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FACULTY OF ECONOMICS**

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**Supplier relations, innovation value of supplier and  
its impact on the market success of the customer  
innovation process**

PhD Thesis



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Miskolc, 2019

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

**Content**

1. Choice of subject..... 3

2. Structure of the dissertation ..... 5

3. Research problem, goal and methodology ..... 7

4. Research hypotheses and research model ..... 11

5. Summary of research results – Theses ..... 17

6. Summary ..... 25

7. Importance of research results, practical applicability, limitations of research..... 28

8. Bibliography ..... 29

9. The author's publications ..... 33

## 1. Choice of subject

The topic of my doctoral dissertation is the examination of relationships between organizations, the impact of cooperation between the supplier and the buyer on the success of the customer innovation process.

The development of the economic and industrial environment of recent years has made it necessary to examine the importance and existence of relationship marketing, collaborations, and networks. Observations have shown that purchasing decisions are complex, decisions can be categorized, and value of relationship capital becomes more and more important (Hakansson, 1982). In markets with globalizing, increasing competition intensity, only creative market solutions, knowledge intensive products, and efficient corporate organizations can succeed (Cooper and Edgett 2009, Loock and Steppeler 2010). The open innovation theory combines and reinforces these two findings. The concept of open innovation implies that innovation can often produce the most results in collaboration with others. The concept of value co-creation is the link between innovation, cooperation and marketing.

Business relations can be seen as a process developed by two companies or other types of organizations that use long-term economic, social, service and technical cooperation to reduce costs, create new values and exploit mutual benefits (Hakansson, 2010). Key elements of corporate relationship portfolios: customer, competitor, suppliers and complementary relationships (Brandenburge and Nalebuff 1997).

Today's business marketing practice shows that the emphasis on traditional transaction marketing is increasingly based on a relationship-based marketing approach (Möller 2013). Relationships, networks play an increasingly important role in shops, new business models, and relationships, interactions, network actors have a fundamental position in SDL, a value-co-creation approach, and the core of co -creation, a value-based marketing theory approach (Gummesson and Mele 2010, Lusch and Vargo 2006).

In addition to technological capabilities, organizational collaborations supporting innovation (Hagedoorn and Link 2000), the efficiency of the relationship system, the company's network competencies (Ritter and Gemünden 2003) are key factors for innovation and business success for both small and large companies . Innovation is no longer a business secret, but a result of more component and multi-player collaboration. Innovation success is determined by the company's ability to manage its relationships and networks in the innovation process.

Companies are increasingly relying on supplier competencies and resources to procure better innovation (Calvi, 2012, Narasimhan and Narayanan, 2013). Suppliers create value for customers by providing or demonstrating creative solutions that meet customer needs (Johnsen, 2009, J. Kim et al., 2014). Given the limited resources of the company, it is important to know which vendor has greater potential to create and support innovation value (Schiele, 2006, Smals and Smits, 2012; Tracey and Neuhaus, 2013; Wynstra et al., 2003).

According to the resource-based view (RBV) the supplier's innovation value comes from its internal resources (Sjoerdsma and van Weele, 2015). According to the traditional RBV model (Hart, 1995), the supplier can provide value due to access to natural, physical resources, such as water or land. Network-based RBV views claim that in networks, shared and non-shared resources can be a competitive advantage for Allied Partners (Lavie, 2006). All in all, when looking for innovation partners, buyer companies are looking for suppliers that have high technology expertise, are similar to them and are in close contact with each other.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

However, recent research shows that these findings are not always valid, as the sources of innovative ideas are increasingly not the usual environment, nor the usual relationship (Kim and Choi, 2015). The perspective of network embeddedness suggests that economic transactions are influenced by other social relationships that commodity markets have (Uzzi, 1997). Because business-to-business interactions are embedded in broader organizational networks (Choi and Kim, 2008, Rowley et al., 2000), it is important to go beyond a node or a slide and apply the network perspective to study innovation (Arlbjørn and Paulraj, 2013) Arlbjørn et al., 2014; Narasimhan and Narayanan, 2013). The network perspective suggests that innovation value can be created by the supplier's value network.

Based on these, I formulated the following research questions:

- i. What characterizes the innovation activity of companies? How common are common developments, innovations, especially suppliers?
- ii. What are the nature of the relationship with the supplier and how intensive are they? What effects can be formulated when dealing with a supplier?
- iii. What are the most important abilities that the company takes into account when selecting suppliers? For suppliers with the same capabilities, what is the basis for deciding to become a supplier of key supplier? What are the abilities that make collaborations ahead? What are the qualities that are important for continuing innovation collaboration?
- iv. How does existing supplier evaluation work for companies? What are the main aspects, value dimensions? To what extent does the supplier contribute to the market success of innovation? When does the customer's innovation need and the potential innovation value of the supplier meet?

