

HOW TO APPLY SUSTAINABLE COMPETITIVE ADVANTAGE FOR REGIONAL DEVELOPMENTS (CASE: OSTROBOTHNIA REGION OF FINLAND)

Josu Takala, Daryna Shylina, Sara Tilabi

University of Vaasa, Department of Production and Industrial Management, Finland

Corresponding author:

Josu Takala

University of Vaasa

Department of Production and Industrial Management

Wolffinitie 34, 65200 Vaasa, Finland

phone: (+358) 29-449-8000

e-mail: josu.takala@uva.fi

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ABSTRACT

Nowadays companies concern more about how to survive and extend their own business in future in their current marketplace. However, developing and prospering a region of the country is becoming more crucial question. Successful cooperation and partnership between different sectors of economy (for instance, between companies, public and academic sectors) leads to the flourishing and prosperity of the region and consequently of a country. European Commission established smart specialization platform, which is a strategic approach to economic development of a region. By defining and developing of vision, competitive advantages and strategic preferences, region will determine knowledge-based potential. The purpose of this paper is to assign and define the collaboration/relations existed, how strong these relations are and what the expectations are between 3 sectors of economy: public, academic and business. Area of carrying out this research is Ostrobothnia region, however, connections in other regions of Finland and internationally is also presented. There have been chosen 3 industrial peaks from Ostrobothnia region: Energy, Fur and Boat industrial peaks. Analysis is conducted by implementing two core methods: Sense & Respond (S&R) and Sustainable Competitive Advantage (SCA). The goal of this research is also to use S&R method so as to allocate efficiently resources, and to define competitive priorities in cooperation. The main results show that the most tight collaboration and partnership is observed between companies and companies in all around Finland and internationally. While concerning other relationships, companies expect to have tighter cooperation especially in Ostrobothnia and other regions of Finland.

KEYWORDS

smart specialization, cooperation, energy industry, sense and respond methodology, sustainable competitive advantage.

Introduction

Turbulent environments in business world changes static sustainable competitive advantages to a dynamic notion. According to [1] “the future competitiveness of manufacturing operations under dynamic and complex business situations relies on forward-thinking strategies”. This shows that company should be able to sense the market and situation in advance and be prepared to react suitably in any condition otherwise they cannot survive in such a complicated situation.

The relation between business and academic area was head line of many discussions for a long time. In fact, there is always a big question if companies should define the project which follows academic research or universities should sense the business needs first and define project which satisfy business worlds. Regardless of answer for this question the connection among business sector and academic sector is vital for any area to compete in market. Smart specialization project is a kind of project which developed recently to estimate the connectivity among academic sector, business sector and public sector. This

project believes one of the easiest ways to have a sustainable competitive development is to have strong connectivity among these three sectors.

The notion of sustainable competitive advantages (SCA) was developed by Porter [2] for the first time and the completed by Barney [3] as “a firm is said to have a sustained competitive advantage when it is implementing a value creating strategy and when other firms are unable to duplicate the benefits of this strategy”. Then in 2001 Barney [4] completed it as resource base view believing that the critical factors for success exist in the firm itself in terms of its resources and capabilities. So if a company wants to be successful it should keep balance in existing company’s resources and uses them towards creating advantages. As knowledge and technology has significant effect on bringing more opportunity to firms so it is included to sense and respond method to calculate SCA levels and also to estimate the effect of Knowledge and Technology (T&K) on SCA levels.

The goal of this paper is to apply SCA method to evaluate the connectivity among three main sectors (academic, business and public) in Ostrobothnia region of Finland. In fact, this paper uses sense and responded questionnaire to evaluate companies, academic and public sector in terms of different attributes which define the connectivity. Finally SCA risk allocation is applied to estimate how much resources allocation supports connection among these three different sectors.

This paper concentrates on three research questions:

1. How critical factor index (CFI) results determines the disconnected area in regional development.
2. How SCA method can be applied to gap analysis to regional development.
3. What is the effect on K&T on regional developments.

This paper starts with the shorts theory background and methodology. Then the introduction of the case is demonstrated. Third past is to bring results and finally conclusions come.

Theoretical background

Sustainable competitive advantage

The first structure to SCA method was introduced by Ansoff in 1960’s [5] as SWTO (strength, weakness, opportunity, treat). SWTO was a statistic frame work and obtain SCA by implementing strategies that increase the internal strengths while decrease internal weaknesses through responding to environmental opportunities and avoiding risk. SWTO

frame work as a start point of SCA method suffers from this problem: concentrating too much on the impact of a firm’s environment and with ignoring firms’ unique structure. Hence in 1990 Porter [6] suggested a positioning theory based on a generic strategy. This generic strategy is based on Overall cost leadership, Differentiation and Segmentation. In 1996 Porter [7] proposed that positioning strategy is not applicable in today’s business world because the nature of business and world is incredibly dynamic and turbulent. Hence resource based view model was introduced as a dynamic approach to sustainable commutative advantages. This model assumes that the critical factors for success exist in the firm itself in terms of its resources and capabilities. The goal of this model is to keep balance in existing firm resources to utilize them towards creating advantages [8].

