

Competitiveness and Knowledge in Theory and Practice¹

Competitividade e conhecimento na teoria e na prática

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Abstract: This article is about competitiveness in theory and in reality at the firm level. The competitive situation of the firm has always been vital to the firm's development while the more theoretical discussions have changed in intensity. One upswing of the theoretical debate came in the 1980's with the introduction of the work by Porter and this debate is still continuing. One result so far seems to be that most scientists are critical to transfer the concept of competitiveness from the micro/firm level to the macro level. There still seems to be two points of departure (or "schools") for how to conceptualize competitiveness. One has been called the industrial economy school linked to Porter and the other using a resource/competence view of the firm, several scientists can be named here, e. g. Penrose and Hunt. In this article we discuss similarities and differences between these schools. After 2000 we have seen several statements from the European Union and others about how developed economies actively must utilize the knowledge base of the communities they are a part of to develop competitiveness. In the empirical part of this article we show how that can be done. This analysis is done within the framework of a resource/competence based view of the firm where it is important to develop competence depending on changing needs from the market.

Keywords: competitiveness; knowledge; competence based view of the firm

Resumo: Este artigo é sobre a competitividade na teoria e na realidade ao nível da empresa. O estágio competitivo da empresa sempre foi vital para o seu desenvolvimento, enquanto que as discussões mais teóricas desaceleraram de intensidade. Uma retomada do debate teórico veio na década de 1980 com a introdução da obra de Porter e este debate ainda se mantém. Um resultado, até agora visto, é que para maioria dos pesquisadores é crucial transferir o conceito de competitividade a partir do nível micro / firma para o nível macro. Parece ainda haver dois pontos de partida ou escolas teóricas para conceituar a competitividade. Uma delas tem sido chamada de escola de economia industrial ligada à Porter e o outro usando a visão baseada nos recursos / competências no âmbito da empresa, e vários pesquisadores podem ser citados, por exemplo, Penrose e Hunt. Neste artigo discutiremos semelhanças e diferenças entre essas escolas. Depois de 2000 temos visto várias afirmações vindo da União Europeia e de outros países sobre como as economias desenvolvidas devem utilizar ativamente a base de conhecimento das comunidades das quais fazem parte para desenvolver a competitividade. Na parte empírica deste artigo vamos mostrar como isso pode ser feito. Esta análise é feita dentro de uma visão baseada nos recursos / competências da empresa, onde é importante para desenvolver competências de acordo com mudanças exigidas pelo mercado.

Palavras-chave: competitividade; conhecimento; visão baseada na competência da empresa.

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Competitiveness in the micro and macro - how to define the concept of competitiveness

The concept of competitiveness is one of the most used and misused in the analysis of economic development and industrial economy. Paul Krugman argued in his famous article "Competitiveness: A dangerous obsession", Krugman (1994) that: "Most people who use the term competitiveness do so without a second thought."

Critical voices to transfer the concept of competitiveness from micro/firm level to the macro/societal level have also come from others, such as Kitson et. al. (2004)

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where they state: "Economists and experts everywhere have elevated "competitiveness" to the status of a natural law of the modern capitalist economy".

The problem is, in brief, that the term competitiveness originally developed for a company, i.e. at the micro level, is transferred uncritically to be used to analyze how geographically delineated areas, like regions or nations, can develop.

Michael Porter reintroduced the concept of competitiveness in the 1980's in his analysis of the competitiveness of the country, but Porter also was critical of the use of this term, and argued, Porter (1992): "I believe that many policy makers as many corporate executives, view the sources of true competitiveness within the wrong framework."

At the national level OECD defines competitiveness as (OECD (1996)): "The degree to which it can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real income of its people over a long term".

The main point of the criticism to use competitiveness at the national level is that companies are rivals and compete in markets, but countries do not compete in the same way. The vast majority of scientists (including Porter and Krugman) link the concept of competitiveness to productivity at the national level. Porter argues, Porter (1980; 1990) that an important factor in determining a country's standard of living is to look at the productivity economy. Then productivity is measured as the value of goods and services produced in the country in relation to resource use.