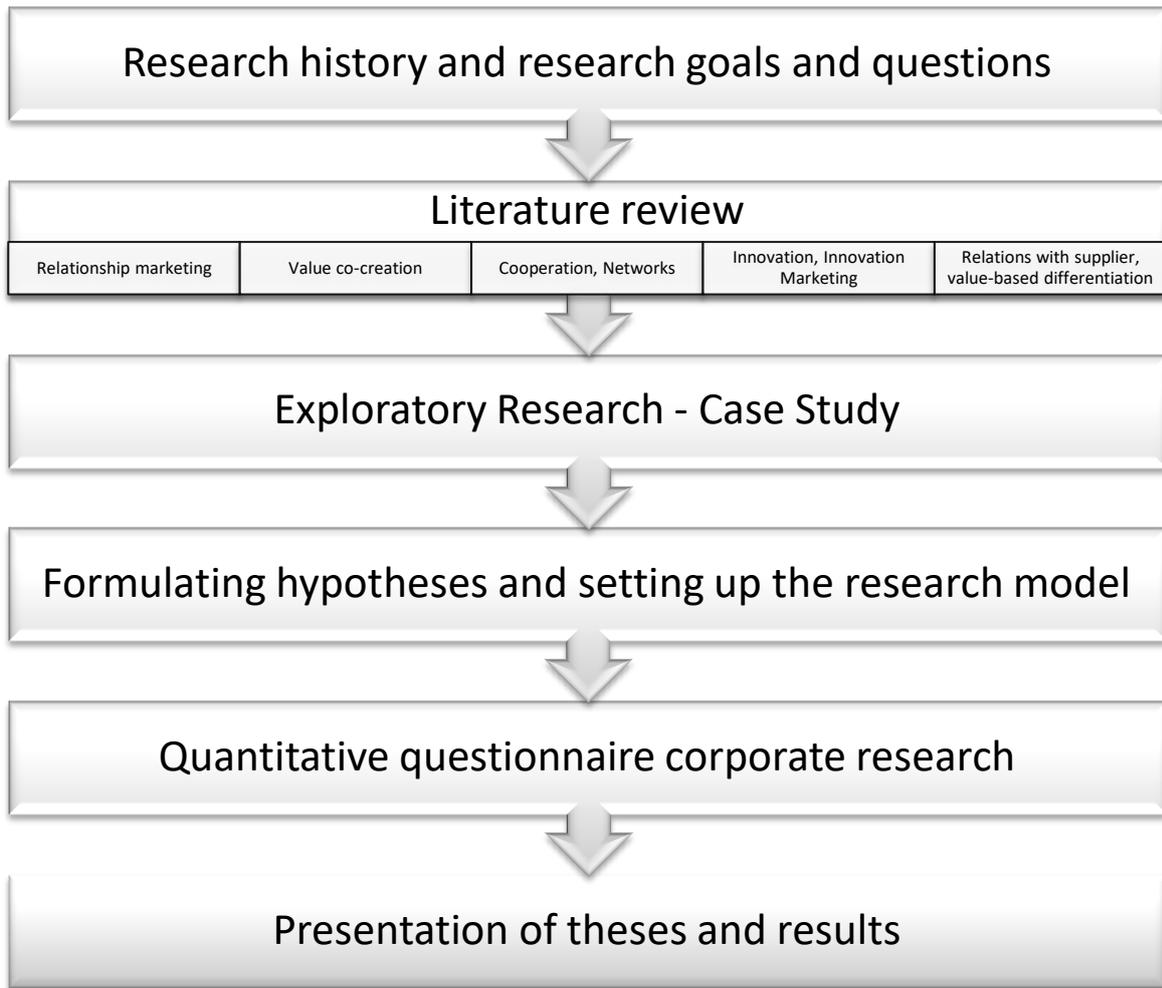
## **2. Structure of the dissertation**

The structure of the dissertation follows the research process, starting with the review of the literature, then continuing with the exploratory research, and finally with the description of the results of the final research model. The research results and theories described in the literature review have been highlighted because these theories have led to the formulation of the final research model, developed and refined the research problem and the research goals. In terms of business marketing trends, supplier relationships have been at the center of theoretical and practical research since the 1980s. The transaction marketing approach has been replaced by the relationship marketing approach, so the literature review begins with the characteristics of the marketing, the main findings and the description of the schools. Relationship marketing approaches raise issues of value and value creation, and some schools (IMP) call for increased network thinking. Thus, along with the thought process, the development of value approaches in marketing and the most important theories related to network approaches and collaborations are presented. In terms of value creation, the concept of value co-creation, which appeared in the early 2000s, determined the direction of cooperation, and most approaches put innovation at the forefront of value creation. This is linked to the paradigm of open innovation, which sees innovation as a key to success. According to research, these innovation collaborations are the most intense with customers and suppliers. Thus, in the following, collaborations with the supplier were examined, examining supplier characteristics, supplier selection in traditional relationships, and also in common value creation, focusing on value theories as resource-based supplier value and network-based resource value theories.

Literary synthesis was followed by an exploratory qualitative research in the form of a case study. Thus, based on the literature and exploratory research results, the hypotheses and the final research model were formulated. In order to test the hypotheses and the research model, I conducted a questionnaire-based company survey among machine manufacturers. The complete structure of the thesis is illustrated in Figure 1.

During my research, the focus was on the impact of collaborations in innovation processes. When looking at the innovation partners, the relationship with the supplier and the supplier was the focus. In addition to supplier competencies and supplier-value-based differentiation, the analysis of value-based relationships based on the foundations of relationship marketing has become the basis of the survey in a network context.

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process



**1. figure: Structure of the doctoral dissertation**

Source: own editing

### **3. Research problem, goal and methodology**

The business marketing literature of the past few years examined business relations on a value-based basis, emphasizing the factors and characteristics of relationship marketing. Based on this, the key issue of the long-term survival and success of companies is the creation of a key customer value. (Slater, 1997, Anderson and Narus, 2004). Not only the strategic importance of relationships with customers is emphasized in the literature, but also in relationships with suppliers. The nature of the relationship has shifted from very aggressive, competing, superficial relationships with many suppliers, and long-term relationships with fewer suppliers. Selection of the supplier and determination of the value of the supplier became a determining factor for competitiveness.

The creation of shared values and the value of relationships with the supplier are the basis of several researches. Most research basically examines the impact of relationships on innovation outcomes by conducting in-depth interviews with managers (Bowonder et al., 2010, Nambisan and Baron, 2009). At first, reflective measurement models provided the basis for modeling the value of relationships (Lapierre, 2000). In later research, the formative measurement model was increasingly used (Ulaga and Eggert, 2006, Schiele et al., 2012, Yan et al, 2017).

Customer-supplier relationships are an important source of innovation (Walter et al., 2001; Young, Wiley, and Wilkinson, 2009). It is also proven that innovation results can be widely interpreted (Song and Di Benedetto, 2008; Soosay et al., 2008). Analyzing the impact of supplier relationships is an important aspect, as most researches highlight the benefits of the relationship, but not the risks and disadvantages. Collaborations can enhance market success, but do these collaborations appear bad in the life of the company?

One of the characteristics of customer-supplier relationships is that if partners want to achieve effective collaboration, they need a close relationship. These connections take up a lot of resources, so the customers keep in touch with one or a few suppliers. The disadvantage of this is that the buyer will increasingly depend on the supplier and the supplier may hinder the customer's operation (Zsidisin and Smith, 2005).

The literature mainly deals with the characteristics of suppliers, highlighting the technological and technical characteristics that can be measured. (Park and Krishnan, 2001). But not only the technical characteristics can determine the connection or its success. According to Croom (2001), the cooperative attitude is also an important condition. The supplier may have innovative capabilities, but if one does not want to really cooperate, these capabilities cannot be used effectively.

In order to know how and to what extent the supplier can contribute to the customer's innovation process, the relationship characteristics of the buyer must be defined (Azadegan et al., 2010; Croom, 2001; Schiele, 2006).

An important aspect for the customer company is the supplier's classification. Literature and practice increasingly focus on value-based discrimination. The supplier's innovation value, based on literature that approximates supplier value, is the supplier's potential contribution to customer innovation by sharing and making available its resources. (Barney, 1991)

The research is based on the findings that collaborations are playing an increasingly important role in innovation development, and that the most common among innovation partners is

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

cooperation and joint development with customers and suppliers. Innovation cooperation with the supplier was highlighted, its content and impact on the market success of innovation. The main goal of the research is to formulate the supplier's innovation value and composition, creating a true value when the customer's innovation needs and supplier capabilities meet.

The basis of the research is a summary of literature, synthesis, on the basis of which a theoretical framework, an initial research model was formulated. It is based on Ritter and Gemünden (2003), the theory of technology and networking competences of innovation partners, which explains that network competencies are as important as technological competencies. Schiele et al., To describe the impact of supplier skills and competencies in supplier collaboration in the customer innovation process. (2012) and Pulles et al. (2014) was the basis of the theoretical approach. Stronger appearance of network properties and network thinking was given by Yan and his co-authors (2017) on the theoretical model of supplier-based value creation. The research model is a slice of the marketing-driven innovation business model, where the impact of cooperating with the supplier is assessed through innovation value to the success of the innovation market.

**1. table: Summary of the main features of the theoretical framework**

Source: own editing

<i>Test Level</i>	<i>Properties</i>	<i>Author</i>
<b>Corporate level</b>	<b>Technological</b>	Park and Krishnan, 2001
	Innovation Capability	Quinn, 2000, Inemek and Matthyssens, 2010, Kibbeling, 2010,
	Corporate factors	Petroni and Panciroll, 2002, Ethiraj et al., 2005, Salomo et al., 2007,
	R+D	Ulaga and Eggert, 2006
	Specialization	Warti and Liker, 1999 Podhasoff et al., 2003
	<b>Relations (Network)</b>	Croom, 2001; Schiele, 2006, Walter et al, 2006. Azadegan et al., 2010;
	Collaborative Attitude	Ganesan, 1994
	Buyer status	Kocabasogin and Suregh, 2006, Scott-Young, Samson, 2008
	Supplier's development program and motivations	Felde, 2004 Corsten and Felde, 2005
	Dependence of buyer from supplier	Kocabasogin and Suregh, 2006
Personal interactions	Croom, 2001	
<b>Diadic level</b>	Strength of cooperation, motivations	Håkansson, 1982, Dwyer et al., 1987; Liker et al., 1996, Sako 1998; Zsidisin and Smith, 2005, Gulati and Sytch, 2007,