Resource Based View of the Firm (RBV)

Although Resource and product are two sides of a coin for firms, Wernerfelt [9] suggests that analyzing a firm from the resource side has more benefit rather than from the product side and finding optimal product market activities is possible by specifying a resource profile for a firm. He defines resources as: “anything that might be thought of as a strength or weakness of a given firm”. According to Barney [3] resources can bring competitive advantages to the firm because they are rare or hard to imitate, have no direct substitutes, and help companies to achieve opportunities or avoid threats.

The key point of resource based theory is that the firms are different and a firm should uses something which has advantages in it [9].

Knowledge and Technology: a key to SCA

As knowing how to do things is more important than having special access to resources, hence Lubit [10] suggested sustainable competitive advantages as a knowledge based approach. Towards to develop a sustainable core competence based on knowledge, it is important to spread knowledge within the firm and avoid from spread to other firms which is not easy [10].

As knowledge and technology provides opportunity of competitive advantage decision makers should consider it in setting strategy [11].

In order to apply knowledge and technology effect to Sense and Respond (S&R) method respondents it is required to estimate the share of basic, core and spearhead technologies in percentages for each attributes while the summation of these three terms should be 100%.

Different types of technology are defined depends on which stage a technology is in its life cycle. According to Tuominen, Knuuttila, Takala & Kekälä [12] there are three different types of technologies: basic (key) technology, core and spearhead technology. The following picture shows these three types of technology besides it presents the connection between technology and product life cycle (Fig. 1).

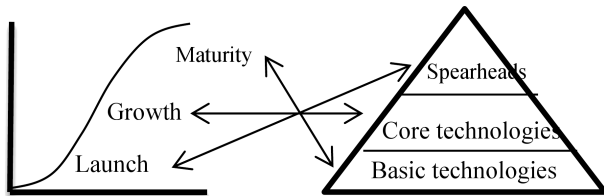


Fig. 1. The linkage between technology life cycle and technology pyramid (Tuominen et al. 2003: 5).

Core technologies include technologies that bring competitive advantages to competitors and enable the company to grow. Basic technology is referring to the technologies that are the most critical for the business. Mainly the products and services are based on these technologies and therefore are the foundation of the business. To prevent the business of leaking to competitors these kind of technologies are kept inside the company. And spearhead technology focuses mainly on future and is the most potential and brings successful business opportunities in future [13].

Research methodologies

Sense and Respond Method

Sense and Respond (S&R) method was developed by Bradley and Nolan [14] and Markides [15] to analyze dynamic business strategy. The main idea of ‘Sense & Response’ philosophy is the implementation of the best action in a turbulent business environment by detecting changes (sensing) and reacting to them properly (responding). In other worlds, this method converts threats into opportunities and drawbacks into strengths.

The S&R method was utilized by Ranta and Takala [16] to develop the operative management

system by introducing critical factor index (CFI). “The Critical Factor Index (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” [16]. In other word, CFI method is a supporting tool for the strategic decision-making which helps managers to make decision more precise .according to Takala and Uusitalo [17] in the current turbulent business environment fast adaptation and development can be considered as one of the most important strengths. Since then, the S&R model has gone through three stages of development, which are called CFI model, balanced critical factor index (BCFI) model, scaled critical factor index (SCFI model) and new scaled critical factor index (NSCFI) [18].

In order to implements Sense and respond method, a questionnaire is developed by Takala and Ranta [16] which is presented in following Tables 1–3.

Table 1
Format of questionnaire (part 1).

Performance attribute	Scale: 1=low, 10=high	
	<i>expectation</i>	<i>experience</i>
Performance 1		
Performance 2		

Table 2
Format of questionnaire (part 2).

Performance attribute	Compared with competitor		
	<i>worse</i>	<i>same</i>	<i>better</i>
Performance 1			
Performance 2			

Table 3
Format of questionnaire (part 3).

Performance attribute	Direction of development		
	<i>worse</i>	<i>same</i>	<i>better</i>
Performance 1			
Performance 2			

After the data collection using questionnaire, the following formulas are used to calculate CFI, BCFI, SCFI and NSCFI [17, 19].

$$CFI: \frac{Std(experience) * Std(expectation)}{Gap\ Index * Direction\ of\ development\ Index * Importance\ Index}, \tag{1}$$

$$BCFI: \frac{Std(experience) * Std(expectation) * Performance\ Index}{Importance\ Index * Gap\ Index * Development\ Index}, \tag{2}$$

$$SCFI: \frac{\sqrt{\frac{1}{n} * \sum_1^n (experience(i) - 1)^2} * \sqrt{\frac{1}{n} * \sum_1^n (expectation(i) - 10)^2} * Performance\ Index}{Importance\ Index * Gap\ Index * Development\ Index}, \quad (3)$$

$$NSCFI: \frac{\sqrt{\frac{1}{n} * \sum_1^n [experience(i) - 1]^2} * \sqrt{\frac{1}{n} * \sum_1^n [expectation(i) - 1]^2}}{Importance\ Index * Gap\ Index * Development\ Index}. \quad (4)$$

