

UNDRESSING INTERACTIONS: *the effect of interactions on performance in multi-project settings*

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ABSTRACT

Contemporary companies work in complex environment comprising many simultaneous running projects, i.e. multi-project settings. To a large extent those projects are interdependent and are multi-professionally constituted of representatives from customers, suppliers, other business partners and researchers from academia. The success of projects, particularly in the multi-project setting, is dependent of the collaboration and interaction among those actors involved. The aim of this article is to explore the dynamics of interactions with external actors, such as customers, suppliers, other business partners and academia and investigate the effect of interactions on performance in multi-project settings.

The methodology is based on a mixed-method approach, comprising a quantitative survey and a complementary case study. The quantitative survey questions are based on the extended literature study of project management interactions. The case study was selected in order to create a deeper understanding of the processes of interaction, barriers to interactions and the outcome in terms of project performance. The results show that interactions with external actors positively influence performance in terms of estimated quality, time, and cost, innovations and actor satisfaction.

Key words: performance, interaction management, external actors, multiple projects.

INTRODUCTION

Increasing market changes, multi-project settings, access to multifaceted information, technology development, growing customer demands, etc. place extra pressure on management for achieving performance. To deal with such externalities and internal company limitations in resources companies are encouraged to reframe working procedures into simultaneously running projects (Archer & Gazemzadeh, 1999), where each of the projects within a multi-project setting is complex, and contains a set of phases, which reflect its dynamics. Managing those projects from initiation to closing phases aims to achieve project performance by optimizing available resources and integrating required inputs. Those inputs can be acquired from interactions with external actors, and concurrently developing collaborative activities with them (Sterman, 1992; Omta, Trienekens & Beers, 2001; Danilovic & Winroth, 2005). This transforms current projects into dynamic systems, which are comprised of multiple interdependent actors based on non-linear interactions (Sterman, 1992) occurring at various project phases.

Although increased number of interactions with external actors add more pressure and complexity in multiprojects (Garaldi & Gerald, 2007), they have a potential to influence performance achievement in a radical manner. Statistics demonstrate that only 15% of enterprises think that it is impossible to withstand market competition through interactions. In the meantime, other 85% are already involved in several interactive activities. From those, who are opened for interactions - 1/4 involved into interactions with competitors, 3/4 with supplier, customer and academia (Agamus Consult, 1999). Scholars suggest (ITEM, 2004; Bader, 2006; Entrekin, 2007) that the involvement of a higher number of interacting participants can lead to a higher number of idea generations, innovations, and increased effectiveness and efficiency.

The performance of companies is directly dependable from their ability to maintain relationship with other market actors and willingness of those to participate in the company's development processes and joint activities (Kandampully, 2002). Belderbos et.al. (2004) supports and further develops this by saying that the expected performance from well-developed relations with suppliers and other business partners directs towards incremental innovations, while interactions with customers can lead company to radical innovations in multi-project settings.

Reviewing project and interaction management literature we have come to the conclusion that there has been not been developed a systematic approach to managing interactions with external actors and understating their impact on performance in project dynamics. There is still need to establish comprehensive picture describing how external participants' resources can be utilized to their best in project dynamics and their influence on performance, and which barriers can hinder it. The development of a systematic approach can provide project management with an understanding of when is the right time of project dynamics for a certain actor's involvement, and which information could be the most crucial at a certain point of time.

Thus, the aim of this article is to explore the dynamics of interactions with external actors, such as customers, suppliers, other business partners and academia and investigate the effect of interactions on performance in multi-project settings. To support the established aim several research questions have been developed, answering which would shed the light on the described problem. This paper is divided into the following parts. The first sections contains problem background and theoretical framework. After this, we describe utilized methodological approach for empirical data acquisition. In the following section the findings and data interpretation are provided. Finally, we elaborate on theoretical, managerial implications and on future research directions.