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

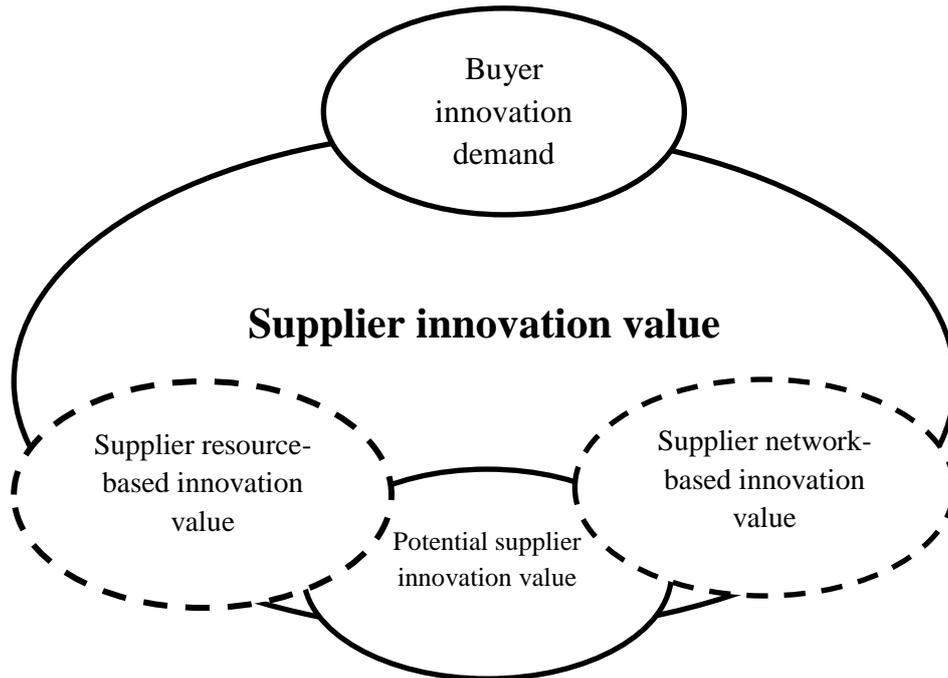
		Kang et al., 2009, Freytag et al., 2012,
<b>Network level</b>	Utilize the resources (networks) of the supplier	Von Hippel, 1998 Nobeoka et al., 2002, Möller and Törrönen, 2003, Ritter and Gemünden, 2003, Liker and Choi, 2004, Azadegan-Dooley, 2010 Gao et al., 2015 Ford et al., 2017 Yan et al., 2017
	Supplier contribution in innovation process	Krause, 2001, Walter et al., 2001; Song and Di Benedetto, 2008 Soosay et al., 2008, Young et al., 2009, Feng et al., 2010 Pulles et al., 2014 Bellamy et al., 2014

The supplier's innovation value is defined in the literature as the supplier's possible contribution to the customer's innovation by sharing and making available its resources (Barney, 1991). In our case - as shown in Figure 2 - this innovation value becomes a real, realized value, because the potential supplier value - which consists of the supplier's own resources and supplier network capabilities - meets the buyer's innovation demand, creating the actual supplier innovation. value. In terms of content, it also includes the network resources that the supplier has, and is willing to share it with its customer in order to maximize the market success of innovation.

A case study analysis was used to clarify the theoretical framework, to better define the research problem, and to set the final theoretical model.

After formulating the theoretical framework and the research questions, the selection of the case and the data collection method to be used were selected. A key player in the case study is a machine tool manufacturer whose customers (nine companies) were interviewed in the first round in order to get to know the management, corporate management characteristics of the customer companies, the characteristics of the supplier market, their suppliers, their innovation processes, and supplier value, their experiences, attitudes. The interviews were preceded by the knowledge of the base company and the customers selected for the research.

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process



**2. figure: Supplier innovation value**

Source: own editing

Innovation activities and networking are exploring several theories and approaches. The most common aspect of the study is territorial and sector-specific discrimination. During the study, the focus has been on one sector, avoiding that the results were influenced by the effects of different sectoral characteristics. Thus, the choice fall on machine manufacturing companies, taking into account the fact that much of the research in the supplier field examines this industry and the traditional feature is networking as well as the open innovation process.

The main aim of the research is to investigate the supplier's cooperation, especially the supplier's contribution to the customer innovation process, and the formulation of the supplier's innovation value. The goal is to formulate critical technology and relationship skills that are most needed by the supplier to deliver innovation value to their customers.

The formulation of the questionnaire was based on the literature theories and international scales described in the previous chapters based on the baseline model based on the results of the case study analysis.

The hypotheses and the research model were formulated based on the findings revealed in the literature synthesis and qualitative research. The definition of the concepts appearing in the model was based on the review of the literature, I tried to apply scales validated by international literature during the research.

#### **4. Research hypotheses and research model**

Many potential innovation partners can be recognized in the market and many potential innovation outcomes can come from these relationships. The research highlighted innovation co-operation between supplier and buyer, since these common value creations are an important source of innovation (Walter et al., 2001, Young et al., 2009) and have a broad impact on innovation outcomes (Song and Di Benedetto, 2008, Soosay et al., 2008).

The core element of the model is the supplier's innovation value, which includes all supplier capabilities that contribute to the market success of the customer's innovation. This actual supplier innovation value is created when the customer's innovation needs are met by the supplier's innovation offer. It is necessary to formulate this, because the buyer company has difficulty in recognizing the most suitable supplier for it, and cannot take full advantage of the innovation relationship with the supplier if he knows only the potential innovation value.

In order to formulate this actual value, it is essential to monitor the outcome of the cooperation with the supplier, that is to say to what extent the supplier contributes to the customer's innovation process. This is directly influenced by the supplier's competencies. More and more people have proven in the literature (Walter et al., 2001, Gemünden, 2003, Piskóti, 2016), and they agree that besides technological competencies, relationship competencies also positively influence the involvement of the supplier in the innovation process.

Most of the technological features are those that, according to the literature, have the characteristics of an innovative supplier, such as ability to innovate, corporate factors, R&D, specialization, product attributes, consulting skills, know-how.

Including link traits in the model and network context completes the analysis of the impact of supplier properties on the buyer innovation process. Co-operation with external partners has become an important factor in enhancing innovation capabilities and outcomes. However, with increasing competition, more and more buyer companies are going to innovate with the same company, but the innovation outcome does not show the same results. However, according to the resource-based approach, the supplier's resources are limited and can only meet a limited number of customer needs (Gulati et al., 2000). It is also important to note that a supplier is in vain innovative and technologically capable of innovation if they are not willing or able to share it effectively with their customers. Thus, the cooperative attitude of the supplier, the buyer's status at the supplier, the supplier's development program, the issue of dependency, the impact of personal interactions, delivery and market entry were included in the study.

The development and use of these capabilities will be more effective with the advancement of collaborations and the intensification of innovation cooperation. The supplier cannot do that by relying on a specific capability, but the capabilities should be developed in combination with the customer's needs, as confirmed by the results of the case study analysis.

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

*Hypotheses about the supplier's innovation value*

Information gained through daily cooperation with suppliers is increasingly helping companies to turn incoming knowledge into new innovation (Berghman et al., 2012).

**H1.** The degree of supplier involvement and innovation with supplier has a positive effect on the market success of customer innovation.

**H2.** The supplier's innovation value has a positive impact on the market success of customer innovation.

**H3.** The extent of supplier involvement in the customer's innovation process has a positive impact on the supplier's innovation value.

The role of procurement from a collaborative perspective can be described as building and maintaining supplier relationships tailored to dynamic customer needs. This approach includes price considerations and thus cost considerations, but the relationship has the greatest impact on competitive advantage.

**H4.** In innovation cooperation with the supplier, relationship costs have a positive impact on knowledge-based relationships and have an impact on the supplier's innovation value.

