How Transfer Of Knowledge Can Be Linked To Productivity And Competitiveness Of The Firm - Theoretical Considerations And Case Study.

Como a transferência de conhecimento pode ser ligada a produtividade e competitividade da empresa - Considerações teóricas e estudo de caso.

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Abstract: The most important contribution management needs to make in the 21st century is to increase the productivity of knowledge work and knowledge workers. This is the point of departure for this article where we first give a theoretical discussion about how firms can utilize knowledge to improve competitiveness. This builds on the assumption that the firm's utilization of tangible resources depends on how they are combined and applied, which is in turn, a function of the firm's knowledge. In the empirical part of the article, we analyze how these processes take place in assembly line operations and support functions. The main result is that although knowledge itself is important, it is essential to develop an understanding of human resource developments on all levels of the managerial system of the firm and ensure that the managers are able to transfer knowledge between groups.

Key words: Knowledge transfer, productivity, competitiveness, culture

Resumo: A mais importante contribuição que a gestão precisa fazer no século XXI é aumentar a produtividade do trabalho de conhecimento e o conhecimento dos trabalhadores. Este é o ponto de partida para este artigo, onde primeiramente nós fazemos uma discussão teórica sobre como as empresas podem utilizar o conhecimento para melhorar a competitividade. Isto baseia-se no pressuposto de que a utilização de recursos tangíveis da firma depende de como eles são combinados e aplicados, o que por sua vez é uma função do conhecimento da firma. Na parte empírica deste artigo nós analisamos como esses processos ocorrem em operações da linha de produção e funções de suporte. O principal resultado é que o conhecimento é importante, mas é essencial desenvolver uma compreensão da evolução dos recursos humanos em todos os níveis do sistema de gestão da empresa e garantir que os gestores são capazes de transferir conhecimento entre os grupos.

Palavras-chave: Transferência de conhecimento, produtividade, competitividade, cultura.

JEL: D83, D21, D22.

1. Firms meeting the demands from the knowledge society.

The evolution to what is called the knowledge society means that firms are becoming more dependent-on the successful utilization of knowledge as a factor of production (Westeren 2012). This represents a real challenge because industries must change their modes of organization, as well as develop knowledge with respect to their employees and networks. Updating of knowledge is also a prerequisite for maintaining the dynamics of production and capacity for innovation. If industries are to be able to keep pace with technological changes and adapt their skills accordingly, they must update knowledge utilization as a part of the ongoing production process.

This article uses a firm producing white meat as a case study, and this industry, as well as most others, must also meet the expectations of a market which places increasing demands on quality and novelty. The response to customer requests becomes a necessity, and the firm must improve competitiveness and innovate. The firm must capitalize the experience held for creating value, and in this process knowledge becomes a true differentiating factor.

Globalization increases the need for the management of knowledge throughout the complete line of production. This is vital, also for the process industries, whose activities involve production in an ever changing environment. This globalization and increased economic uncertainty lead firms to put more emphasis on their core competencies to help improve performance in terms of production, technology, management and costs.

2. Knowledge transfer and competitiveness

2.1 Knowledge and skills as resources

Knowledge was certainly not at the center of the neoclassical theory of production and it was not until Edith Penrose's vision of resources as the basis for the firm (Penrose 1959) that we saw the beginning of what has been called "The Resource Based View" (RBV) of the firm. This approach was developed further by Wernerfelt (1984) and Barney (1991). The RBV continued to develop after 1990 in many directions, including knowledge (Grant, 1996; Spender, 1996), core competencies (Prahalad and Hamel, 1990), and dynamic capacity (Teece, Pisano, and Shuen, 1997).

Many authors starting within the RBV and knowledge based perspectives adopted a model like in Figure 1.

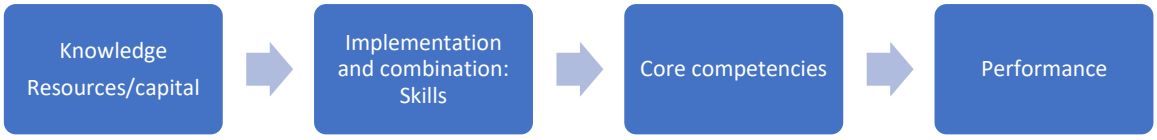

Figure 1 Developments of the knowledge resources of the firm

In general, resources refer to the means which are necessary to achieve the transformation of inputs into outputs, and are owned or controlled by the firm. Here we have special interest in the knowledge resources/capital in the broad sense, and one often used definition (MERITUM (2002)) is to say that the firm's knowledge capital is equal to the sum of three elements:

1. Human capital: defined as the knowledge that employees have and hold, regardless of whether they are in the workplace or not, for example the employees' expertise, education etc.
2. Structural capital: defined as the collection of knowledge that stays in the company, such as formal rights to knowledge, patents, corporate practices, databases, descriptions of routines etc.
3. Relational capital: ~~are~~ defined as all human capital and structural capital that is associated with the network of all external business relationships, such as contacts to subcontractors, marketing etc.