Several of the analyses Porter (or made by others based on Porter's model) has made about countries' competitiveness have had far reaching importance for recommendations for economic policies from the 1980's and up to now. The EU, European Commission (2000), within the framework of the Lisbon agenda, adopted a strategy for competitiveness in March 2000 where the goal was to make the EU: "The most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and great social cohesion."

As you can see from the quote EU linked the development of competitiveness with the transition to a knowledge-based economy. In July 2005 EU launched a further development of this, Commission (2005) within the framework of three priority areas:

- Making Europe a more attractive place to invest and work;
- Knowledge and innovation for growth;
- More and better jobs.

Porter's analysis of the competitiveness of nations was innovative. Discussion and criticism of the use of the concept of competitiveness at the national level is somewhat different compared to the regional level. Regions within countries are competing more directly with each other than nations. In particular, it is often the case that regions compete to attract businesses and qualified workers.

In 2004, Porter and his partners made an analysis of the competitiveness of rural regions in the U.S., Porter et. al. (2004). The results of this study correspond to a large extent with many other studies of rural districts in European countries. It is interesting to note that many of the factors that Porter finds that affect the competitiveness of rural regions in the U.S. positively, are the same as those found in the Norwegian and other European analyses and policy recommendations on how to get rural regions to grow. Porter points to the fact that rural regions are different from urban in the sense that they have fewer inhabitants per square kilometer and

generally lower income levels. The factors Porter finds that contribute to economic success in rural regions are:

1. Education and skills in the workforce of the region.
2. An effective transportation system reducing availability drawbacks.
3. Accepting an open economy with competition from other regions, but, at the same time, developing both the human capital and the networks that are necessary to ensure that businesses are productive.
4. Ensure that the landscape and environmental qualities that can provide advantages through efficient and rapid planning processes.
5. A positive attitude to the development of entrepreneurship.
6. Cultural capacity – in the sense that the community's culture contributes to the companies' need for increased productivity.
7. Identity development.
8. Efficient institutions avoiding unnecessary bureaucratic obstacles and encouraging the building of partnerships between private and public sectors.

2. Firms and the microeconomic and macroeconomic rationale and use of the term productivity.

Porter, like many other economists, looks at the company's internal and external factors when it comes to the analysis of productivity. This terminology is essentially the same as Marshall used in his book "Principles", Marshall (1890/1920). Porter's (2004) point of departure is what he calls the microeconomic foundations of the businesses:

- Sophistication of company operations and strategy (Internal factors)
- Quality of the business environment (External Factors).

Then Porter continues by saying the following: "Moving to more sophisticated ways of competing depends on parallel changes in the microeconomic business environment. The business environment can be understood in terms of four interrelated areas: The quality of factor input conditions, the context for firm strategy and rivalry, the quality of local demand conditions, and the presence of related and supporting industries. Because of their graphical representation the four areas have collectively become referred to as the diamond."

This is the core of Porter's diamond model and what it does is first to provide a formula for the focus areas that are most important to analyze the competitiveness of the firm, and then to see what connections there are between internal and external business factors.

Further, Porter argues that clusters are important and may affect the competitiveness of firms in three ways. Firstly, it can increase the productivity of the firm in the sense that the company gets more efficient access to specialized suppliers, specialized labor and information flows more generally. Second, clusters increase the opportunities for innovation. And third, clusters stimulate business development more generally.

3. Resource-based business oriented analysis of competitiveness

An important and interesting contribution to the discussion of the concept of competition, and more specifically about how companies develop competitive advantage, comes from the American professor Shelby B. Hunt. Hunt believes that what he calls a "Resource Advantage Theory" is the best starting point for analyzing companies' competitive position, (Hunt 2000, 2001). Hunt looks at several economic platforms for his Resource Advantage (RA) theory where the important one is evolutionary economics represented by Schumpeter (1934, 1950) and Nelson and Winter (1982). Furthermore, he draws on the resource based tradition represented by Penrose (1959) and competence based tradition represented by Selznick (1957), Hamel and Prahalab (1989, 1994) and Sanches and Heene (1997). Furthermore, he also finds interesting contributions from institutional economics and transaction cost economics (Williamson, 1975, 1996).