The supplier's innovation value, such as the buyer's status at the supplier, or the supplier's development program (Yan et al., 2017) affects the supplier's innovation value.

**H5.** There is a formal causal relationship between supplier competencies and supplier's innovation value.

- a. The supplier's ability to innovate has a positive effect on the supplier's innovation value.
- b. Internal corporate factors have a positive impact on the supplier's innovation value.
- c. The supplier's R&D expenditures have a positive impact on the supplier's innovation value.
- d. The supplier's specialization has a positive effect on the supplier's innovation value.
- e. The characteristics of the supplier's products have a positive effect on the supplier's innovation value.
- f. The supplier's ability to advise has a positive impact on the supplier's innovation value.
- g. Supplier know-how has a positive impact on the supplier's innovation value.
- h. The supplier's cooperative attitude has a positive effect on the supplier's innovation value.
- i. The buyer's status at the supplier has a positive effect on the supplier's innovation value.
- j. The supplier's development program has a positive impact on the supplier's innovation value.
- k. The development of supplier dependency has a positive impact on the supplier's innovation value.
- l. Personal interactions between the supplier and the customer's company have a positive effect on the supplier's innovation value.
- m. The supplier's delivery service and ability have a positive effect on the supplier's innovation value.

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

- n. The supplier's position on the market (time to market) has a positive impact on the supplier's innovation value.

*Hypotheses for supplier contribution in customer innovation process*

**H6.** The extent of supplier involvement in the customer innovation process, the tightness of innovation cooperation directly and positively influence the supplier's technological competencies.

Not only the actual operational results are taken into account in the decision-making process, but they seek the innovation potential in the suppliers and try to use it in value creation (Kibbeling, 2010). According to the organizational view, corporate innovation is the result of appropriate and rapid responses to market changes and organizational learning (Hurley and Hult, 1998). Others regard business relationships and interactions as a source of emphasis on supplier-buyer relationships (Hakansson, 1982, Roy et al., 2004).

- a. The extent of supplier involvement has a positive effect on the supplier's ability to innovate.

The company's internal innovation activities have an impact on innovation co-operation with an external partner, so corporate culture and corporate management capabilities influence innovation performance (Gemünden et al., 2007). Companies with higher project management capabilities can deliver higher performance in new product developments (Ethiraj et al., 2005, Petroni and Panciroli, 2002). At the same time, existing collaborations can encourage suppliers to develop their innovation capabilities.

- b. The extent of supplier involvement in the customer's innovation process has a positive effect on internal corporate factors.

Literature and practical experience show that the higher the R&D spending in a company, the more likely it is to be innovative (Griffith et al., 2006). Therefore, these innovative companies can be more appropriate innovation partners, and they are more likely to contribute to the innovation process of their customers, and the co-operation increases the level of R&D spending.

- c. The extent of supplier involvement in the customer's innovation process has a positive impact on the supplier's R&D spending.

Companies are usually looking for supplier partners who have some kind of unique knowledge and can generate new knowledge from collaboration (Ahuja, 2000). In the course of specialization, the literature generally refers to a technological specialization, to which innovation and innovation ability are closely linked (Thevel, 2000). Buying companies that work with technologically specialized suppliers get much more sophisticated and creative solutions to their projects, so the more specialized a supplier is, the more it can help the customer's innovation processes (Pulles et al, 2014).

- d. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's specialization.

Product attributes are the basis of relationships, and beyond the value of the core supply, customers get value in the purchasing process, representing the value of the materials and components manufacturing process.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

- e. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's product characteristics.

In the course of collaborations, it is highly important for the customer company to react quickly and resolve any issues and problems that arise. Information exchange and sharing is an essential part of value creation and its support.

- f. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's ability to advise.

The supplier's existing technological knowledge, ability and practice has always been the basis for supplier selection, and has a major impact on the subsequent value creation process. In the case of the established cooperation, experience and common value creation further enhance the supplier's know-how.

- g. The extent of supplier involvement in the customer's innovation process has a positive effect on supplier know-how.

In the analysis of the effects of supplier-buyer cooperation, the literature first focused only on technological abilities because of their easier to measure and understand (Ho et al., 2010, Park and Krishnan, 2001). However, the question arises that if a company does not want to cooperate, then it has no innovative capabilities (Croom, 2001), because it does not share it with its customer, and so these abilities may not be effectively utilized.

**H7.** The degree of supplier involvement in the customer innovation process, the tightness of innovation cooperation directly and positively influence the supplier's competence in the relationship.

Innovation cooperation between supplier and buyer can be successful if both parties have constructive interoperability (Allred et al., 2011). The ability to cooperate can affect not only external but also internal relationships (Powell et al., 1996). Relationship to collaboration may change through experience, and positive attitudes can enhance co-operation with companies and become more open.

- a. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's attitude to cooperation.

Because suppliers do not share their resources equally among their customers, customers are competing for supplier goodwill (Shiele et al., 2012). The buyer company must become "attractive" to the supplier company to share its main resources with it and not with its competitors. Therefore, the buyer must reach the "preferred customer status", if achieved, the supplier is more likely to share with him the resources and joint developments that will not be available to the competitor (Hüttinger et al, 2012).

- b. The extent of supplier involvement in the customer's innovation process has a positive effect on the buyer's status at the supplier.

In the development of a supplier, intense collaboration can lead to new ideas and new solutions that enhance supplier-buyer relationships as a direct impact, and thus increase the results from the relationship. The joint action and the trust created as a result of the relationship are the two most critical factors in supplier development that increase the customer's competitiveness (Humphreys et al, 2007).

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

- c. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's development program.

According to the resource-dependence theory, different levels of dependence on external resources lead to network connections and sustainability (Hillman et al., 2009; Pfeffer and Salancik, 1978, 2003). This approach recognizes the influence of external factors on organizational behavior and examines whether leaders are able to control environmental uncertainty and dependence with different organizational solutions (Breuer and Lüdeke-Freund, 2014; Zott et al., 2011).

- d. The extent of supplier involvement in the customer's innovation process has a positive effect on the dependency of the supplier.

Personal contacts have always been of great importance in business marketing. They are defined as a key factor to be dealt with in value-based supplier relationships (Ulaga-Eggert, 2006). In the case study analysis, most companies have identified personal relationship as a critical point, as good communication with the supplier and seamless joint work are one of the decision-making factors for continuing the work together. A good relationship between employees increases the ability to solve and understand the goals of the partner company.

- e. The extent of supplier involvement in the customer's innovation process has a positive effect on personal interactions between the supplier and the customer.

Classical purchasing expectations, such as compliance with delivery time and the most efficient delivery of delivery, appear as value factors in supplier-customer relationships (Ulaga-Eggert, 2006).