Parameters:

- Importance index: presents the level of importance of one criterion among others. This index reflects the actual expectations of the company regarding one criterion.

$$\frac{Avg(expectation)}{10}. \quad (5)$$

- Gap Index: is used to understand the gap between experience and expectations of a specific criterion.

$$\left| \frac{Avg(experiecne) - Avg(expectation)}{10} - 1 \right|. \quad (6)$$

- Development index: presents the information about the actual direction of the company's development.

$$\left| \frac{Better\% - Worse\%}{100} - 1 \right|. \quad (7)$$

- Performance index: presents the value of an attribute's performance based on the real experience of the respondents.

$$\frac{Avg(experience)}{10}. \quad (8)$$

- Standard deviation of experience: represents if respondents have similar answer regarding to one attribute for what they have experienced.

$$\frac{Std(experience)}{10} + 1. \quad (9)$$

- Standard deviation of expectations: reflects if respondents have similar answer regarding to one attribute for expectation in a specific future.

$$\frac{Std(expectation)}{10} + 1. \quad (10)$$

When the calculations are ready, the results of CFI, BCFI, SCFI and NSCFI calculations can be presented in the following bar chart (Fig. 2):

When the bar chart is ready, three colors are used to define the level which one attribute are located: red for under resources attributes, green for normal attribute (not critical) and yellow for over recours attributes. Green bars are considered as balanced whereas both red and yellow bars (over and under

resources attributes) are critical and needed to be considered in improvement plan [18].

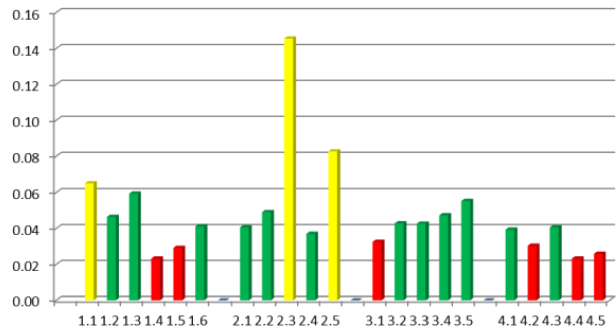


Fig. 2. Example of the final bar chart to represents CFI, BCFI, SCFI or NSCFI results.

Sustainable Competitive Advantage

Sustainable competitive advantages method (SCA) is a risk measurement tool to estimate functionality of operation strategy. This tool helps to understand if company internal resource allocation supports companies' strategy. In this paper, there are three indexes, which are MAPE, RMSE and MAD to measure the risk level of the operation strategy for sustainable competitive advantages.

MAPE (absolute percentage error)

$$SCA = 1 - SUMi((ABSi((BS-BR)/BS))). \quad (11)$$

RMSE (root means squared error)

$$SCA = 1 - (SUMi((BS-BR)/BS)^2)^{1/2}. \quad (12)$$

MAD (maximum deviation)

$$SCA = 1 - MAX(ABSi(BS-BR)/BS)). \quad (13)$$

Case introduction: Smart specialization (S3) in Ostrobothnia

The goal of smart specialization project is to have better and stranger connection among public area, academic and business sector. In fact, this project believes the key answer to have sustainable development is to have stronger connection among these three part in one region.

Considering these three sectors (academic, public and business) there are 4 different kinds of relations:

- Academic sector – business sector;
- Academic sector – public sector;
- Business sector – public sector;
- Academic sector – Business sector – Public sector.

According to the goal of S3 project the optimum relation is the last one which these three sectors are involved.

In order to conduct smart specialization in Ostrobothnia region of Finland three steps should be conducted:

1. Mapping of partners (Network analysis);
2. Measuring the strength of the partnership: the most important relations in the triple helix network (Sustainable Competitive Advantage analysis);
3. Identifying and evaluating current and future technologies.

Results

In S3 project 9 companies participated in the survey, which belong to energy industry. In this chapter connections and partnerships with business, public and academic sectors will be defined from energy industry point of view. Results are presented below.

Companies from the energy peak maintain partnerships in three sectors: public, academic and business. Collaboration between business and public sectors is the strongest in the national level as well as collaboration between business and academic sectors. Contrary to that, partnership in business sectors exists in both levels: national and international. What is more important to mention is that there are 4 companies among 9 companies do not have partners in public, academic and business sectors (Appendix 1).