The platform for Hunt's Resource Advantage Theory (RA) includes:

- RA theory has an evolutionary basis largely in line with Nelson and Winter.
- RA theory treats competition between companies in such a way that innovation and organizational learning are endogenous factors.
- Companies and the demand side have perfect information.
- Institutions and public sector have an impact on the financial performance of businesses performance.

One can say that the assumptions and focus areas that Hunt emphasizes largely correspond to what Foss (1996) calls a competence perspective for the analysis of firm competitiveness.

Another point to make clear is how to deal with demand. Neoclassical economic theory with their view on the perfect competition claimed that one identified commodity only had one demand behavior to deal with. This claim and the assumptions it is based on have proven to be so far from reality that the analysis of competitiveness based on RA-theory/resource-based theory assumes what is called heterogeneous demand theory. This implies that the manufacturers which produce similar goods meet different demand behavior depending on consumer tastes and preferences. For example, there may be products where design and functions are very similar, but the actual delivery terms different, which mean that both price and market conditions may be different.

With this background corporate resources are heterogeneous and mobility in relation to the different types of inputs can vary from completely mobile to absolutely no mobility. Similarly, the company's resources are considered as unique and adapted to different market segments to achieve corporate objectives to the greatest extent possible. This means that the company's competitive advantages and disadvantages must be viewed in relation to how they are combined with the company's unique resources and the market segment the company has for the various commodities it produces. This manner of reasoning is also used by Porter but reached from a slightly different point of departure. To illustrate his perception Hunt presents a "Competitive Position Matrix" Hunt (2000, 2001) that can be used for analysis of different commodities.

To assess which product has a competitive advantage Hunt uses two main criteria:

- The unit cost of the commodity – that can be lower, equal or higher than the competitor.
- Relative Resource Produced Value – This refers to how the demander sees this product's perceived value relative to the competing commodities.

Hunt gives in his book from 2000, Hunt (2000) and article from 2001, Hunt (2001) examples about how companies' different strategies can change the competitive position.

He also points out that corporate objectives when these competitive processes still are in progress must be based on earnings and profits. It is essential, as described in the works mentioned above, that the coordination of market processes and technological product development takes place while the financial situation is preferably reinforced, at least not worsened. To achieve this, the company's total resource picture, the financial, technological/physical, human/knowledge-related, organizational and relational factors, must be managed in an integrated context. The company's strategy must, in short, be formulated in such a way that it is a balance between unit cost of production and perceived value of the product in the market. These arguments are based on the premise that markets, competitive situation, technology and knowledge are dynamic factors and the company within this framework should develop their innovative capacity. It is interesting to see how both Hunt and others, like Nelson and Winter (1982), based on an evolutionary business economic logic conclude as follows (Hunt (2001)): "Firms in evolutionary theory are motivated by profit and search for ways to improve profits which differs from profit maximation over well defined and exogenously given choice sets."

Hunt and others in the resource-based business financial analysis usually make the assumption that firms' objective is "superior financial performance" (Hunt 2001). Other writers such as Stieglitz (2010) documents that the attitude of profit varies considerably between producers and between cultural beliefs from country to country and that these interpretations also change over time, depending of both the cultural development in general and how institutions, especially political institutions, change.

