The knowledge transfer in contract manufacturing relationships

Keywords (max. 6): *contract manufacturing, knowledge management, knowledge transfer*

The aim of our paper is to investigate the contract manufacturing relationships from the aspect of knowledge transfer: what is the relationship between knowledge transfer in contract manufacturing and the business relationships of the organizations participating in the knowledge transfer. To be able to investigate the contract manufacturing projects we conducted empirical research using the case study method. The paper is based on the empirical results of the case study.

Our research question is: How can knowledge process be described in contract manufacturing relationships?

1. Introduction

Contract manufacturing is of major importance to the modern global economy because of the growing specialisation and interdependency of industrial activities (Han et al. 2012). Numerous industries use this process, especially the aerospace, defence, computer, semiconductor, electronics (Electronic Manufacturing Services, EMS), energy, medical and pharmaceuticals (where also called contract manufacturing organizations, or CMO), food manufacturing, personal care, packaging, and automotive manufacturing industries. The value of the contract manufacturing industry in 2017 was estimated at USD 471 billion, and it is expected to grow to USD 675 billion by 2020 (Global Information – New Venture Report, 2018).

Contract manufacturing is an inter-organizational process whose goal is not the sale of a finished project. Business models, which are based on the outsourcing of manufacturing processes (Han et al. 2012), create complex, inter-organizational relationships that are limited or quasi-limited in time (the duration of a contract). The process is usually complex, as is the business relationship. It has a one-off character, but other projects may be created with the same partner (so there is discontinuity, but a sleeping relationship may only involve short sleeps). Uniqueness is possible, but not certain (the same product may be produced at the same time by several contract manufacturers). An "inter-organizational project" often resembles a "standard" project but differs because of the dynamics that involve a concrete state of interdependence (a state of mutual dependency may exist with classic projects, as in any business relationships, but these tend to be less dynamic since they are "simply" well-defined projects). Project marketing investigates business relationships between the project selling and buying companies (Cova et al 2002). This involves trying to understand the characteristics of the discontinuity of the project, its uniqueness and complexity (Mandjak and Veres 1998), in which the seller's entrepreneurial culture, and the capacity of personnel to develop relationships (Huemer 2004) are among the key capabilities of success.

Organizational knowledge processes as essentials of dynamic capabilities

One approach of empirical studies in the literature of dynamic capabilities deal with generic knowledge-related processes (Eriksson 2014). The latter approach is founded in the idea that "the process of how a firm acquires its capabilities cannot be separated from how it acquires its

knowledge" (Pandza et al. 2003:1028). Empirical studies suggest that knowledge accumulation, knowledge integration, knowledge utilization and knowledge reconfiguration refer to the general *essential processes* of dynamic capabilities.

The knowledge accumulation process is path-dependent, cumulative, and occurs through experience. There are two purposes of knowledge accumulation: the replication of existing knowledge, and its renewal. Balancing these two is a challenge. There are internal and external sources of knowledge accumulation, but only the most recent research deals with the importance of external resources such as inter-organizational cooperation (Eriksson 2014).

Knowledge integration involves combining various resources and typically refers to a process of connecting new knowledge with an existing knowledge base. The integration of diverse knowledge bases happens primarily through problem-solving activities. Integration is key to exploiting internal organisational knowledge and the knowledge organisations have access to. "Synchronising internal and external knowledge has been found to contribute to resource uniqueness, and therefore possibly to the competitive advantage of the firm" (Eriksson 2014:70).

Knowledge utilization is an often-neglected area of research, although it is a key process through which benefits can be derived from knowledge that has been accumulated and integrated. Nevertheless, due to the difference between the tacit and the expressed nature of knowledge, the role of managers in using knowledge is of paramount importance. Ambrosini and Bowman (2009) claim that managers need to have entrepreneurial skills rather than managerial skills for effective knowledge utilization.

Knowledge reconfiguration refers to two processes: generating new combinations of existing knowledge, or leveraging existing knowledge for new purposes or using it in new ways. "The ability to reconfigure knowledge resources directly affects the firm's ability to sense opportunities. Reconfiguration is thus a crucial element [of dynamic capabilities]" (Eriksson 2014:70).

At this point, it is interesting and important to return to the thoughts of Barney (1991:110) concerning the imperfectly imitable nature of sustainable competitive advantage: "…complex physical technology is not included in this category of sources of imperfectly imitable. In general, physical technology, whether it takes the form of machine tools or robots in factories or complex information management systems is *by itself* typically imitable." Nevertheless, "on the other hand, an information processing system that is deeply embedded in a firm's informal and formal management decision-making process may hold the potential of sustained competitive advantage. It is also a socially complex system, and thus will probably be imperfectly imitable" (Barney 1991:114).