Companies from energy peak expect from the partnership with public sector that collaboration will be improved significantly in Ostrobothnia and other regions of Finland. The biggest changes are expected in Ostrobothnia region: cooperation in regional development and in planning the use of land. At the same time no development is expected in such cooperation compared to past period of time: in environmental affairs and in employment affairs in Ostrobothnia region, in development of industries in other regions of Finland, and in most areas of cooperation in the international level. Moreover, cooperation in employment affairs in other regions of Finland will worsen in future and will not be improved (Fig. 3).

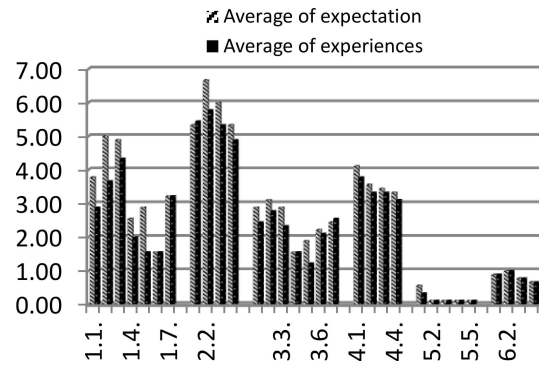


Fig. 3. Average of expectations vs. Average of experiences (business – public sectors).

In order to receive deeper analysis, S&R method was used for defining critical and balanced areas of cooperation. NSCFI method is used as the main method, which is considered to be the most reliable in this situation.

Talking in to the consideration future period of time, generally situation will be slightly improved, but cooperation in the international level will remain problematic along with cooperation in planning the use of land in the Ostrobothnia region, and also cooperation in development of technologies in Ostrobothnia region will also remain scattered area in future. On the other hand, there will be small changes and improvements: cooperation in planning the use of land in other regions of Finland will become stable in the contrast to cooperation in development of industries in other regions of Finland which will become scattered (Fig. 4). Additionally to that, such attributes as our key partner contacts us, our key partner knows our operations, our key partner improves our innovational activities and our key partner knows our staff will be scattered in future period of time.

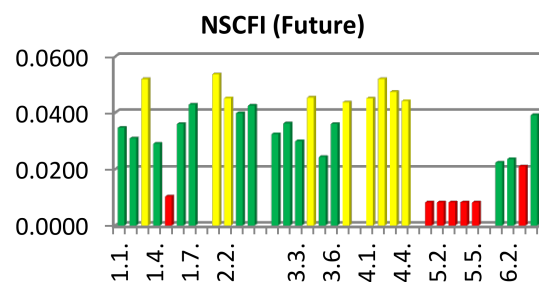


Fig. 4. S&R method: NSCFI (Future): business sector – public sector.

Companies from energy peak expect from collaboration with academic sector that significant improvement will be in the national level, while in the international level there will not be any development or situation will remain the same as in past. The

most significant changes will be in Educational cooperation and cooperation in research in Ostrobothnia. Cooperation in development in other regions of Finland and cooperation in research in the international level will not be developed in future are expected to stay in the same level as in past period of time (Fig. 5).

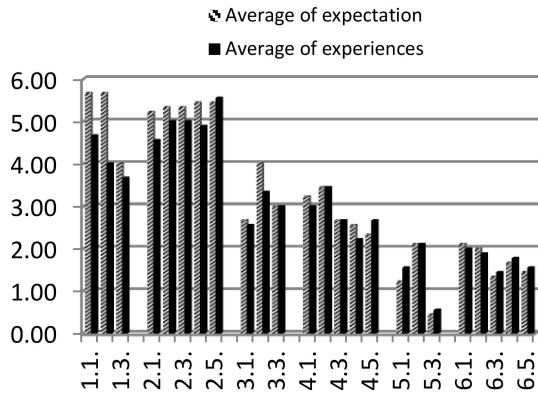


Fig. 5. Average of expectations vs. Average of experiences (business – academic sectors).

With the help of S&R method overall picture of cooperation between business and academic sectors is determined and showed in Fig. 6. Taking into the consideration results from the Fig. 6 which predicts situation in future period of time situation will be improved by considerably improvement of the scattered areas in other regions of Finland and internationally. On the other hand, cooperation in development internationally will remain problematic in future period of time. Additionally to that some scattered areas will appear in the national level: we know our key partner’s operations and we know the supporters and the teaching staff of our key partner (those related to our field).

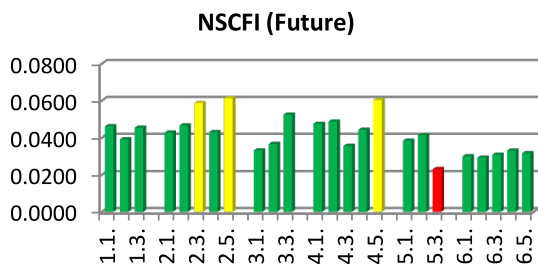


Fig. 6. S&R method: NSCFI (Future): business sector – academic sector.