4. A discussion of the similarities and differences between the analysis based on an industrial economic founded analysis and a resource oriented analysis

There is a large number of books and articles in which the authors believe they have a good solution to analyze what competitive advantage for a company is and what strategies one should lay as the basis for achieving corporate goals. The review provided here has two main starting points for the interpretation of the concept of competitiveness at the firm level, the first largely linked to Porter and industrial economics and the other to a resource-based and evolutionary oriented analysis of the firm. In actual analysis the differences are not so large, both directions borrow from each other, and there are also many articles and books which only to a modest extent explain the basis of the analysis. Furthermore, it is also often the case that the analysis that is chosen depends on the type of product and market niche in question. As Porter (1985, p33) says: "Competitive advantage stems from the many discrete activities a firm performs in designing, producing, marketing, delivering, and

supporting its product. Each of these activities can contribute to a firm's relative cost position and create a basis for differentiation."

The concept of the value chain is an important tool companies use to understand and analyze the relationships between various activities to improve its competitiveness, Value chain and value chain analysis is a systematic way to divide up the various processes within the firm, but also to see the connection between them, so that management can understand the company's cost structure and the potential it has to differentiate their products in different markets. How such an analysis is conducted depends on the type of business and there is a distinction in attitudes in the literature between small, medium and large businesses. One can say that the analysis of Porter in many ways assumes that there are larger companies with substantial resources both in terms of product development and management.

This differs basically from the situation for smaller companies where a relatively small management team who is responsible for the different activities. This has both advantages and disadvantages and some of the advantages for small businesses is that they have a higher degree of integrated management decisions where the participants are in direct contact with each other. The disadvantages for the small firms are often a lack of resources and specialization.

The concept of competitive advantage was developed and used before Porter, for example, by Penrose (1959). Several authors like Mintzberg (Mintzberg 1978, Mintzberg and Waters 1985) have criticized Porter's use and definition of the concept of competitive advantage from the point of view of formulation of a strategy for a company because this concept to a large extent is a socially constructed concept with an individual and not clearly definable content. One can say that Porter (Porter 1980, 1985) belongs to the classical part of the industrial economists who believe that through a rational process in the company it can analyze the company's environment and internal system and from this come up with effective and correct answers about how the company as a whole should adapt to achieve the goals. This is largely based on a rational profit maximizing attitude.

The alternative is to go further into details about behavior looking at activities including building and using network of social relationships. This means that the formulation of strategy for the company is not only linked to the rationality found in the company, but also to cultural rules and how the company is linked to local communities, other businesses and surrounding networks. This raises the question of the relationships seen between the concept of competitive advantage and strategy concept. There are a large number of books on how a company should analyze its competitiveness and present the strategy to meet corporate goals, such as a widely used book called *Business and Competitive Analysis* by Fleischer and Bensoussan (2007). In this book you will find the following quotation, also found in many other similar books: "Competitive analysis is the cornerstone of effective strategy formulation and execution."

This implies that one must first conduct an analysis of the company's competitive situation and let this then form the basis for the formulation and implementation of the strategy that owners and the management see as the best for the company.

Almost all variants of the definition of the concept of competitiveness and competitive advantage are based on dividing so that you look at the company's internal capabilities and the external factors affecting the company. Business oriented analysis based on a resource based platform may use the following factors for the analysis of the company's competitive advantages, Wickham (2001):

- Costs – Importance of price to customers, suppliers and distributors. Extent of demand elasticity.
- Knowledge – Stage of industrial life cycle. Common or localized knowledge. Tacit or codified knowledge.
- Relationships – Building links with customers, suppliers and distributors. Position in network and relative power.
- Organization – Creation of organizational appropriate structures. Ability to respond to market signals. Leadership styles (Delegation or centralization).

It is interesting to compare how Porter formulates his diamond compared to a resource oriented approach like the one of Wickham presented above. The most striking difference is that the resource based business economists emphasize knowledge and knowledge as an independent driving force behind the development of competitiveness where Porter looks at knowledge more as a result when the various factors work together.

If we go further into the human resource model the development of expertise gives the company special competitive advantage because such expertise is impossible or provides competitors little opportunities to imitate or to substitute.