All firms have knowledge capital but the first important task for the firm is to develop the knowledge capital into skills. Skills are normally understood as the capacity of the firm to combine the knowledge capital in the optimal way. This understanding can be traced back to Schumpeter (1934) via Prahalad and Hamel (1990) and up to recent work on knowledge in organizations by Takeuchi et al. (2013). The central capacity of skills as a result of knowledge is that it can improve in value by learning, unlike physical capital assets.

- To determine the value of knowledge capital, firms can use the following keywords, see e. g. MERITUM (2002):
- Identification: Here we need to look at knowledge in relation to the processes that are crucial for value creation in the company – core competences.
- Measurement: Here we need to find a useful set of indicators to measure the knowledge capital as it actually is.
- Management: We must develop a management system for the company where we take into account the effects that knowledge capital has to achieve corporate goals.

This delineation brings in the concept of core competencies and Prahalad and Hamel (1990, p 81) offered this definition: “Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies.”

One important lesson from the core competencies discussion is that the knowledge and skills of the firm must be treated within the overall goal of the firm, normally profit maximization. Most firms want a large knowledge base and highly skilled employees. But in an international, highly competitive business environment, firms in general must identify their most important procedures based on knowledge (the core competencies) that their competitors can not imitate without high costs. This

normally also demands an optimal combination of explicit and tacit knowledge, Takeuchi et al. (2013).

2.2 Knowledge transfers

2.2.1 The point of departure

Knowledge transfers have been a focus for studies for decades and we normally divide between intra-organizational transfers, which is between units of the same organization, and inter-organizational transfer, which is between the unit and the outside environment. In this article and in the case study, the focus is on intra-organizational knowledge transfer which can be defined as the process by which the experience of a unit is affected by another, Argote et al. (1990; 2000). This definition was originally formulated based on a subject-object split, meaning that organizational knowledge exists outside of the individual and can be stored and transferred from one place to another in the organization in the form of technologies, practices, routines, rules, procedures or of individual connections.

Szulanski (1996) was one of the first to propose a conceptualization of knowledge transfers in terms of a process. He defines the transfer as an exchange of organizational knowledge within a system consisting of a sender and a receiver. Szulanski (1996) considers that the transfer of knowledge takes place in four steps:

Step 1: The initiation.

This includes all events that are at the origin of the transfer. A transfer occurs when the need is formulated in such a way that it initiates a response from the organization. During the initiation phase, the problems that arise are often related to the identification of needs and the definition of the terms of the transfer.

Step 2: The implementation.

Implementation begins when the decision to proceed with the transfer of knowledge is taken. At this stage resources start to flow between the sender and the receiver, and social links between them are established. The transferred knowledge and practice undergoes adaptations based on the anticipated needs of the receiver to prevent problems and to allow the introduction of new knowledge. During the implementation phase the problems that arise are often related to the difficulty of finding common ground for communication between the sender and the receiver.

Step3: “Ramp-up”.

The receiver has just started using the transferred knowledge. At this stage the receiver's focus is to solve unforeseen problems preventing him from fully utilizing the advantages of the transferred practice. Adler (1990).

Step 4: Integration.

Integration begins at the point where the receiver begins to take advantage of the new practice, transferring it into profitable use, and building up to improve/change routines. The sender and the receiver are now using the same practices together. This

joint use of the same knowledge promotes better coordination of activities between the sender and the receiver.

Such a conceptualization is inspired by models of communication developed by Shannon and Weaver (1949). Like any process of communication, the transfer process includes a transmitter (the sender), a message, a transmission channel and a receiver. Such a design looks at the transfer as a simple process and underlines the mechanical dimension.