Companies from energy peak expect from collaboration with business sector that improvements will take place in both national and international levels. The biggest changes are expected in cooperation with subcontractors in the national level. In

the contrary to that companies do not have big expectations concerning cooperation in organizational development in the national and international levels, cooperation in marketing in Ostrobothnia region and cooperation in developing processes internationally (Fig. 7).

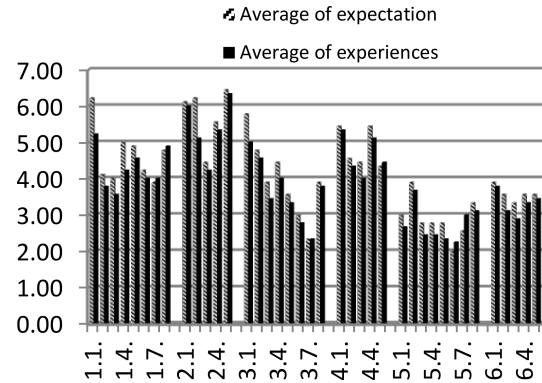


Fig. 7. Average of expectations vs. Average of experience (business – business sectors).

General situation was defined with the help of S&R method, particularly by NSCFI tool. Based on the results from Fig. 8 general situation will worsen in future compared to past period of time. However, scattered and critical areas which are in past will be improved and will become balanced areas. Moreover, 3 more problematic areas will appear in the national level: cooperation with subcontractors and cooperation in organizational development. Moreover, cooperation with customers will become scattered and will require more attention as in further future it can be changed to problematic area.

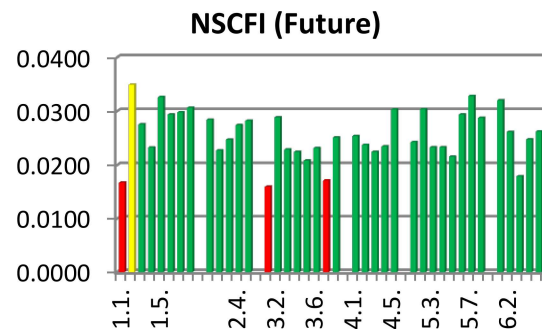


Fig. 8. S&R method: NSCFI (Future): business sector – business sector.

Furthermore, technology and knowledge level was defined. There are three types of technology levels: basic, core and spearhead, which are mentioned and described earlier. In the collaboration with public sector basic technology is dominating (Fig. 9). In the partnership with academic sector basic technology is dominating and is used in the national level while

core technology is dominating and is used in the international level (Fig. 10). At last, in the cooperation with business sector core technology is dominating, but basic technology is reaching the level of core technology (Fig. 11).

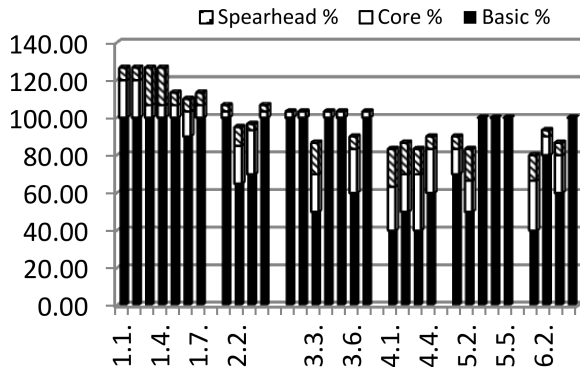


Fig. 9. Technology and Knowledge level, business sector – public sector.

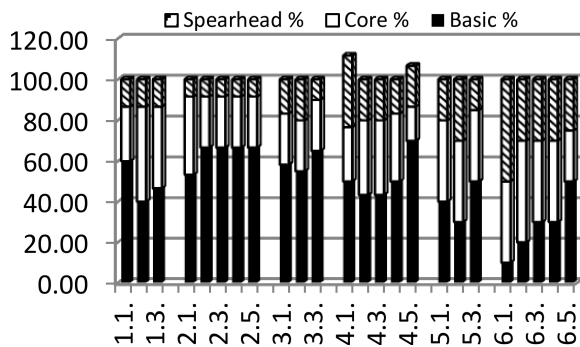


Fig. 10. Technology and Knowledge level, business sector – academic sector.

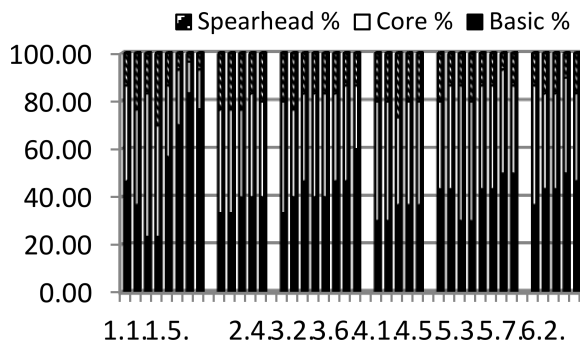


Fig. 11. Technology and Knowledge level, business sector – business sector.

