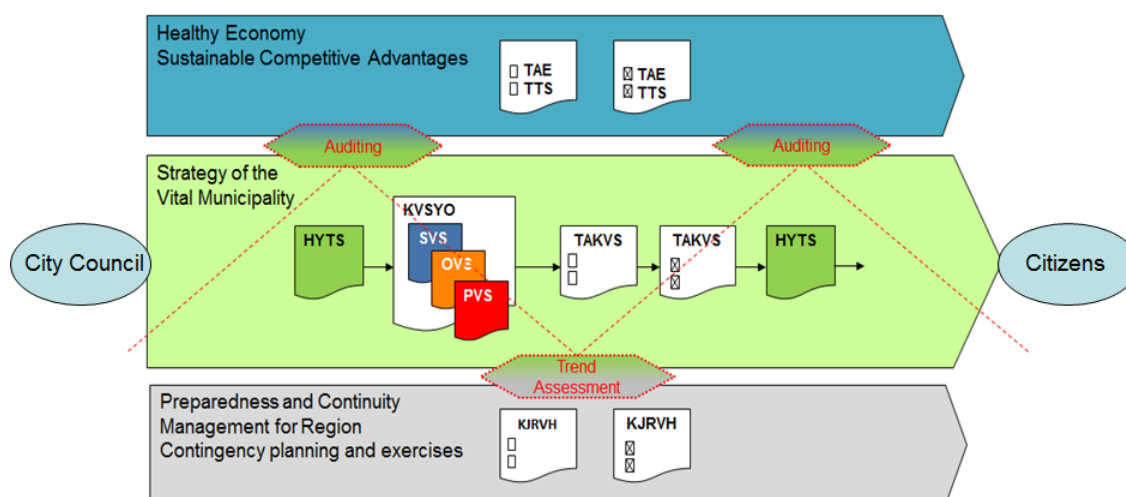


Figure 31. Operational Application 3: Steering Processes for Vital Municipality.

Table 7. Abbreviations of the steering process (Figure 31).

Finnish abbreviations	English translation and explanation
HYTS	<ul style="list-style-type: none"> Well-being and comprehensive security plan City Council
KVSYO	<ul style="list-style-type: none"> Preparedness plan Common part, “threats in general, nationally” City Council
SVS	<ul style="list-style-type: none"> Preparedness plan, part I Strategic part, “for whom, where and why we are doing” City Board
OVS	<ul style="list-style-type: none"> Preparedness plan, part II Operational part, “how we do it” City Board
PVS	<ul style="list-style-type: none"> Preparedness plan, part III Emergency situations, “war clouds, nuclear fallout, pandemic” City Board
TAKVS	<ul style="list-style-type: none"> Readiness plan Service Center’s design for preventions Annual actions
KJRVH	<ul style="list-style-type: none"> City’s practicing Mayor
TAE TTS	<ul style="list-style-type: none"> Annual budget and financial plan

As the latest Emergency Powers Act [7], § 12 files, the municipalities – its centers, departments, divisions, units, groups, teams, etc. – are responsible for proofing all the processes in all situations and to prepare for them in advance [4]. To have succeeded service producer, e.g. regional rescue service, could participate customers, the municipality's service center core operations and their quality of development to steers supporting services. According to Rescue Department of South Ostrobothnia Co-operation Agreement [99] (Etelä-Pohjanmaan pelastuslaitos, 2009) there are 19 municipalities in the target area with varying organizational structures to do that.

The number of partners requires a different approach to development. According to the Service Level Agreement for the City of Seinäjoki [100] (Etelä-Pohjanmaan pelastuslaitos, 2009) “The person is responsible for the plan's implementation and update the changes needs”. On the other hand, neither preparedness liaison officer, the City of Seinäjoki's and the Rescue Department of South Ostrobothnia, are not included any management group during a crisis [49], [66].

This implies a structure and/or process updating needs cause the task-specific organization is incompatible with the new requirements of operational responsibility and the expectation of incident management; Hallberg committee et al [4], [5], [6], [7], [8].

On the other hand the latest Rules and Regulations of the Rescue Department of South Ostrobothnia [101] (Council 18.2.2013 § 22), still aims to accident management as before (Council approved 10.11.2008 § 18 and Council updated 25.10.2010 § 158): “The available resources are directed towards full participation in the management of the risk of accidents [unofficial translation].”

There are at least three types of this expectation. First, the precautionary administrative work is the spearhead technology in the municipality especially before crisis according to the strategic expectation of sustainable development [1], [102] (Seinäjoen kaupunki, 2007). Secondly, the administrative work is not the basis technology what the municipalities expect a local rescue department to do during a crisis [100]. Third, incidents will occur [4]. The municipality or municipalities of the uniform economic zone have to have a joint body [82] in the core technology to develop common resource operations after crisis – as a sensing and responding [11].

Accomplish sustainability of the operations need for preventing on design [78] (Kamardeen, 2010). A municipality security coordination group (Figure 11, page 33) should aim to monitor risk management and the development trend of resource allocation – identifying, assessing and analyzing the municipality's organization and its environment what are the threats and operations vulnerabilities in there, so that the expectations that have been described above would (*and would not*) come true.