2.2.2 Alternative perspectives on the knowledge concept

In recent decades new perspectives of knowledge transfer and its mechanisms have come to challenge the simple objectivist model. One framework has abandoned the assumption that knowledge and learning are individual processes and instead looks at knowledge transfer processes as cultural and social phenomena, Brown and Duguid (1991), Lave and Wenger (1991). This framework sees organizational knowledge transfers as a form of distributed social expertise, "knowledge-in-practice", meaning that knowledge is not separable from its historical and cultural context. Knowledge is thus linked to the practice and is formed in the interaction.

Organizational knowledge is here based on four main features:

- It is located in a system of ongoing practices.
- It is relational.
- It is rooted in a context of interactions and is acquired through participation in communities of practice.
- It is continually reproduced and renegotiated and is therefore always dynamic and temporary.

This interpretation of knowledge builds on a social constructivist philosophy of science where knowledge is assembled forms inside of a social context characterized by the presence of multiple, collective and individual actors. The transfer of knowledge here is looked at as a process of translation in which the transport involves the transformation. The idea of knowledge translation implies an ongoing process through which practices emerge, grow and turn into routines and eventually disappear.

2.2.3 A closer look at factors influencing the success of knowledge transfers

It is possible to establish many classifications when analyzing factors influencing the successful transfer of knowledge, but the following four are often used:

- The types of the transferred knowledge.
- The receiver.
- The sender.
- The organizational context.

<u>The types of the transferred knowledge</u>

One important type of transferred knowledge is based on the distinction between tacit knowledge and explicit knowledge, and this may also have a decisive influence on the process of knowledge transfer, see Szulanski (1996), Foss and Pedersen (2002),

Håkanson and Nobel (2000), Hansen (1999; 2002), Kotabe et. al. (2003) and Polanyi (1962). The tacit knowledge concept is central in both theoretical and empirical literature on the types of knowledge. This concept is derived from the work of Polanyi (1966) which came with the famous statement that "*we can know more than we can tell",* Polanyi (1966, p. 4). Tacit knowledge needs to be codified before it can be transferred when we look at the knowledge concept from a positivistic philosophical view.

The success of knowledge transfers is also dependent on its complexity, and Reed and DeFillippi (1990, p. 91) say: *"Complexity and, thus, ambiguity arise from large numbers of technologies, organization routines, and individual- or team-based experience"*. After about year 2000 we have seen research on transfers taking into account the complexity of the knowledge like Simonin (1999), Dyer and Hatch (2006) and Carlile (2004). Simonin (1999) showed that complexity in general had a negative impact on the transfer. In general, researchers consider that complex knowledge is more difficult to transfer because it demands a high variation in connecting skills and technologies.

Another characteristic of knowledge studied by literature on transfer is the specificity of the knowledge. Reed and DeFillippi (1990), building on Williamson (1985), describe the specificity as the transaction skills used in production processes and in the provision of services to individual customers. Reed and DeFillippi (1990) argue that tacitness and complexity create problems for knowledge transfer much faster than specificity, yet specificity of knowledge often is a necessary part of developing the core competencies of the firm.

Minbaeva (2007) offers a new dimension of knowledge called availability of knowledge. Minbaeva (2007, p. 574) says that availability is: "... the characteristic of knowledge that refers to the "not observable in use vs. observable in use" dimension in Winter's taxonomy (Winter 1987)".

Availability can be linked both to the tacit and explicit nature of knowledge. Knowledge can be tacit and the availability is then dependent on the process of transforming tacit to explicit knowledge. And explicit knowledge may not be accessible if the employees are reluctant to share with the newcomers. In general, Minbaeva (2007) looks at availability as positively associated with knowledge transfers.

Characteristics of the receiver

The motivation and the absorption capacity of the receiver have a determinative effect on the transfer process. The ability of absorption depends on the stock and flow of knowledge of the receiver. It determines the ability to assimilate and apply new knowledge in the organization. The absorption capacity concept is one of the most widely used and discussed in knowledge transfer literature and was first introduced by Cohen and Levinthal (1990), and further developed by among others by Foss and Pedersen (2002), Minbaeva et al. (2003) and Tsai (2001). Cohen and Levinthal (1990, p. 129) say the following, "The concept of absorptive capacity can best be developed through an examination of the cognitive structures that underlie learning". The lack of absorption capacity of the receiver is one of the most analyzed barriers to transfer of knowledge and the general conclusion is that the lower level of absorption capacity of the receiver contributes greatly to unsuccessful knowledge transfer.