PROBLEM BACKGROUND AND RESEARCH QUESTIONS

Driven by the objective to sustain market leadership organizations need to fight two main challenges: scarcity of resources (Penrose, 1959; Barney 1991; Grant, 1996) and product/process complexity (Lundkvist, 2003). In order to deal with them companies organize their activities in multi-project settings accompanied by interactions with external actors. Scholars of the project management claim that more than 90% of all companies on the market arrange their working procedures in the way of running multiple projects (Archer & Gazemzadeh, 1999; Payne, 1995, Reiss, 1996, etc.). By involving external actors into such projects at a particular time of their life-cycle managers can maximize value of scarce human and information resources, minimize product and process complexity and increase one's problem-solving capacity. Such approach leads organizations to achieving increased number of innovations, improved efficiency and effectiveness (time-cost-quality), and participant satisfaction as components of overall performance. However, extensive and intensive knowledge/ information exchange between project participants requires from management to prioritize interactions with particular actors at a particular phase of project life-cycle in order to achieve the established criteria for performance.

In the project management literature there has been conducted little research on how companies handle complex interactions with multiple external actors, how they prioritize their relations and choose the time for their involvement, and how this processes/ manipulations influence the outcome of multiple projects. The proposed research problem facilitates the establishment of the following research questions:

1. Why do interactions take place in multi-project settings?
2. Which of external actors interact in different phases and which information do they provide in the multiproject context?
3. Which barriers hinder interaction effectiveness?
4. To what extent external actors influence performance?

Seeking answers to the established research questions we have developed a research model. It examines the nature of interactions (motives, barriers) in project dynamics, information, which is exchanged and shared among project participants and reflects them on performance.

THEORETICAL FRAMEWORK

In this section we review the previously generated theory within the area of project performance, its dynamics with particular focus on life-cycle phases and interaction management.

Project success criteria (performance)

Due to the *Halo Effect* (Rosenzweig, 2007) performance is a relative, complex and subjective parameter, which is very much dependant on company position on the market and risk involved with one's activities. Each firm develops its own set of criteria which defines achieved project performance. Having in mind overwhelming variety of suggested by scholars performance measures this article is concentrating on the aspects of time-cost-quality, innovations and actor satisfaction as main criteria to reflect the project performance on.

Firstly, for more than 50 years majority of companies judge projects on the "Iron Triangle" criteria, which are focused on the deliverables in terms of time, cost and product performance/ quality. It has been considered as the classic, practitioner-oriented and widely accepted model for measuring success or failure of projects. (Morris & Pinto, 2007). These three criteria seem to be not so simple as they sound, on the way to its achievement a lot of constraints can be met. The latter can mostly occur due to quick changing environmental changes, differentiation in customer requirements, complexity of the relations internal as well as external involved, and etc. All these three criteria are estimated on certain phase of projects (mostly on planning phase) and their achievement, and, even, going beyond of established indicators becomes a benchmark for projects. Dooley et. al. (2005) claim that achievement time-cost-quality (TCQ) indicators is enabled by project high interaction capabilities realized within project dynamics (life-cycle). The "Iron Triangle" found multiple elaborations in the performance matrix presented above, where time, cost and quality are inalienable constituents of responsiveness, efficiency and quality categories respectively.

Atkinson (1999) and Lechler (1998) argue that, although Iron Triangle criteria are relevant, there should be developed other criteria, which would holistically measure project performance. Second important criteria, taken under consideration, contribute significantly in company capacity development, growth, and competitive advantage. It is innovation, what means breakthroughs of products/process/technology and/or modification of existing products/process/technology. It was taken under our consideration by relying on Den Hertog & Huizenga (2000), who says that it is a key success factor and value-enhancer for company performance.

According to Sterman (1992) innovativeness is a quality which is aiming multiprojects as well as any other project type. The potential to reach innovativeness is its capacity to innovate, which is depending from financial well-being, adaptability to environmental changes, perceptibility of novel ideas and the speed of their implementation into practice. Most of the

ideas and information about environmental changes received from customer and other external market actors which play a role of catalysts for innovativeness.

Third criteria for performance considered is coming out from “stakeholder community benefits” theory (Atkinson, 1999), which includes customer, supplier, other business partners and academia satisfaction. Nicholas (1989) claims that these criteria are appropriate to match any project. Under satisfaction, in case with customer, is understood the acceptance and approval of product specification and quality; in case with supplier, other partners and academia it is the process and result of joint activities. According to Fornell (1992) the achievement of performance through actors satisfaction may lead companies to leading market position and profitability. This type of criteria are also represented in performance matrix in several categories, such as quality and flexibility.