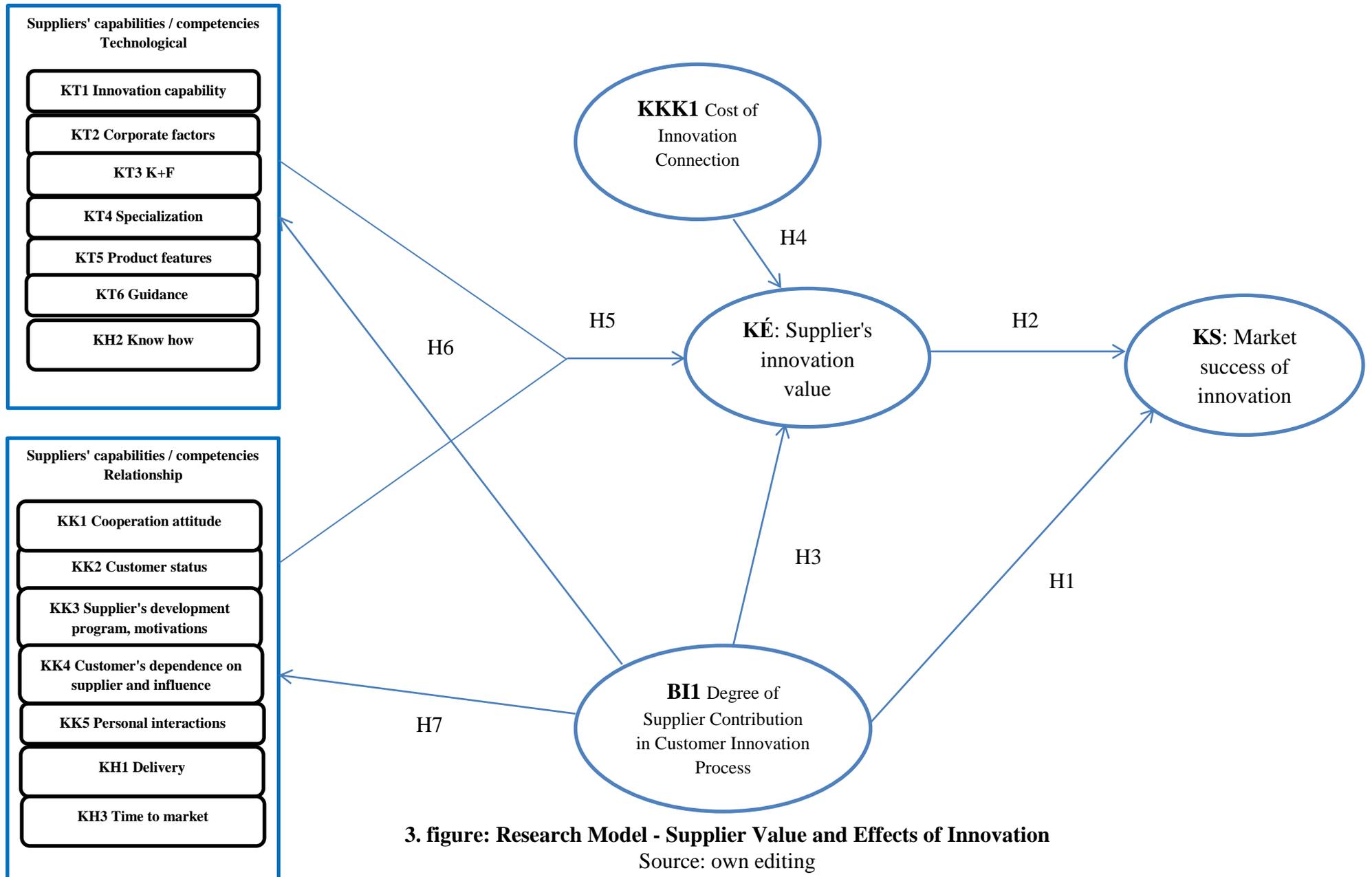
- f. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's delivery service and ability.

One of the critical points for supplier selection and joint development is the ability of the supplier to get more out of the market, for example by shortening cycle times. The supplier's judgment on the market is closely linked to this.

- g. The extent of supplier involvement in the customer's innovation process has a positive effect on shortening the time to market.

Figure 3 shows the research model and illustrates the hypotheses.

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process



3. figure: Research Model - Supplier Value and Effects of Innovation  
Source: own editing

## 5. Summary of research results – Theses

After the data collection, input, and clearing, the statistical analysis of the questionnaire was performed with the help of the SPSS 22.0 program. The main objective was to analyze the relationships between the theoretical model and the structural analysis process, including the PLS-SEM method (SmartPLS 3.0). The application of the structural analysis procedure is also explained by the fact that all the variables involved in the study are latent, ie they cannot be considered as directly measurable variables, so the relationships between the variables can be described using the method.

For testing the external model and performing the reliability and validity tests, I made confirmatory factor analysis, and then the indicators below 0.5 factor weight were removed - according to the literature guideline, the higher validity can be obtained by removal. According to the literature, the minimum factor weight to be considered in the evaluation of the models is 0.4, the indicators below this value must be removed from the model, but this does not impair the validity of the model (Klarmann, 2011). However, it is also pointed out that deleting an indicator may upset the balance of the model, so deleting the indicators is only recommended if the value of the CR indicator significantly improves (Henseler et.al., 2009).

During the analysis, those that did not meet the criteria were removed from the initial 18 variables and 90 indicators. 17 variables and 64 indicators were included in the final analysis. Among the variables, the supplier's specialization was not included in the final analysis.

Analyzes show that indicators and variables meet expectations. Factor weights are in most cases above 0.7 but in none of the cases lower than 0.4. The latent variables correspond to the thresholds for CR, AVE, and Cronback alpha. Looking at the four indicators as a whole, their variables and indicators meet expectations.

When checking the discriminatory validity, I examined the cross-weight validation, the Fornell-Larcker criterion, and the HTMT index, and it can be established that the required criteria are met. Since the indicators and the variables meet the required criteria, I decided to accept them.

After validity and reliability analyzes, it can be concluded that the external model's reliability and validity criteria are adequate, so the resulting relationships can be generalized.

In the tests of the internal model, the results of the tests of the individual roads are presented in the first round and the effects of latent variables are analyzed. The aim of the dissertation is to formulate and map the factors influencing the innovation value of the supplier. According to the model, the supplier's contribution to the innovation of the buyer has the greatest influence on the supplier's innovation value. Supplier involvement directly influences the supplier's technological and network capabilities, which influence the supplier's innovation value. The multiple determination coefficients in the model are also presented and analyzed.

The significance of road coefficients was tested by bootstrap sampling. The number of sub-samples used was 5,000 according to the literature guidelines (Henseler et al., 2009, Hair et al., 2011, Hair et al., 2012, Hair et al. 2017). I have set the individual sign change option to handle sign change.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

The supplier's innovation value is unique, and each supplier has a different innovation value for the buyer, just as a supplier can have different innovation value for different customers. In the course of the study, I was interested in the factors that are most important in selecting a supplier, which are the ones that most influence the formulation of the supplier's innovation value. My assumption is that the supplier's innovation value depends on the technological capabilities of the supplier's own resources, from which a resource-based innovation value can be formulated. It depends on the supplier's ability to communicate, which can be a network innovation value, which is not only the proper formatting and transfer of own resources to the buyer, but also the transfer of other network resources to the buyer company. Third, the supplier's innovation value depends on how close the innovation cooperation between the parties is, ie how much the customer's innovation needs and expectations match those of the supplier. Finally, I considered it important to examine the impact of costs on innovation processes.

The following statements can be made when interpreting path coefficients ( $\beta$ ):

- The innovation value of the supplier has a strong, positive effect on the market success of innovation ( $\beta = 0.640$ ).
- Supplier's contribution directly influences the supplier's innovation value, and this effect is strong ( $\beta = 0.474$ ).
- The cost of the innovation relationship has a weak, negative impact on the supplier's innovation value ( $\beta = -0,090$ ).
- Consulting ( $\beta = -0,335$ ), product attributes ( $\beta = 0,290$ ), supplier development program ( $\beta = 0,289$ ), market entry time ( $\beta = 0,281$ ) have a strong influence on the supplier's innovation value. Knowledge ( $\beta = -0,423$ ) and personal interactions ( $\beta = 0,343$ ) have a strong impact, and the supplier's ability to innovate ( $\beta = 0,180$ ) has a less pronounced effect, but here p values are not significant. In the other ways, we can talk about poor effects.
- Examining the impact of supplier involvement on supplier competencies, the following can be said: the supplier's contribution to know-how ( $\beta = 0.881$ ) has the strongest impact. This is followed by the supplier's development program ( $\beta = 0.654$ ), the time to market ( $\beta = 0.652$ ), the cooperative attitude ( $\beta = 0.662$ ), customer status ( $\beta = 0.502$ ), the supplier's ability to innovate ( $\beta = 0.438$ ), personal interactions ( $\beta = 0.388$ ), product attributes ( $\beta = 0.385$ ), supplier dependency ( $\beta = 0.311$ ), R & D ( $\beta = 0.310$ ). Less powerful impact on supplier's innovation value ( $\beta = 0.289$ ), delivery ( $\beta = 0.278$ ), consulting ( $\beta = 0.265$ ), and corporate factors ( $\beta = 0.235$ ).