6.2. Further research

Referring to the Local Government Act § 1 and § 2, [43] (Ministry of Finance, 1995), the municipality must come from within the development impulses, which is the very essence of the municipality. Resource allocations interpretation can be a regional and national basis when the interpretation method is such that credible results provide the base image of the critical factors of the municipality and/or municipalities' operational abilities to act before, during and after a crisis. With the presented method has the potential to form an evaluation team even to the Defence Forces to assess the criticality of municipal supply in national level.

According to the authors work history in the small and medium size public organizations with their neighbors in three regions at Western Finland, they have the same challenges and a solution has been in the same direction. What these three jobs have in common is the operations management, identify, develop and rearrange resources especially to manage property replacement value for society to secure its performance under all conditions. What varies it is an ability to maintain the readiness and to respond to the quality of services for different conditions. Internal control and evaluation methods seem to be more an outline than an accurate system to take effective development steps for same direction in the consolidation project. After all, the consolidation of municipalities is a strategic choice with the aim of improved ability to meet the challenges of the future as one of the municipality [103] (Kuntaliitto, 2013). In other words the consolidation of municipalities is a challenge for detecting new ways to manage operations. After the decision, is obliged to adopt the necessary changes towards a more sustainable competitive advantage.

In future research, the study raises the operative findings of sustainable competitive advantage. The analytical models should go deeper to analyze the practicability of the results. The evaluations will be compared with more case studies with successful international organizations to verify the validity further. The case studies will need to be longitudinally followed from one to two years to check whether the development of competitiveness potential can be achieved in practice.

A working hypothesis is proposed that when a network of organizations wants to achieve goals in every situation [94] (Turvallisuus- ja puolustusasiain komitean sihteeristö, 2012), it has to sustain flexibility in the organizational levels; its management has to possess certain type of leaders [104] (Takala, 2007) to make decisions and lead the whole organization to behave as an integrated management system [105] (Jørgensen, 2004).

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APPENDIX

Pilot Case Studies for Research on Global Manufacturing Strategies

Dr. Yang Liu & Prof. Josu Takala, University of Vaasa

NAME _____

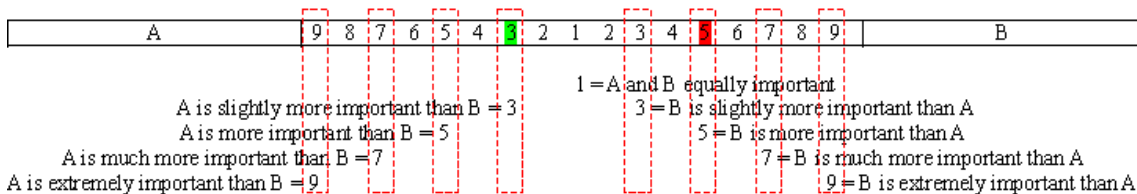
ORGANISATION _____ COUNTRY _____

ANSWER IS ABOUT (corporation, business area etc.) _____

Please specify roughly the main operations strategy in your company by evaluating the priority weights of Q (Quality), C (Cost), T (Time/Delivery) and F (Flexibility). Note: Percentage of Quality, Cost, Delivery and Flexibility altogether is 100%, which means the sum of every row in below table should be 100%.

	Quality %	Cost %	Delivery %	Flexibility %
Past 3~5 years				
Future 3~5 years				

Then we use AHP methods to evaluate in details the main and sub-criteria in operations strategy. AHP method uses pairwise comparison among all the factors to support decision making process. All questions in this questionnaire are designed to follow AHP logic. It takes two steps to answer each question. For instance, you are given two different criteria which affect manufacturing decision making. Firstly you need to compare these two given factors and select one factor which you considered as more important than the other (for example: A is more important than B or vice versa). Secondly you need to give a weight within scale of 1-9 to indicate in what extent you consider this selected factor is more important than the other one. If the factors are equally important, then select number 1. You can also use even numbers from the scale, if your answer is better suited between odd numbers.



In order to ensure the validity of answers, two incorrect examples with high inconsistency ratio (ICR) are illustrated below. By understanding the causes of ICR, informants are recommended to recheck the consistency after filling the answers.

Example 1:

1	A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	B
2	A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	C
3	B	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	C

This means $A > B$ & $B > C$ & $C > A$ which is logically inconsistent, so it causes high ICR.

Example 2:

1	A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	B
2	A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	C
3	B	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	C

This means A is much bigger than B, and A is a little bigger than C, from these two conditions it can be concluded that C should be bigger than B, but last condition put B is bigger than C, which is contradictory and causes high ICR.

Please evaluate the following criteria in every pairwise comparisons what are more important in your opinion. Please circle (O) the evaluation values for past situation and mark (X) the evaluation values for future situation.