In the final analysis SCA is calculated and interpreted (Table 4). Two periods of time are introduced in these tables: past and future. The values of SCA are between 0 and 1. Therefore, values which

are close or greater than 0.97 are considered to be high, values which vary from 0.90 to 0.97 are defined as medium high and values which are from less than 0.90 – low values.

Table 4
SCA – risk level results (Future).

	BCFI	SCFI	NSCFI	BCFI T/K
Business sector – Public sector	0.95	1	0.96	0.99
Business sector – Academic sector	0.89	0.88	0.89	0.94
Business sector – Business sector	0.94	0.96	0.95	0.91

The final stage of calculation and analysis is defining risk level in future period of time. Risk level in future period of time will be improved in all three types of partnerships. Moreover, the highest risk level will remain in the cooperation with academic sector. The most stable risk level is in the cooperation with business sector, which does not change much compared to past time. Such situation shows that more resources should be properly allocated and should be paid more attention on this partnership. Moreover, the lowest risk level is observed in the partnership between business and public sectors (Table 4).

Discussion

This paper concentrates on three research questions:

First question is: How critical factor index (CFI) results determine the disconnected area in regional development. In this paper S& R method is presented as a tool to gap analysis among different sector for the first time. In other worlds in questionnaire the attributes are defined showing connectivity. In next stage, when the interview conducted the balanced level is calculated. So each attribute which is located in balance line shows the good connection and each attribute in under resource area shows weak or no connection. However, considering this method there is no clear definition about the attribute which are located in over resource area and in general the situation of this attribute considered as unknown in terms of connectivity.

Second question is: How SCA method can be applied to gap analysis to regional development. In this paper when CFIs analysis is conducted, the SCA levels are calculated. The explanation behind SCA level is that how much company internal resource allocation supports having connection with other sectors. In Ostrobothnia case, SCA level for academic and

business sectors is the lowest showing that there is less tendency between these two sectors to have connection comparing others.

And finally this paper looks for the effect on K&T on regional developments. This research shows that K/T effects on regional development but not in the same for all the sectors. For the relations among business sector with academic and public sector, K/T factor improves the connection and reduces the SCA risk level while for the relation among business with other business, K /T factor decreases the SCA level and increases the risk. Hence K/T factor effects the connection between companies with other companies in negative way.

Conclusions

The main purpose of this study is to create a system for defining existence and strengths of cooperation between different organizations through implementation of Sustainable Competitive Advantage method in macro level. It also helps to determine problematic and stable areas of these partnerships. Energy peak was chosen for conducting this survey. There were 9 companies/respondents participated in the survey. The collaboration in energy peak is observed between business sector (companies) and public and academic sectors.

Based on the main findings presented above, firstly, it can be mentioned that the strong cooperation in the national level, especially in Ostrobothnia region is presented between business sector and public and academic sectors. On the other hand, the strong partnership between business and business sectors are noticed in both levels, national and international. Moreover, average of expectations and experiences calculations prove that companies are willing and are expecting to have considerable improvements in the cooperation in the national level only between public and academic sectors. While taking into the consideration cooperation with business sector companies from energy peak expect to have a significant development in both levels, national and international.

According to the problematic and stable areas in these partnerships in future period of time, it can be concluded that companies – public sector and companies – academic sectors collaborations have the most stable areas in the national level and there are critical areas in the international level. On the other hand, business – business sectors cooperation has some problematic areas in the national level and stable situation in the international level. In addition to that, Technology & Knowledge criterion is taken to the consideration as well. To sum up, in the compa-

nies – public sector cooperation the main technology is considered to be basic in levels, nation and international. In the companies – academic sector cooperation there is a leading technology which exists in the national level, while core technology is the leading technology in the international level. At last, only in the business – business cooperation the core technology is the leading and the main technology in the national and international levels. However, basic technology is quite close to the core technology.

In the final stage the risk levels in the future period of time are calculated. The highest risk level observed to be in the cooperation between business and academic sectors, which means that this cooperation is not strong enough and resources are not distributed and used properly. In contrast to that collaborations in business – public sectors and business – business sectors have the lowest risk levels, which demonstrates the situation where internal resources are well allocated and used.

In the future research, several ideas can be proposed as follows:

- as it was mentioned above there are only 9 respondents/companies from energy peak participated in this project. For future research it is more reliable to have more desirable to have more respondents from each company and at the same time to have more companies from energy peak in order to have more reliable results and findings. It will help to see more accurate situation and to make more precise conclusions about the peak of industry;
- S&R and SCA methods should be more tested in such cases because it will help to use only one tool which is the best tool for detection of the strength of the cooperation, problematic and stable areas and the risk levels. Thus resource allocation can be divided and distributed more precisely within the companies and other institutions based on the proper decision making. Additionally, more partnerships will be created and existed one will be improved;
- this research was based on relationships between companies and public sector, academic sector and companies. In future research works new relationships can be created. For example, relationships/cooperation between public sector and companies, academic sector and public organizations. The same idea applies to universities. This research will help to indicate from different perspectives expectations and real situations about cooperation among all these 3 helixes. Hence, new questionnaire should be created for public and academic sectors while the system itself remains unchanged.