Later research on networks, see Haussler (2005) show a trend in the direction of greater transparency with respect to the exchange of knowledge and this openness is to the benefit of developing the competitiveness of companies. Previously it was assumed that business managers tried to maximize the knowledge inflow and minimize the outflow of knowledge from the company. This may still be right in many situations but Haussler shows that in some knowledge-intensive activities, such as in pharmaceuticals, there is a trend towards greater transparency, both in sending and receiving information from the company to both cooperating and competing firms. This is also related to the type of knowledge in question and can be understood as a part of the process that tacit knowledge is becoming more and more important compared to explicit knowledge.

An important background variable for the individual firm's opportunities to participate in and contribute to building networks is the social and knowledge capital of the employees. Within the framework of human resource model, how compensation and incentive schemes actually work and motivate executives and other participants in the network is analyzed. It is interesting in this context to see that both the reward systems based on direct monetary benefits and reward systems based on other socially motivating factors like recognition and more responsibility both play a role.

Economists that rely on resource based models as a starting point for an analysis of competitiveness have criticized Porter for not emphasizing knowledge and relations properly and Porter (1991) has the following comments to this: "Resources are not valuable in and of themselves, but because they allow firms to perform activities that create advantages in particular markets."

This leads to the central point stressing that it is to what extent and how the human resources and relations contribute to the company's competitive advantages that is the key.

5. Empirical example

5.1 Project background

Aker Verdal is a Norwegian company that produces equipment for the offshore oil sector. The North Sea has been their primary geographic market, but in recent years, Aker Verdal has produced equipment used in offshore applications in Canada and the Gulf of Mexico. Between 2000 and 2009, the company had a total annual production value of about 200 million USD and employing roughly 750 workers. The main output produced by Aker Verdal is steel jackets; a market which has experienced significant changes in demand, large fluctuations in volume and changes in design and engineering. It is a great challenge for the company to maintain continuity in production when activity is low and market fluctuations are the rule, not the exception.

Aker Verdal built a specific steel jacket called a Valhall between May 2008 and June 2009. The steel jacket weighed about 7000 tons, had a cost of roughly 100 million USD, and took about 500,000 work-hours to build. The report from the Valhall project (Westeren 2010) discusses many aspects of the production process; here, we will focus on the analysis and data collection looking at the following questions:

1. How can we obtain a more general picture of the company's competitive position by looking at production errors?
2. How do knowledge creation, transfer and use influence competitiveness?
3. How do competitiveness of in-firm factors like production errors compare to relational variables like participation with other firms?

The company has focused on welding technology and developing mechanized welding equipment and robots. One of the reasons for the company's success in the offshore industry has to do with fulfilling very stringent requirements in welding quality for off-shore products in the oil sector. All welding equipment can be bought on the world market and the company has no technology related patents. The competitive advantage for a company like Aker Verdal lies in the use of new cost saving solutions. This requires an interaction in the entire production line, from design/drawings to manufacturing and work management, and control/testing of the job. A technological advantage is therefore both the actual technological solution and in how the whole production system is organized.

5.2 Data collection

Data collection for this project was based on observation and registration of central steps of the manufacturing process. The data collection followed closely the entire production process and the central concept in the manufacturing design of a steel jacket is referred to as the **work package**. The production of Valhall was divided into approximately 600 work packages and each work package had complete drawings of the "piece" that was produced and a description of all work processes and test procedures for the acceptance of the work package in its final form and an estimate of the number of work hours required for the production process. Work

packages differed in size and content, from small jobs with less than 100 work-hours to large scale operations of more than 2000 work-hours .

The central characteristic of the data collection in the project was how the knowledge and innovation variables were linked to other properties of each work package. This was done by using an indicator set. For every indicator we registered values which in practice were done by having one member of the research team one (sometimes two) day(s) each week at the production site. Special attention was paid to situations where work hours were saved or lost compared to the standard calculation for the specific work package. The most important function of how communication and knowledge transfer took place in the production of the work packages included the central position of group leaders.

The variables used in the project were first divided into three main groups:

- I. Background and structural variables;
- II. Variables related to knowledge capital;
- III. Variables related to results from production activities.