Characteristics of the sender

Any transfer of knowledge requires a collaborative effort which means that it depends not only on the absorption capacity of the receiver (Cohen and Levinthal 1990) but also of the attitude and the behavior of the sender. While the absorption capacity concept by Cohen and Levinthal (1990) has more than 31,000 citations and is one of the most discussed concepts, less work has been done on the behavior of the source. We have some studies like Husted and Michailova (2002); Michailova and Husted, (2003); Cabrera, (2003) and more general summaries by Riege (2005) and Foss, Husted and Michailova (2010). One conclusion is that the general level of knowledge by the sender is important but this factor is interlinked with many others like trust and communicative skills, so there seems to be no common interpretative paradigm here.

The characteristics of the organizational context

In communication theory in general the context is an important factor and Reagans and McEvily (2003) consider that the intra-organizational context determines the success of the transfer of practices. The intra-organizational network consists of the set of relationships which are established within the firm. This network is based on structural configurations such as communication, coordination, and control mechanisms, Björkman et al. (2004) and Foss and Pedersen (2002). The success of these exchanges depends on the ability to communicate and the relationship between the source and the receiver.

3. Empirical study and results

The empirical study in this article comes from the firm Cooperativa Agroindustrial LAR in Medianeira, Parana in Brasil. The firm is organized as a cooperative which means that it has an integrated supply chain. This means that in the poultry activity, LAR keeps track of the entire process which involves the production of corn and soybeans used in manufacture of feed, breeding, production of the small chicks, and industrialization of poultry. In this study it is the slaughtering/production of white meat which is the focus of the study and this takes place in a modern production facility with a daily production of about 300 000 chickens in 2014. LAR's production totals 1% of the national production in Brazil and the firm has an export share of about 40%. There are about 30 main producers of white meat in Brazil that are serious competitors to LAR on the world market. The firm has modern technology, but the production is quite labor intensive compared to European production.

The data presented in this article is from a project about knowledge and competitiveness. In this project we collected data from five firms producing white meat from poultry, Danpo in Denmark, Ytterøy in Norway, LAR in Brasil, Crysbro in Sri Lanka and Cupco in Kuwait. In this article we will only discuss and use the data from LAR. For more information from the project, see Cader et. al. (2017). The data collection from the firm started in 2012 and lasted to 2016. We did four data collection trips to the LAR company and the used a questionnaire. Like all food producing firms, LAR is divided into departments that are responsible for the different functions of production. Table 1 shows the structure of operations at the LAR firm. In general, the firm is divided into two more general functions, ASF: Assembly Line Functions and SF: Support Functions. Each of these have the following operations:

Assembly line functions: Receiving, Killing, Defeathering, Evisceration, Deboning and partitioning, and Packing.

Support functions: Freezing, Expedition, Maintenance, Hygiene and quality control, and Management

During the data collection period we received 162 questionnaires from group leaders in assembly line functions and 104 from support functions. The main research question here is to investigate the connections between productivity and communication and also to see if cultural variables play a role.

Table 1: Data collection from the LAR company

Function	Number of questionnaires
Receiving	35
Killing	50
Defeathering	
Evisceration	
Deboning and partitioning	77
Packing	
Assembly line functions (ASF)	162
Freezing	37
Expedition	22
Maintenence	0
Hygiene and	34
quality control	
Management	11
Support functions (SF)	104
Total: Assembly line + Support functions	266

Source: Data extracted from the project reported in Cader et. al. (2017)

The outcome variable "Speed of production ok" is based on the question to the group leaders, *"To your knowledge was the speed of production satisfactory today"* and the answers were recorded on a Lickert scale from 1 - A big problem, to 5 – Going very well. Although these results are based on the group leaders' individual evaluation of the situation we got the understanding after talking to group leaders several times that it was a reasonably common understanding of the question. Table 2 shows a quite high score which reflects that production went on quite fluently.

The education variable is measured by asking the group leaders to distribute the workers between six standard education levels.

1. Did not finish primary school/illiterate
2. Finished primary school - can read and write simple text
3. Finished secondary school - general level (9 years of education)
4. Finished secondary school with special relevant skills for the job
5. Finished high-school (12 years of education)
6. University education

The competence variable about understanding of technology from the workers in the group was collected by asking the average participant of the group, "What is the competence level for understanding technology?"

1. Understand immediately without no explanation
2. Understand immediately with short (less than 10 minutes) explanation
3. Must have more than 10 minutes but less than 30 minutes explanation
4. Must have special training and or long (more than 30 minutes) explanation

The next competence variable is about the number of group members participating in training last month. The results here are "normalized" by considering group size.