Despite the fact that not all road ratios show significant results, they were not excluded from the model. I believe that we should not neglect their significance because of the well-founded literature and the closer examination of the correlations between the variables.

During the analysis I did a two-step factor analysis, which I wanted to examine the overall effect of technology and network competencies, but statistically, these results did not show a defensible result, so the impact study refers to the elements of competencies.

Analyzing the multiple determinants, it can be said that the explanatory power of the supplier's innovation value can be considered high ( $R^2 = 0.623$ ); Values for the fit of the model are  $SRMR = 0.093$ ,  $NFI = 0.111$ , which are - according to the literature - an acceptable fit (Hair et al., 2017).

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

When examining the explanatory power of supplier contribution, it turns out that some determinants have a high determination coefficient. 77% of the know-how is explained by the supplier's contribution. Medium explanatory power is observed with regard to the cooperative attitude ( $R^2 = 0.392$ ), supplier development program ( $R^2 = 0.428$ ), market entry time ( $R^2 = 0.425$ ).

In the course of quantitative research, the relations between the latent variables and the hypotheses were analyzed using PLS path analysis and bootstrap algorithm.

The research was based on the assumption that the relationship with the supplier has an impact on the market success of customer innovation, thus hypothesis H1 has been formulated:

**H1.** The degree of supplier involvement and innovation with supplier has a positive effect on the market success of customer innovation.

It already became clear in the exploratory qualitative phase, that the relationship with the supplier and the supplier is important for the companies, and cooperation for innovation is becoming more and more common. One of the most important benefits of effective relationship with suppliers has been the impact on innovation in the market. This finding was also confirmed by the quantitative stage, as the positive and significant relationship between the supplier's success and the market success of innovation ( $\beta = 0.492$ ) can be described. Based on these I decided to accept hypothesis H1. Based on this, the first thesis can be formulated:

### Thesis 1.

The degree of supplier involvement in the customer's innovation process and the market success of the customer's innovation has a positive, significant relationship. So the greater the degree of supplier involvement is in the customer innovation process, the greater is the success of the market for customer innovation.

It follows that if we look at cooperations in general, the relationship with the supplier carries value for the buyer company. The thesis emphasizes innovation co-operation, but it is important to note that it is generally said among Hungarian machine manufacturers that innovation co-operation is preceded by a more traditional, usually co-operation type.

In innovation cooperation, the supplier has an innovation value for the customer, and based on this:

**H2.** The supplier's innovation value has a positive impact on the market success of customer innovation.

There is a significant and positive relationship between the supplier's innovation value and the market success of innovation ( $\beta = 0.640$ ), so I accepted the H2 hypothesis.

### Thesis 2.

The supplier's innovation value has a positive, significant impact on the market success of customer innovation. The higher is the innovation value of the supplier, the greater is the market success of customer innovation.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

The success of the innovation in the market is positively influenced by the supplier's contribution as well as the supplier's innovation value, on the basis of which it can be assumed that the positive relationship between the two influencing variables can be written:

**H3.** The extent of supplier involvement in the customer's innovation process has a positive impact on the supplier's innovation value.

The results of PLS road analysis showed that supplier contribution has a strong, positive and significant impact on the supplier's innovation value (Total Impact  $\beta = 0.687$ , direct effect  $\beta = 0,474$ ). Hypothesis H3 was accepted.

### Thesis 3.

The degree of supplier involvement in the innovation process of the buyer and the innovation value of the supplier has a positive and significant relationship. The higher is the supplier's share of the customer's innovation process, the higher is the supplier's innovation value.

Costs incur during all cooperation. According to the traditional procurement approach, the decision is influenced by the price and related costs. As a result of the case study analysis, the right value for money was highlighted. My assumption is that the costs incurred by the supplier in innovation relationships will affect the supplier's innovation value.

**H4.** In innovation cooperation with the supplier, relationship costs have a positive impact on knowledge-based relationships and have an impact on the supplier's innovation value.

According to the results of the questionnaire corporate survey, the costs of the innovation relationship have no effect on the supplier's innovation value; Thus, based on the result, hypothesis H4 was rejected.

### Thesis 4.

In innovation cooperation with the supplier, the cost of innovation is not influenced by knowledge-based relationships, and has no impact on the supplier's innovation value.

The supplier's innovation value is based on the supplier's competencies based on resource-based and network-based theories. Integrating the two theories, I suppose these competencies explain the supplier's innovation value, and the innovation value can be written as a complex aggregate indicator. At the bottom of it, the H5 hypothesis group was formulated.

**H5.** There is a formal causal relationship between supplier competencies and supplier's innovation value.

- a. The supplier's ability to innovate has a positive effect on the supplier's innovation value.
- b. Internal corporate factors have a positive impact on the supplier's innovation value.
- c. The supplier's R&D expenditures have a positive impact on the supplier's innovation value.
- d. The supplier's specialization has a positive effect on the supplier's innovation value.
- e. The characteristics of the supplier's products have a positive effect on the supplier's innovation value.
- f. The supplier's ability to advise has a positive impact on the supplier's innovation value.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

- g. Supplier know-how has a positive impact on the supplier's innovation value.
- h. The supplier's cooperative attitude has a positive effect on the supplier's innovation value.
- i. The buyer's status at the supplier has a positive effect on the supplier's innovation value.
- j. The supplier's development program has a positive impact on the supplier's innovation value.
- k. The development of supplier dependency has a positive impact on the supplier's innovation value.
- l. Personal interactions between the supplier and the customer's company have a positive effect on the supplier's innovation value.
- m. The supplier's delivery service and ability have a positive effect on the supplier's innovation value.
- n. The supplier's position on the market (time to market) has a positive impact on the supplier's innovation value.

Based on the results of the confirmatory factor analysis, it can be concluded that there is a formative relationship between the supplier's competencies and the value of innovation. This is evidenced by the model's fit, validity and reliability studies (SRMR = 0.093, NFI = 0.111). The supplier's innovation value is strongly influenced by consulting ( $\beta = -0,335$ ), the product characteristics ( $\beta = 0,290$ ), the supplier's development program ( $\beta = 0,289$ ), and the time to market ( $\beta = 0,281$ ). Knowledge ( $\beta = -0,423$ ) and personal interactions ( $\beta = 0,343$ ) have a strong impact, and the supplier's ability to innovate ( $\beta = 0,180$ ) has a less pronounced effect, but here p values are not significant. For the other roads, we can talk about weaker effects. Hypothesis H5 is accepted in part.

### Thesis 5.

There is a formal causal relationship between supplier competencies and supplier's innovation value. The supplier's competencies have an impact on the supplier's innovation value, ie the supplier's competencies are more advanced, the more the supplier contributes to the innovation process of the buyer, and thus the supplier's innovation value will be higher. The supplier's innovation value is most strongly influenced by consulting, product features, supplier development program, market entry time, know-how, personal interactions, and supplier's ability to innovate.

By further examination of supplier competencies, it became clear during the case study analysis that other supplier competencies are at the forefront of cooperation and continuation of cooperation. As collaboration develops, the importance of relationship-based competencies increases. Also, not only bilateral relations are important, but also the role in the network. Thus, it can be assumed that supplier competencies are influenced by the supplier's involvement in the customer innovation process.