2. Research method

This paper describes empirical, qualitative research about knowledge processes using the case study method. Case studies are often considered the starting point for theory development (Eisenhardt, 1989), and we employ the method in this sense – with the intention of exploring the characteristics of the processes under investigation. For the case study, data were collected from primary and secondary sources. The primary data collection involved two rounds, while the collection of secondary sources occurred in parallel with the primary phases. The primary data were collected from in-depth interviews conducted in Videoton Elektro-Plast in two periods (a first round of interviews in November 2016, and a second one in September 2017). In the first round, 31 interviews were undertaken with mid- or high-level managers. Respondents were chosen according to their competence, experience and knowledge of the company and its history, especially the development of its contract manufacturing activity. Interviews were conducted face-to-face on site, lasting 30-60 minutes. They were all recorded and transcribed. The interviews were semi-structured, based on questions about the history of the company, contract manufacturing activity and success factors.

From the interviews, knowledge management and the project component of contract manufacturing appeared to be worth further investigation. Following the principles of abductive research (Dubois and Gadde 2002) we went back to the theory and formulated research questions for the next round of primary research which was then conducted in September 2017. In the second round, four in-depth interviews were undertaken: one each with the retired executive officer, the two then-current managing directors, the director of quality management, and the director of sales and marketing (these individuals were also interviewed in the first round). In the analysis of the interviews we used NVivo 2009 software to help organize, analyze and reveal insights.

As secondary sources, we used the company website, company presentations, and internal corporate materials concerning the knowledge management process. For understanding the contract manufacturing industry we used industrial and internal company publications. This information helped us not only to learn about the industry and the company, but to put together a case study database that included case study notes, case study documents, and the narratives collected during the research process (Gibbert et al., 2008).

The company: Videoton Elektro-Plast

Videoton (VT) Elektro-Plast is a subsidiary of Videoton Holding (a large industrial company), located in Kaposvár in the south-west of Hungary. VT Elektro-Plast is engaged in a broad range of activities such as participating in product and component design, prototyping, manufacturing of mechanical sub-assemblies, function tests, production development, etc. It serves customers from the household, personal care, mother and childcare product, industrial application and automotive markets (Company website, 2017).

The original company was founded as the United Lightbulb and Electronics Factory in 1970 in Kaposvár as a state-owned company, and worked with partners in the manufacturing of thermonic tubes. Later (in 1983) the name United Lightbulb was changed to the brand name

Tungsram, and in parallel with metal tool manufacturing, the company started producing plastic tools. After the change of regime in Hungary (1990), the company started plastic injection molding. When General Electric (GE) later became the owner of the company, plastic injection molding proved to be a poor fit, since GE's main desire was to control a producer of lighting sources. However, "*GE did not close the factory at all but sold it to a former Austrian supplier of Videoton in 1992 who took the company to the edge of bankruptcy*" (former managing director).

After a difficult period in 1997, Videoton Holding took over the company together with the factory, human resources and know-how, and started assembling battery packs. The company changed its name to Videoton Elektro-Plast and became a member of the Videoton Holding.

A year after the takeover, the portfolio was extended to household appliance manufacturing which is still the dominant field of activity in the company profile.

The company currently provides personalized, high quality design, manufacturing and logistics services. They are best suited to meet the requirements of industries such as household appliances, mother and child-care, floor care, personal care and industrial appliances. The company is capable of managing the whole manufacturing process: from the very first step of design through testing to mass production. Videoton's largest partners are Philips, Delonghi and Braun.

Discussion: knowledge interlocking in contract manufacturing relationships

Based on the empirical results of the case study we identified knowledge interlocking process within the knowledge processes of the partners. In the discussion part of the paper we describe this knowledge interlocking process.

From the focal company (Videoton's) point of view, a ***knowledge interlocking process*** appears to have emerged which has several steps. These steps trend toward the exploration and exploitation of particular customer relationships (Davies and Brady 2016). In the contract manufacturing context, this relationship refers to the temporally limited mutual dependence of a product manufacturing process. The steps of ***knowledge interlocking*** that may be observed are:

(1) The existence of internal knowledge; the customer's "entry" into the project

"We were able to convince them [the Petzl Company, a professional French lighting and security company] *that they had already seen our internal knowledge. Specifically, we can manufacture plastic pegs. We can weld ultrasonically. So our company possesses all this knowledge. Because of this, we were able to convince them, and they were willing to choose us at a higher price level against the Bulgarians because they knew that their product would be safe here."* (Director of Sales and Marketing).