5.3. Competitiveness and error generation and repairs

To answer the questions asked in this analysis we pay special attention to the following variables: One variable linked to outcome of production: Production errors – extra hours spent; One relational knowledge capital variable: Participation with other firms.

In the data collection for each work package we registered all production errors meaning all tasks that had to be done once again or otherwise had to be corrected in relation to what was described in the work package. For all work packages where an error occurred we recorded the number of hours needed to do this additional work so that the work package could be approved. In business language, this is called a rep, which stands for repair. Some modification work was carried out within the framework of the number of hours originally calculated in the job package and this is not registered as an error.

The data shows that there was a production error in 61 work packages accounting for a total number of 1198 hours, very close to 1% of the total number of hours recorded in the project. The average number of hours for the repair was 20 hours and most of the repairs took between 4 and 20 hours.

We built a regression model to explain the factors underlying incorrect productions operations after having looked at the correlations that seemed interesting. Since Production errors – extra hours spent is a very interesting variable we did two different formulations with this variable. One based on the original formulation based on 431 observations and one where we look at the 61 work packages where an actual error has occurred in production.

One explanatory variable is called “Loss of hours because of non-responsive behavior” and this variable measures extra hours spent by the group leader to intervene more than calculated in the work package. The production takes place in such a way that drawings and other material describing how the work package shall be built first is sent to the group leader in charge of the production process. He then gives instructions to the members of the group, on the average six workers, where three normally are welders. Depending on the complexity of the work package some

hours are included in the work package for a follow up by the group leader. When the job is finished it is carefully controlled both by the firm's own control team and by external control of the ordering company, in this case British Petroleum. The control procedures normally include X-rays of critical parts. There is a culture in the firm concerning the production of the work packages to be very conscious and accurate. So when there is doubt about interpretation of the working instructions the group leader is called. Registrations of hours when the group leader spend more hours than assumed in the description of the work package is what lies behind the variable "Loss of hours because of non-responsive behavior". The variable "Number of welders on the job package" is a size variable and tells the actual number on the team that performed the job.

Among the 431 job packages examined the company hired other firms to do work as a part of the work package in 24 cases. The firm purchased in total 1325 hours and the average size of purchased work from others was 55 hours. The reason for purchasing from the others is mainly specialized operations as other firms can deliver more cheaply than in-house production and in some cases the firm outsourced work to others because of capacity bottlenecks. The variable "Hiring other companies to work package" is measured by registering the number of hours bought for each case.

The variable "Competency Level" is a knowledge variable based on registration of the welders' competence level. The variable "Extra hours spent – measuring accuracy" is a technology variable measured in the following way. As explained, during the production process it is of vital importance that the work package is done to the exact specifications. This includes that the size of the different parts must be correct. During the production process the workers measure size several times and these measurement operations are complicated (normally using laser equipment) and sometimes when there is doubt these measurement processes must be done several times to ensure that quality standards are maintained. In the project we registered all work packages where more hours had been spent than anticipated in the standard calculation.

The dependent variable in the regression model in Table 1 is "Production errors – extra hours spent" which is an indicator for competitiveness of the firm more generally. The variable representing the involvement of the group leader is the dominating explanatory variable. This makes sense since all information is filtered through him or her. The analysis shows that more extra hours spent on production errors, the more the group leader must interfere, in excess of what is calculated in the work package. Another variable that is significant in the regression model is the number of welders at the work package. This means that the larger the number of welders participating in the work package is, the more severe the production errors are. This suggests that it is not the individual welders' competence in itself that is the problem, but the interaction that goes on in production.

Table 1 - Regression results for dependent variable Production errors – extra hours spent. (Variable based on 431 observations)

	Non-standardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.885	1.576		-.561	.575
Loss of hours of non-responsive behavior	.198	.017	.521	11.326	.000
Number of welders at work package	.575	.154	.178	3.733	.000
Hiring other companies to work package	.436	.156	.106	2.801	.005
Competency Level	.122	.658	.007	.185	.854
R	R Square	Adjusted R Square	Std. Error of the Estimate		
.646	.417	.412	8,178		
Dependent variable: Production errors – extra hours spent					

Source: The search results.