**H6.** The extent of supplier involvement in the customer innovation process, the tightness of innovation cooperation directly and positively influence the supplier's technological competencies.

- a. The extent of supplier involvement has a positive effect on the supplier's ability to innovate.
- b. The extent of supplier involvement in the customer's innovation process has a positive effect on internal corporate factors.

Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

- c. The extent of supplier involvement in the customer's innovation process has a positive impact on the supplier's R&D spending.
- d. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's specialization.
- e. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's product characteristics.
- f. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's ability to advise.
- g. The extent of supplier involvement in the customer's innovation process has a positive effect on supplier know-how.

The results of the structural modeling process showed that supplier involvement has a significant and positive effect on know-how ( $\beta = 0.881$ ), supplier's innovation ability ( $\beta = 0.438$ ), product characteristics ( $\beta = 0.385$ ), R&D ( $\beta = 0.310$ ) for counseling ( $\beta = 0.265$ ). Corporate factors ( $\beta = 0.235$ ) also have a positive effect, but this correlation did not show significant correlation. Hypothesis H6 is partly accepted by the group, since no significant correlation can be found with internal corporate factors.

**Thesis 6.**

The supplier's involvement in the customer innovation process, the tightness of innovation cooperation directly and positively influence the supplier's technological competencies, mentioning supplier know-how, supplier's ability to innovate, product features delivered, R&D spending, and supplier's consulting services. In the process of innovation cooperation, the supplier's technological competencies can be improved, which will bring value to both the supplier and the buyer, as this will ensure the success of the innovation market.

**H7.** The extent of supplier involvement in the customer innovation process, the tightness of innovation cooperation directly and positively influence the supplier's competence in the relationship.

- a. The extent of supplier involvement in the innovation process of the customer has a positive effect on the supplier's attitude to cooperation.
- b. The extent of supplier involvement in the customer's innovation process has a positive effect on the buyer's status at the supplier.
- c. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's development program.
- d. The extent of supplier involvement in the customer's innovation process has a positive effect on the dependency of the supplier.
- e. The extent of supplier involvement in the customer's innovation process has a positive effect on personal interactions between the supplier and the customer.
- f. The extent of supplier involvement in the customer's innovation process has a positive effect on the supplier's delivery service and ability.
- g. The extent of supplier involvement in the customer's innovation process has a positive effect on shortening the time to market. A további eredmények szerint a beszállítói közreműködés szignifikáns és pozitív hatással van a beszállító fejlődési programjára ( $\beta=0,654$ ), a piacra kerülési időre ( $\beta=0,652$ ), az együttműködési attitűdre ( $\beta=0,626$ ), a vásárlói státuszra ( $\beta=0,502$ ), a személyes interakciókra ( $\beta=0,388$ ), a beszállítótól való függésre ( $\beta=0,311$ ) és a kiszállításra ( $\beta=0,278$ ).

So the H7 hypothesis group was accepted.

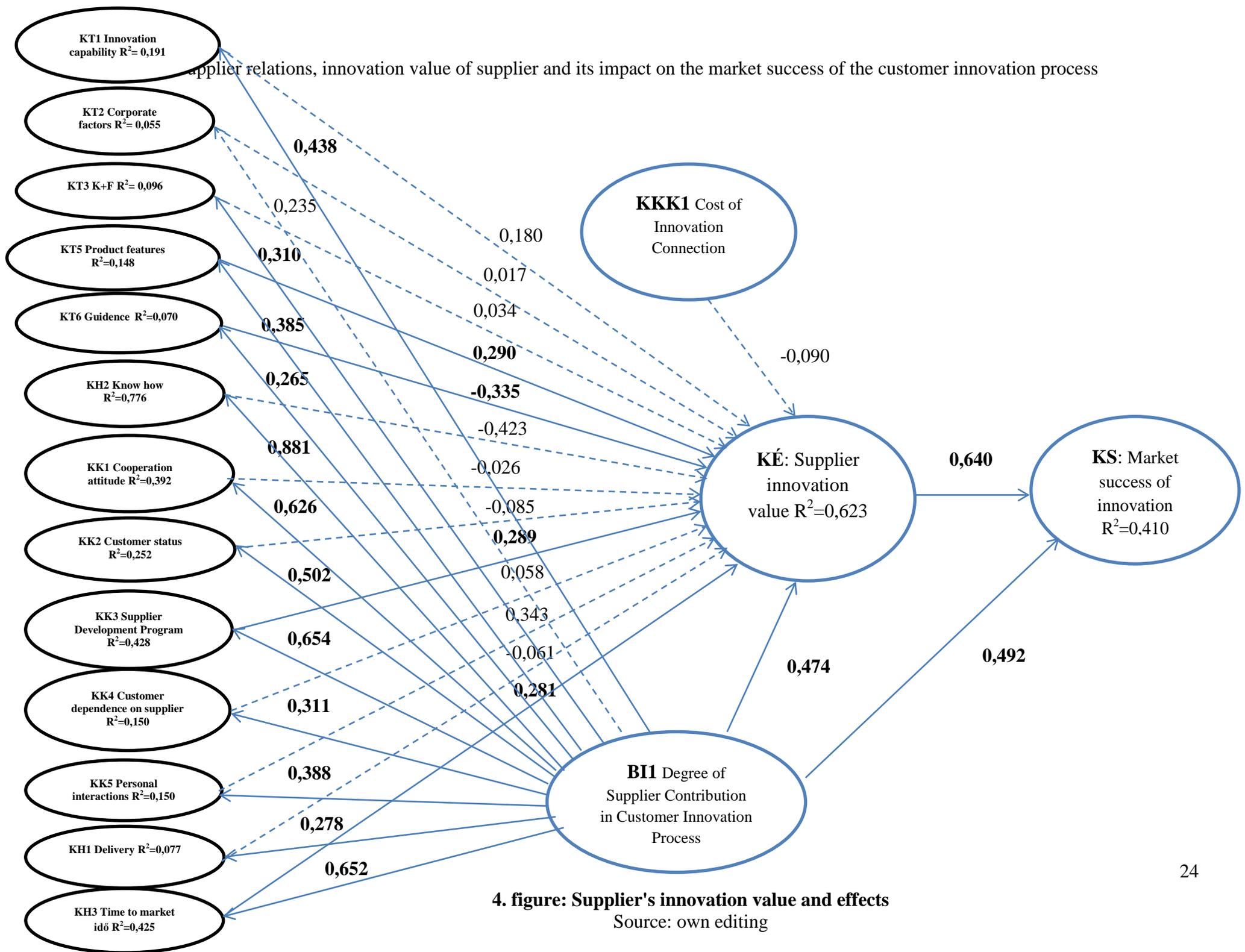
Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

**Thesis 7.**

The supplier's involvement in the customer innovation process, the tightness of innovation cooperation directly and positively influence the supplier's network competencies with the supplier's development program, time to market, cooperative attitude, customer status, personal interactions, supplier dependency, and delivery. In the process of innovation cooperation, the supplier's network competencies are at the forefront; this can be developed, which is a value for both the supplier and the buyer, as it can ensure the success of the innovation market.

Figure 4 illustrates the final model, where the full lines represent significant pathways, while the dashed lines represent non-significant paths. Multiple determinations coefficients ( $R^2$ ) are also indicated under the names of the variables.

supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process



4. figure: Supplier's innovation value and effects  
Source: own editing

## 6. Summary

The starting point of the doctoral dissertation was the examination of the value-creation between companies, which was given by the growing and developing literature background based on the research context. Companies are collaborating with several partners in their innovation processes, but cooperation with customers and suppliers is outstanding in terms of number and intensity of collaboration. Examining the literature of businessmarketing, we can find more and more issues such as supplier, supplier competencies, cooperation with supplier, and supplier's contribution to innovation processes.