(*2) Recombining and presenting the company's internal knowledge to the partner*

"We also went out to the Petzl Company several times. We introduced some interesting products to prove that our internal knowledge means that we have the ability to manufacture

plastics. Or we can even, if necessary, involve other partners in a manufacturing procedure, or even procure certain parts from one of our sister companies, from Székesfehérvár [the home city of Videoton Holding in Hungary]. *Yes, so we convinced them"* (Director of Sales and Marketing).

(3) Interlocking with external knowledge

"We prefer that we get new business from new buyers simply because this way we can collect more knowledge for ourselves" (Director of Sales and Marketing). This position underlines that the integration of diverse sources of knowledge happens primarily through problem-solving activities (Eriksson 2014). As the battery factory manager said, *"The best thing to happen from this is that the buyers teach us to manufacture and then they forget how, and they no longer know how without us. The know-how that they deliver is further developed. Sooner or later, they cannot live without us."* This process can help create more multifaceted forms of cooperation with the client and the realization of more complex projects. *"Later, the company developed so well that we were able to take part in projects where the product did not exist ... a very active back-and-forth game, a dialogue, an interaction between the supplier and the buyer. And I think in this way, products of increasingly high quality are being bought to market."* (Factory Manager, Delonghi).

This happens at the operators' level too. *"Two or three people went to Vienna to learn, and when they came back, colleagues from Austria came to help them start production. To do this, we need to start the processes and use operating instructions according to our own internal systems. Photographing things… so that employees could be informed, be trained and be able to assemble components in an appropriate way. And when problems arose, we asked for help again. You had to change the documentation. Unfortunately, the documentation system of AKG were not perfect. Documents were outdated. They needed to be improved and modified continually"* (Philips Factory Manager).

(4) Finally, existing knowledge becomes part of a new project, and new knowledge is born.

"What we learn from a customer – a technical solution, method or process – we can use that experience with an existing customer, or even with a new customer. The point is that this process greatly contributes to using these experiences in the future to obtain new businesses. Actually, no buyer can come here who has demands we cannot fulfil. We have already had so many experiences with so many customers that it is very rare that they ask for new ones." (Director of Quality Management).

One might ask, what happens with knowledge when the buyer leaves? Parts of projects are embedded into later projects as internal knowledge: *"Surely this knowledge will not go to waste if it happens that AKG leaves us, because the operators, the engineers who are there, now have this knowledge themselves. And each factory is so specialized at something that when a new business comes in, it goes to those who are already very good at that thing. So we try to keep the know-how in one factory so that if the customer leaves and a new one arrives with a similar*

'demand', practically the same team will get it [the job], so the knowledge base does not age in this way." (Director of Sales and Marketing).

The essential component of the ***knowledge interlocking process*** is clearly formulated by Videoton's New Product Manager: *"It often happens that the buyer comes here without a tangible product. We had several projects when a 3D model was brought to us, we saw it on the screen, and we were told that it should be like this. There was no concrete idea [about manufacturing]. This is going on in the meantime and we have to get started [manufacturing] in parallel, otherwise we will not be prepared to meet the deadline by which the product should be assembled."*

The knowledge interlocking process has its own outcome which is a state of temporally limited mutual interdependence between the contract manufacturing company (i.e. the focal company of the research) and its partner. This is the product manufacturing process, which is the subject of this relationship and shows several similarities with the projects studied in research into project marketing (Cova et al 2002, Cova and Salle 2007).

Conclusions

The essence of the knowledge-interlocking process is that two sources of knowledge (the internal knowledge of a focal company and the partner's own internal knowledge which is external to the focal company) come together in a process of interaction (Ford et al 2010). There is at first a small amount of common internal knowledge that is inherent to any given inter-organizational relationship, and which is in each case unique to the situation. With the passage of time (i.e., with an increase of the frequency of interactions) (Håkansson 1982), this pool of common knowledge will become larger.

If a company builds knowledge skilfully, it manages not only to keep internal knowledge in the company, but to develop it from project to project, thereby working in increasingly complex and efficient ways. This process of sequential knowledge accumulation represents a competitive edge and enables the company to develop.

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