The communication variables are based on answers from the group leaders about their:

- Communication up from their level and up to the executive level: Number of communicative initiatives up to manager.
- Communication to their group: Number of communicative initiatives to speak to own group members.
- Communicative initiatives up from their group to them: Group member initiatives to you.

This is based on both theoretical and case studies, that in general, more communication improves productivity.

Culture is becoming an increasingly more important aspect in analyzing and explaining the link between productivity and communication. The data collection in this project is based on Hofstede's analysis, Hofstede (1991) and what he calls cultural constructs. The group leaders are asked to express their opinions on the following statements based on a Lickert scale where 1. Disagree, 2. Partly disagree, 3. Neutral, 4. Partly agree, 5. Agree.

The statements are:

- Do you try to avoid uncertainty?
- Do you expect and agree that power should be unequally shared?
- Do you encourage and reward collective distribution of recourses and collective action?
- Do you express pride and loyalty in the firm where you work?
- Do you try to minimize role between men and women?
- Are you conferential in relationships with other people in the firm?
- Do you engage in future oriented behaviors such as planning and investing in the future?
- Do you encourage and reward individuals for being fair, generous, caring and kind to others?

Tables 2, 3 and 4 show the results of the data collection.

Table 2 Outcome and competence variables

	Speed of production ok	Educational average	Technical level	Number of group members participated in training last month
LAR A, N = 162	3,85	2,771	3,09	1,19
LAR S, N = 104	4,14	4,056	2,48	5,16
LAR T, N = 266	3,97	3,273	2,85	2,74

Source: Cader et. al. (2017). In Tables 2 – 4 we use the following abbreviations: A: Assembly line functions, S: Support functions, T: Total, N: Number of observations.

Table 3 Number of communicative initiatives on data collection day

	Number of communicative initiatives up to manager	Number of communicative initiatives to speak to own group members	Group member initiatives to you
LAR A, N = 162	7,63	11,70	7,13
LAR S, N = 104	6,38	10,30	10,31
LAR T, N = 166	7,14	11,15	8,37

Source: Cader et. al. (2017).

Table 4 Cultural constructs

	Avoid uncertainty	Power unequal	Reward collective	Pride in firm	Equality men/ women	Confron-tational in firm	Future oriented	Generous
LAR A, N = 162	3,89	2,48	4,31	4,59	4,23	3,57	3,79	4,59
LAR S, N = 104	4,46	2,74	4,73	4,87	4,71	4,22	4,44	4,68
LAR T, N = 166	4,11	2,58	4,47	4,70	4,42	3,82	4,05	4,62

Source: Cader et. al. (2017).

One important aspect of this research is to investigate if there are any differences between productivity and communication depending on the functions of the firm. In Table 5 we have done a t-test to analyze differences between assembly line functions and support functions in LAR. The variable about productivity, "Speed of production ok" has quite similar value for Assembly Line Functions (ALF) as well as Support Functions (SF). Table 5 shows the difference between means (ALF minus SF) of -0,292 which indicates that SF performs a little better than ALF. The difference is big enough so the t-test is significant on the 5% level between the groups.

The results for the communication variables are not significant for communication upwards to the boss or to the group leaders own group. To have the same communication pattern up to the boss is what we could expect. It is interesting to see that we have a quite equal communication structure on the group level independent of function. This can be interpreted that communication is restricted by necessity and cost (Riege 2007), no group leader uses more time to communicate than he has to. The variable "Group member initiatives to you" shows significant differences (on the 1% level) between ALF and SF and that is expected. At the assembly line it is more difficult to take a communicative initiative because of how production is organized. When production of white meat changes structure to a higher degree of automation like in Denmark, see Cader et. al (2017) then the communication pattern also changes because group leaders have a greater necessity to talk with capital equipment operators than traditional assembly line workers.

The competence variables like "Educational average", "Technical level" (be aware of the fact that this is defined in the "inverse" way – low numerical values means

high understanding) and "Number of group members participating in training last month" all show significant differences between means better than the 1% level for the t-test. This is expected and when we compare this to the trend with higher degree of automation, the differences will become smaller.