The central issue of the dissertation is the formulation of the value of innovation cooperation with the supplier. In defining the supplier's innovation value, the primary consideration was the integration of resource-based and network-based supplier value theories into an actual supplier value that can be measured for companies with both technological and networking competencies.

Based on all of these, the literature review focuses on the literature that has been step-by-step in formulating and finalizing the final results. Relationship marketing - which many people call paradigm shift not only in business marketing but also in marketing - provided the theoretical basis for understanding the relationships between the parties, and for marketing relationships. The issue of networks and network thinking is already at the forefront in the course of outlining the theory of relationship marketing, as every connection is part of a network. Common value creation summarizes the benefits and values of these relationships and networks, highlighting the importance of value-based differentiation. In their procurement activities, companies take into account the individual competencies of the supplier companies, the values that can be obtained from them, and the resources that can be obtained through the supplier's network. Examining these, understanding the connection points is essential for formulating the supplier's innovation value.

After a highly theoretical foundation of the doctoral dissertation, I carried out exploratory qualitative research among customers of a machine tool manufacturing company. The case study analysis confirmed and complemented the supplier competencies that were considered significant by the literature, which have an impact on the supplier's innovation value and thus on the market success of innovation.

During the quantitative questionnaire survey I sought to find out how the innovation cooperation with the supplier affects the supplier's innovation value and thus the market success of innovation. The impact of the supplier's technological and relationship competencies on the supplier's innovation value and the impact of supplier involvement on these factors were investigated.

One of the main results of the research is that in terms of the innovation practices of companies, the dominance of technological innovations can be observed. Innovation cooperation is becoming more and more common in Hungarian companies - the importance of innovation cooperation with the supplier is increasing. However, it is still true that we can talk about semi-open innovations and staggered collaborations. "Traditional" purchasing thinking is still present, but the development of a small and narrow supply chain is increasingly prevalent.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

The practice is characterized by an increase in the number of organizational innovations and organizational changes aimed at facilitating joint innovation and the development of a similar network value system. However, it is not enough to create a similar organizational structure, but to develop new innovation business models.

Market practice is increasingly showing that companies are outsourcing some of their production, citing capacity shortages. However, this is followed by continuous supplier development, ie continuous advisory and control activities. Thanks to a closer relationship, the customer's innovation process can be more efficient. The spread of vendor management is not limited to multi-company.

First of all, the companies take into account the technological characteristics of the cooperation, and in the course of the relationship the relationship and network factors become more and more appreciated. As innovation cooperation progresses, the supplier's innovation value is increasingly influenced by its relationship characteristics.

The supplier's innovation value basically consists of resource-based capabilities and network-based capabilities. There is a positive, moderately strong link between innovation value and resource-based capabilities. The most important of resource-based capabilities is the technical, economic and organizational knowledge and experience of the supplier company.

The supplier's innovation value and network-based capabilities have a positive, medium-strong relationship. Even during the case study, it became clear that networking capabilities are becoming more and more important in innovation collaboration. The supplier's development opportunities, motivations, continuous support for the buyer company, and willingness to cooperate are the most important qualities that are often more important than some of the company's technological capabilities.

There is a positive medium strong relationship between the supplier's innovation value and the level of supplier involvement. Innovation cooperation involves common innovation processes between supplier and buyer, the continuity and intensity of these processes, the meeting of customer and supplier innovation needs and offers. So the closer the innovation of the two parties is, the higher the value of the supplier's innovation value.

For the buyer, we can talk about the actual value of innovation if these three factors appear side by side, supporting each other and being connected. These factors have a different weight in each company, and as a result, the supplier's innovation value for each company is different, similar to the relationship.

Perhaps the most surprising result of the research is that the cost of innovation does not affect the supplier's innovation value. This can be explained by the fact that, in knowledge-based relationships, the parties count on higher costs, but this is dwarfed by future benefits and value.

It is also an interesting result that dependence on the supplier is becoming more and more a disadvantage of innovation cooperation in international literature and practice. However, this is not yet perceived by Hungarian companies.

The results reinforce the previously described approach that innovation should become market-driven. It can be stated that technological innovations are still predominant in Hungarian corporate practice, but perhaps the integration of organizational and marketing innovations has started, if not always in a conscious way.

## Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

The novelty of the dissertation is that it examines a relatively less researched area in Hungary. During the primary research, a theoretical model was created, which organizes the supplier's innovation value and impact, taking into account both corporate, diadic and network levels. The supplier's innovation value - unlike the wording in international literature - can not only be extended to new product innovations, but also to non-technological innovations. To be more precise, it puts the view that innovation should be seen as a kind of innovation portfolio, the combined use of other types of innovation is necessary for the success of new product innovations.

The dissertation also uses novelties in its methodology, as the use of PLS-SEM analysis has only appeared in Hungarian marketing research in recent years.

## **7. Importance of research results, practical applicability, limitations of research**

In practice, supplier evaluation systems use only statistically measurable factors when selecting a supplier. However, these systems mostly - because of the measurability - examine technological competencies, ignoring other, harder-to-measure competencies. While continuing and expanding the co-operation, the competencies that are more difficult to measure are appreciated, but companies generally use statistics to help them make their decisions. The supplier innovation value formulated in the doctoral research can help to make these decisions and find the suppliers with which they can cooperate most effectively in their innovation processes. Finding the right supplier, the supplier's innovation value is an innovative competitive advantage for the company, leading to market success.

The research sets out the theoretical basis on which an aggregate indicator can be formulated for the supplier's innovation value, which can solve the problem of measurability. The supplier's innovation value not only examines the supplier's own resources, but also includes the resources obtained by the supplier's network. This is also important as there is a growing tendency - compared to what has been experienced so far - to achieve innovation cooperation between supplier and buyer with different value networks, where non-traditional innovation business models emerge, not just new product innovations. . As an example, there is an increasingly close cooperation between car manufacturers and various software companies in the field of self-driving cars. As a result, it can help to optimize the supply chain of suppliers, as the supplier's resources will be concentrated in one place, and creating an appropriate and efficient supply chain will result in long-term resource savings and competitive advantage.

The adequacy of research is investigated by the literature in terms of validity, reliability and generalizability (Malhotra - Simon, 2008). Validity and reliability tests and their results have already been described, and it can be concluded that the results and research can be considered relevant for these two aspects. From the generalization's point of view, it is a limitation of the research that the survey was carried out among machine manufacturing companies close to the Hungarian automotive industry. Further sector inquiries may reveal factors that have additional influencing properties or may reveal sector-specificity to the supplier's innovation value.

The doctoral research provides a theoretical framework for the formulation of the aggregate indicator of the value of the already mentioned supplier, but it has not been determined in its entirety. In determining the supplier's innovation value, there is a significant impact of less competence than I expected, so these competencies and their effects require further research. The research did not examine the relationships and effects between supplier competencies, although the thesis mentions, for example, the effect of the cooperative attitude on other competencies, since the supplier company has inadequate competencies for the buyer if it is not willing to share it. Further study of these effects may reveal important relationships that may be the subject of further research and may complement the findings of this research.

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### 2019

*Az innovációs együttműködések jelentősége a beszállító vevő kapcsolatokban*

In: Marketing & Menedzsment

(Megjelenés alatt)

*Innovation cooperation – the buyer-supplier relations*

In: Theory, Methodology, Practice

(Megjelenés alatt)

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### 2018

Papp Adrienn, Piskóti István

*Supplier Innovation Value - First Results of an Empirical Research*

In: 9 th Annual Global Business Conference Szeptember 26–29, 2018 Dubrovnik, Croatia

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*Innovációs együttműködések - beszállító-vevő kapcsolatok*

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Supplier relations, innovation value of supplier and its impact on the market success of the customer innovation process

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