Main Criteria

Costs	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Quality
Costs	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Delivery
Costs	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Flexibility
Quality	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Delivery
Quality	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Flexibility
Delivery	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Flexibility

Cost

Low Cost	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Value Added
Low Cost	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Quality Costs
Low Cost	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Activity Based Measurement
Low Cost	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Continuous Improvement
Value Added	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Quality Costs
Value Added	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Activity Based Measurement
Value Added	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Continuous Improvement
Quality Costs	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Activity Based Measurement
Quality Costs	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Continuous Improvement
Activity Based Measurement	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Continuous Improvement

Quality

Low Defect Rate	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Product Performance
Low Defect Rate	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Reliability
Low Defect Rate	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Environmental Aspects
Low Defect Rate	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Certification
Product Performance	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Reliability
Product Performance	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Environmental Aspects
Product Performance	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Certification
Reliability	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Environmental Aspects
Reliability	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Certification
Environmental Aspects	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Certification

Delivery

Fast Delivery	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	On Agreed Time
Fast Delivery	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Right Amount
Fast Delivery	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Right Quality
Fast Delivery	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Dependable Promises
On Agreed Time	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Right Amount
On Agreed Time	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Right Quality
On Agreed Time	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Dependable Promises
Right Amount	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Right Quality
Right Amount	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Dependable Promises
Right Quality	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Dependable Promises

Flexibility

Design Adjustment	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Volume Change
Design Adjustment	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Mix Changes
Design Adjustment	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Broad Product Line
Volume Change	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Mix Changes
Volume Change	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Broad Product Line
Mix Changes	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	Broad Product Line

THANK YOU FOR YOUR ANSWER!

Detailed Description on manufacturing main priorities**Costs**

The main criteria cost was divided into five sub criteria: low costs, value added costs, quality costs, activity based measurement and continuous improvement. Low costs means the cost of production and value added costs are the cost which increase the value of product from customer's point of view. Customers won't pay for something, that doesn't increase value. Keeping high quality causes quality costs which are caused by avoiding poor quality like internal and external failures. Activity based measurement means whether the cost of measuring adds value and Continuous improvement means the costs, which are caused by improving production.

Quality

There are several definitions of quality. Juran says that quality is fitness for use and According to Crosby quality is Conformance to requirement. ISO standard gives wide aspect: the totality of features and characteristics of a product or service that bears on its ability to meet a stated or implied need. In our research quality criterion was divided into sub-criteria such as low defect rate, product performance, reliability, environmental aspect, and certification. Low defect rate tells how important is avoid the defects from manufacturing point of view. Product performance explains company's ability to fulfill or overfill customer's demands considering the product. Reliability always describes

more or less the dependability of the whole company and organization. An Environmental aspect measures how important corporation values environmental things to be in their strategy and certification describes how important certification is for quality.

Delivery

The purpose of logistics is to get raw materials, semi-products or end products to the right place at right time with right quality. Also the amount has to be right and chosen service level needs to be fulfilled while optimizing corporation's financial outcome. Therefore delivery criterion was specified mostly basing on the basic rules of logistics. Sub-criteria were fast delivery, on agreed time, right amount, right quality, and dependable promises. Fast delivery means simply the fastness of delivery and on agreed time is basically the same as just in time. Right amount is the amount that customer has wanted and what company has promised to deliver. Right quality in delivery means that the agreed product is on the agreed place in the quality that has been agreed in advance. Dependable promises is the ability to be able to keep the promises and what has been agreed.

Flexibility

Flexibility dimensions were taken from the research of Operationalizing Manufacturing Strategy. Criterion was divided into four sub criteria that were design adjustments, volume change, mix changes, and broad product line. Design adjustments means how easily the engines are accommodated to fit with the circumstances where they are going to be used and how important it's to the corporation that the designs are flexible to meet the customers' needs. Volume change defines productions ability to react to the different levels of demand. Mix changes describe how much corporation values the ability to change product mix rapidly and broad product line gives answer to the question whether wide product line gives competitive advantage to the corporation.

Sub-criteria Description

Quality Criterion

- Low defect rate: Tells how important is avoid the defects from manufacturing point of view
- Product performance: The company's ability to fulfill or overfill customer's demands considering the product.
- Reliability: More or less the dependability of the whole company and organization.
- Environmental aspect: How important corporation values environmental things to be in their strategy
- Certification: How important certification is for quality.

Cost Criterion

- Low costs: The cost of production
- Value added costs: The costs that increase the value of product from customer's point of view.
- Quality costs: The costs are caused by avoiding poor quality like internal and external failures in order to keep high quality of product.
- Activity based measurement: The cost of measuring adds value
- Continuous improvement: The costs are caused by improving production

Delivery Criterion

- Fast delivery: Simply the fastness of delivery
- On agreed time: Basically the same as just in time
- Right quality: The agreed product is on the agreed place in the quality that has been agreed in advance.
- Right amount: The amount that customer has wanted and what company has promised to deliver.
- Dependable promises: The ability to be able to keep the promises and what has been agreed.

Flexibility Criterion

- Design adjustments: How easily the engines are accommodated to fit with the circumstances where they are going to be used and how important it's to the corporation that the designs are flexible to meet the customers' needs.
- Volume change: Production's ability to react to the different levels of demand.
- Mix changes: How much corporation values the ability to change product mix rapidly
- Broad product line: Wide product line gives competitive advantage to the corporation.