Appendix 1. Existed relations in energy peak

	Business sector – Public sector	Business sector – Academic sector	Business sector – Business sector
Company 1	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia regions • other regions of Finland 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia regions • other regions of Finland • international cooperation
Company 2	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia regions • other regions of Finland • international cooperation
Company 3	No relation	No relation	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia regions • other regions of Finland • international cooperation
Company 4	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland • international cooperation 	No relation	No relation
Company 5	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland • international cooperation
Company 6	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland 	No relation	No relation
Company 7	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland • international cooperation 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland
Company 8	No relation	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland • international cooperation
Company 9	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland • international cooperation 	<ul style="list-style-type: none"> • Ostrobothnia and Central Ostrobothnia region • other regions of Finland • international cooperation
Conclusion	National cooperation	National cooperation	National and international cooperation

Appendix 2. S&R questionnaire for business – public sectors cooperation

	Attributes
	Cooperation in Ostrobothnia and Central Ostrobothnia
1.1	Cooperation regarding infrastructure/logistics
1.2	Cooperation in regional development
1.3	Cooperation in development of technologies
1.4	Cooperation in development of industries
1.5	Cooperation in planning the use of land
1.6	Cooperation in environmental affairs
1.7	Cooperation in employment affairs
	Our key partner of public administration (a partner may be anything from previous sections)
2.1	Our key partner contacts us
2.2	Our key partner knows our operations
2.3	Our key partner improves our innovational activities
2.4	Our key partner knows our staff
	Cooperation outside Ostrobothnia and Central Ostrobothnia (elsewhere in Finland)
3.1	Cooperation regarding infrastructure/logistics
3.2	Cooperation in regional development
3.3	Cooperation in development of technologies
3.4	Cooperation in development of industries
3.5	Cooperation in planning the use of land
3.6	Cooperation in environmental affairs
3.7	Cooperation in employment affairs

	The main public partner
4.1	Our key partner contacts us
4.2	Our key partner knows our operations
4.3	Our key partner improves our innovational activities
4.4	Our key partner knows our staff
	International cooperation
5.1	Cooperation in technological development and development in industry
5.2	Cooperation in environmental affairs
5.3	Cooperation regarding infrastructure/logistics
5.4	Cooperation in training development
5.5	Cooperation in regional development
	Note! Please select your partner which is the most important and only answer to this one in relation to the following questions (partner can be from any part of the area)
6.1	Our key partner knows our operations
6.2	Our key partner helps to solve our difficult problems
6.3	We know the staff of our key partner
6.4	Our key partner knows the concepts and statutes of our industry

Appendix 3. S&R questionnaire for business – academic sectors cooperation

	Attributes
	Cooperation in Ostrobothnia and Central Ostrobothnia (Note: In this section your partner may change depending on question)
1.1	Educational cooperation
1.2	Cooperation in research
1.3	Cooperation in development
	Note: Pick the most important partner of yours and only answer for this one as for the following questions
2.1	We take contact to our key partner
2.2	We know our key partner's methods of teaching, research and development
2.3	We know our key partner's operations
2.4	Our key partner improves our innovational activities
2.5	We know the supporters and the teaching staff of our key partner (those related to our field)
	Cooperation in other parts of Finland
3.1	Educational cooperation
3.2	Cooperation in research
3.3	Cooperation in development
	Note: Pick the most important partner of yours and only answer for this one as for the following questions
4.1	We take contact to our key partner
4.2	We know our key partner's methods of teaching, research and development
4.3	We know our key partner's operations
4.4	Our key partner improves our innovational activities
4.5	We know the supporters and the teaching staff of our key partner (those related to our field)
	International cooperation
5.1	Educational cooperation
5.2	Cooperation in research
5.3	Cooperation in development
	Note: Pick the most important partner of yours and only answer for this one as for the following questions
6.1	We take contact to our key partner
6.2	We know our key partner's methods of teaching, research and development
6.3	We know our key partner's operations
6.4	Our key partner improves our innovational activities
6.5	We know the supporters and the teaching staff of our key partner (those related to our field)