Another variable that has explanatory power is “Hiring of other companies to work package”. It seems that cooperating with others gives rise to more production errors than what is the situation with in-house responsibility. It may be possible that the firm learns from cooperating with others, but the analysis of all variables, see Westernen (2010) does not show significant results in this direction. At least it looks like the firm must lose in efficiency in the short run to be able to learn in the long run. In general it looks like production errors are more an organizational problem and a communication problem than a technological problem.

When a production error occurs the firm tries to minimize the problem as best it can. The regression results for the recoded variable “Production errors – extra hours spent, recoded” are found in Table 2.

Table 2 - Regression results for the variable Production errors - extra hours spent, recoded. (Recoded variable, based on 61 observations where production errors have occurred)

	Non-standardized coefficients		Standardized coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	26.454	8.852		2.988	.004
Extra hours spent - accuracy	1.091	.669	.232	1.631	.109
Competence Level	-4.131	3.157	-.136	-2.308	.020
Loss of hours of non-responsive behavior	.132	.042	.440	3.101	.003
R	R Square	Adjusted R Square	Std. Error of the Estimate		
.640	.410	.377	16.821		
Dependent variable: Production errors – extra hours spent, recoded					

Source: The search results.

The role of the group leader is still significant, but in this specification two other variables show up as significant. The level of knowledge for the welders is significant in the way that the higher “Competence Level” for the welders the less extra hours the firm has to spend on repairs. In the situation when an error has

occurred we find a significant connection between knowledge and competitiveness. We also find that one of the technology variables is significant in this situation “Extra hours spent – accuracy”. The interpretation is that when the firm has problems with technology this leads to a loss in competitiveness.

Conclusions

This chapter is about competitiveness in theory and in reality at the firm level. The competitive situation of the firm has always been vital to the firm’s development while the more theoretical discussions have changed in intensity. One upswing of the theoretical debate came in the 1980’s with the introduction of the work by Porter and this debate is still continuing. One result so far seems to be that most scientists are critical to transfer the concept of competitiveness from the micro/firm level to the macro level. Different studies also show interesting similarities between countries about which policies to advise to enhance business developments and promotion of firm’s competitive situation.

There still seems to be two points of departure (or “schools”) for how to conceptualize competitiveness. One has been called the industrial economy school linked to Porter and the other using a resource/competence view of the firm, several scientists can be named here, e. g. Penrose and Hunt. There are no clear cut “borders” between these schools but one can find some elements from neoclassical based market economy in the industrial school while the resource/competence school more can be linked to an evolutionary economy tradition. One interesting difference is the attitude to knowledge creation and transfer, and how knowledge is important for competitiveness.

After 2000 we have seen several statements from the European Union and others about how developed economies actively must utilize the knowledge base of the communities they are a part of to develop competitiveness. In the empirical part of this chapter we show how that can be done. This analysis is done within the framework of a resource/competence based view of the firm where it is important to develop competence depending on changing needs from the market. Another result is that to analyze the relationships between competitiveness and knowledge is a very resource demanding task for the firm. And it also looks like such an analysis is uniquely linked to this firm’s situation and the processes of how one firm develops competitiveness by utilizing knowledge may not be the same even within firms in the same sector. One result from the case study is how the group leader functions as a “knowledge broker” is of vital importance for knowledge transfer, and thereby for productivity and production costs. On the other hand we find more mixed results of the importance about what the knowledge level (and changes in knowledge level) has to say for productivity and production costs. The case study is from a firm where the fundamental knowledge is mastered on the different levels of the firm by strict control procedures. But whether the best idea is to use an extra resource on educational training to enhance individual skills or for better systems for knowledge transfer within the company depends on the situation, especially technology, organization and product.

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