When we look at the cultural construct we find differences in means for all indicators except the one about generosity. For all the others we find higher and significant values for the support compared to assembly line functions. This has the more general explanation that educational level and a stronger feeling of identity towards the firm indicate higher "positive" values for the cultural constructs. For example, the SF are more positive concerning the statement about "Pride in firm" that the ASF. One indicator needs special attention, "Power unequal". The question here is about whether you (the respondent) expect and agree that power should be unequally shared. The question is formulated in a negative way – the higher score the respondent chooses – the larger the power distance in communication between the respondent and his cooperative partners. When we look at Hofstede (1991) and House (2002) they relate this statement to the more general concept of trust. This is an important and much analyzed concept when it comes to communication and management, see Chen and Huang (2007). In this setting the results can be interpreted that the power distance is higher in ASF than in SF which is what we on forehand would assume.

Table 5: t-test for Equality of Means for assembly line and support functions.

	t-test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Speed of production ok	-2,238	264	0,026	-0,292	0,131
Communication number up to boss	1,350	264	0,178	1,255	0,929
Number speak to own group	1,599	264	0,111	1,399	0,875
Group members initiatives to you	-3,628	264	0,000	-3,178	0,876
Competence average	-10,885	264	0,000	-1,285032	0,118051
Technical level	4,617	264	0,000	0,612	0,133
Group participating in training last month	-2,633	264	0,009	-11,929	4,531
Avoid uncertainity	-3,703	264	0,000	-0,573	0,155
Power unqual	-2,487	264	0,017	-0,259	0,187
Reward collective	-5,851	264	0,000	-0,422	0,072
Pride in firm	-4,240	264	0,000	-0,273	0,064
Roles men/women	-4,419	264	0,000	-0,483	0,109
Confrontational in firm	-5,598	264	0,000	-0,653	0,117
Future oriented	-5,350	264	0,000	-0,652	0,122
Generous	-1,393	264	0,165	-0,096	0,069

Source: Cader et. al. (2017).

It is interesting to analyze the relationships between an output variable like "Speed production ok" and communication variables. The results from the correlation analysis are shown in Table 6. The interpretation of the results is based on the assumption that more communication improves productivity, se Mazzei (2014). When we look at the correlation coefficient we find that they are significant for the firm and support functions, but not for assembly line functions. This means that the effect of communication to improve productivity is found mainly in support functions. This supports data that shows that the communication messages from support functions have a higher knowledge content compared to assembly line functions.

Table 6 Correlation matrix for the variable "Speed of production ok" and communication variables for the LAR firm.

		Communication up to manager	Communication to own group	Group member initiatives
Speed prod ok	Correlation	,151*	,202**	,205**
	Sig. (2-tailed)	0,013	0,001	0,001
	N: For the firm	266	266	266
Speed prod ok	Correlation	0,132	0,103	-0,013
	Sig. (2-tailed)	0,093	0,194	0,869
	N: For assembly line functions	162	162	162
Speed prod ok	Correlation	,218*	,389**	,423**
	Sig. (2-tailed)	0,026	0,000	0,000
	N: For support functions	104	104	104

(**): Significant at the 1% level. (*): Significant at the 5% level
Source: Cader et. al. (2017).

4. Concluding remarks

The search to improve competitiveness is at the forefront for most firms, and knowledge is looked at as a key factor. A well functioning communication system is essential and how to develop and maintain a communication system that optimizes creation and utilization of knowledge has developed into being a central task for every firm. This research looks at traditional manufacturing based on assembly line and support functions – a type of industry we will continue to have for decades – but that also will change with developments in technology, knowledge and organization. One structural change is the development of support functions like hygiene, quality control, and distribution into advanced knowledge based operations. This changes knowledge transfers into more context-dependent operations where the tacit component of the knowledge becomes increasingly important. This also gives firms such as LAR, the possibility to develop a competitiveness that is more difficult for similar firms to imitate.

In this research we see that communication contributes to improve productivity for the firm, and this effect is mainly significant for support functions. This is in line with the more general results for knowledge based firms. The question is, what can the firm do to improve communication in assembly line functions? Results from Europe, Cader et. al. (2017), show that more capital intensive modes of production increase productivity, but at the same time, require a higher education level and more frequent and knowledge intensive communication. Looking at the theoretical considerations, this means that the early positivistic sender-receiver communication models are getting too simple. This conclusion is reinforced by the fact that cultural factors have

more influence on communication than earlier assumed. From the empirical part in this study, we see that trust and power distance affect the outcome of communication processes. Consequently, it appears that some changes in communication models will be necessary to accommodate new trends. Knowledge and communication will continue to be high on the research agenda for the analysis of productivity of firms. In this article we have presented one case study, and we need more empirical work together with more general firm studies to reveal the trends of the knowledge economy, both on the national and international level.

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