Appendix 4. S&R questionnaire for business – business sectors cooperation

	Attributes
	Yhteistyö Pohjanmaan ja Keski-Pohjanmaan maakuntien alueella
1.1	Cooperation with subcontractors
1.2	Cooperation with customers
1.3	Cooperation between departments of the company
1.4	Cooperation in developing technologies
1.5	Cooperation in developing productional functions
1.6	Cooperation in developing processes
1.7	Cooperation in organizational development
1.8	Cooperation in marketing
	Note: Pick the most important partner of yours and only answer for this one as for the following questions
2.1	We share our key know-how with our key partner during mutual innovation process
2.2	Our key partner knows our company's products/services
2.3	Our key partner knows our company's standards and concepts
2.4	Our key partner helps to solve our difficult problems
2.5	Our key partner knows our key personnel
	Other regions of Finland
3.1	Cooperation with subcontractors
3.2	Cooperation with customers
3.3	Cooperation between departments of the company
3.4	Cooperation in developing technologies
3.5	Cooperation in developing productional functions
3.6	Cooperation in developing processes
3.7	Cooperation in organizational development
3.8	Cooperation in marketing
	Note: Pick the most important partner of yours and only answer for this one as for the following questions
4.1	We share our key know-how with our key partner during mutual innovation process
4.2	Our key partner knows our company's products/services
4.3	Our key partner knows our company's standards and concepts
4.4	Our key partner helps to solve our difficult problems
4.5	Our key partner knows our key personnel
	International cooperation
5.1	Cooperation with subcontractors
5.2	Cooperation with customers
5.3	Cooperation between departments of the company
5.4	Cooperation in developing technologies
5.5	Cooperation in developing productional functions
5.6	Cooperation in developing processes
5.7	Cooperation in organizational development
5.8	Cooperation in marketing
	Note: Pick the most important partner of yours and only answer for this one as for the following questions
6.1	We share our key know-how with our key partner during mutual innovation process
6.2	Our key partner knows our company's products/services
6.3	Our key partner knows our company's standards and concepts
6.4	Our key partner helps to solve our difficult problems
6.5	Our key partner knows our key personnel

References

- [1] Si S., Takala J., Liu Y., *Benchmarking and developing the operational competitiveness of Chinese state-owned manufacturing enterprises in a global context*, J. Innovation and Learning, 7, 2, 2010.
- [2] Porter M.E., *Competitive Advantage: Creating and Sustaining Superior Performance*, The Free Press, New York, NY, 1985.
- [3] Barney J., *Firm resources and sustained competitive advantage*, Journal of Management, 17, 99–120, 1991.
- [4] Barney J.B., *Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view*, Journal of Management, 6, 643–650, 2001.
- [5] Ansoff H.I., *Corporate strategy: an analytic approach to business policy for growth and expansion*, New York: McGraw-Hill Higher Education, 1965.
- [6] Porter M.E., *The Competitive Advantage of Nations*, Macmillan, London, 1990.
- [7] Porter M.E., *What Is Strategy?*, Harvard Business Review, 61–78, 1996.
- [8] Xiao Zhong-hai, Ning Bo, Yuan Hong, *On Company Core Competence and its Sustainable Competitive Advantage during Industrial Transformation*, International Conference on Information Management, Innovation Management and Industrial Engineering, 2008.
- [9] Wernerfelt B., *A resource base view of the firm*, Strategic Management Journal, 5, 171–180, 1984.
- [10] Lubit R., *Tacit Knowledge and Knowledge Management: The Keys to Sustainable Competitive Advantage*, Organizational Dynamics, 29, 4, 164–178, 2001.
- [11] Morone J., *Strategic Use of Technology*, California Management Review, 31, 4, 91–110, 1989.
- [12] Tuominen T., Rinta-Knuuttila A., Takala J., Kekäle T., *Technology survey: logistics and automation branch of materials handling industry*, The 2nd International Conference on Logistics & Transport, LOADO'2003, pp. 1–9, 2003.
- [13] Takala J., *Resilient and Proactive Utilization of Opportunities and Uncertainties in Service Business*, Proceedings of the University of Vaasa, Finland, University of Vaasa, Vaasa, 2012.
- [14] Bradley S.P., Nolan R.L., *Capturing Value in the Network Era*, Harvard Business School Press, Boston, 1998.
- [15] Markides C., *All the right moves: a guide to crafting breakthrough strategy*, Harvard Business Press, USA, 2000.
- [16] Ranta J.M., Takala J., *A holistic method for finding out critical feature of industry maintenance services*, International Journal of Services and Standards, 2007, Vol. 3 No. 3, pp. 312–325.
- [17] Takala J., Uusitalo T., *Resilient and Proactive Utilization of Opportunities and Uncertainties in Service Business*, 2012.
- [18] Liu Y., Wu Q., Zhao S., Takala J., *Operations Strategy Optimization Based on Developed Sense and Respond Methodology*, Proceedings of the 8th International Conference on Innovation & Management, Finland, University of Vaasa, pp. 1010–1015, 2011.
- [19] Nadler D., Takala J., *The Development of the Critical Factor Index Method*, Faculty of Technology, Department of Production, University of Vaasa, 65200 Finland, 2008.