Thus, the five main success criteria for performance achievement are chosen as focus in this article: Time (T), Cost (C), Product Quality (Q), Innovations (I), and actors satisfaction (AS), which are touched upon in all categories of the matrix and even more. The achievement of aforementioned criteria can be measured in any point throughout project time, which enables the further basis for decision-making and re/formulation of the process. By highlighting quite a few of success criteria for performance achievement we try to capture various perspectives of project development throughout its dynamic process, because it is obvious that some of criteria are more important than the others in each period of project life-cycle.

Innovation and patenting

Many scholars highlight the importance of interactive activities on company performance in projects. Graf (2006, p. 13) summarizes the understandings of Dosi and Lawson by saying that “the whole environment and the system of relationships actors embedded in are also crucial for the success of innovative project,” which is identified by Allen as collective invention, that is based both on unconscious and conscious information exchange. Klomp & Van Leeuwen (2001) found that firms which are involved in innovation cooperations demonstrate a significantly higher share of their sales.

Knowledge sources for innovation are usually split according to the type of partner into academic sources and industrial sources (customer-downstream, suppliers and competitors-upstream). Von Hippel (1988) showed that network relationships, particularly with customers, stimulate innovation success. Similarly, Klomp & van Leeuwen (2001) found evidence that sourcing knowledge from industrial sources positively affects innovation success.

It is understood that patents can measure only some parts of innovative activities and project performance (Griliches, 1990). Duguet & Monjon (2004) argue that data on patents mainly estimate the persistence of innovative leadership rather than persistence of innovation.” In their research Havnes & Senneneth (2001) provide arguments for the validity of assumption that networking and managing internal and external relationships positively influence organizational performance and further company growth.

Dynamics of multiple projects

Labuschagne & Brent (2005, p.162) defines a project as “a temporary endeavour undertaken to create a unique product or service.” Projects are instruments for operationalizing, achieving goals, and accomplishing specific tasks (Archibald, 1987; Morris, 1988). Pressures of competition and dynamic market development influence company business strategies for sustaining their leadership. The latter has been stimulated by collections of simultaneously run projects (multiple projects), which tend to perform better than single-project business. Since in multiple projects focus switches from “local optimum” (project objectives) to “global optimum”

(organization objectives) (Morris & Pinto, 2007), they have become the strategic technique for maximizing value of organizational scarce resources and minimizing each single product and process complexity. Such companies, with the project-intense environment, are the focal point of our research.

Multiprojects management is not a onetime event; it is dynamic - continual, interactive and changing process, which requires ongoing monitoring and course correction (Rejegopal et.al., 2007). Generally, each project has the beginning, the middle and the end. These three periods comprise a life of the project or the project life-cycle (“generic macro schedules”). The life-cycle reflects internal dynamics of project process.

Typically, project life-cycle is described in terms of three to six phases, which have diversified content. These phases help to track project development, enable decision-making, make revisions, updates of the process and its effectiveness criteria on each step. Project-phase decomposition can differ depending on the type of projects, industries, companies’ multiplicity due to inability to apply one standardized life-cycle to all project practices. Several examples of project-phase packages are presented by Morris (1988), Kerzner (1989), Thiry (2004), etc. The fundamental model taken for the research framework is based on the phases suggested by Project Management Institute (2000):

- Initiation (definition of new project and obtaining authorization to start it);
- Planning (establishment project scope and objectives, course of actions);
- Design and Execution (completing the work and satisfy project criteria);
- Monitoring and Reporting (tracking and measurement of performance, make changes if needed);
- Closing and Reviewing (formal closure and lessons learning).

Archibald (1987) says that this phases are too broad with generic titles, which increase confusion in their understanding. Moreover, he continuous, that the definition up to 10 phases is needed for each project. At the same time von Wangenheim et.al. (2010) claims that such phases division is rather concrete and task-oriented. Relying on von Wangenheim et.al. (2010) opinion, which is supported by current organizational practices, where this standardized project life-cycle is followed by majority of organizations, this project-phase typology is chosen for the research.

Normally, the pre-project and beginning project phases are most critical in project dynamics because is overwhelmed with ambiguity, uncertainty and when wishes of different stakeholders are implemented into the product/process (Kerzner, 1989). Within it a lot of efforts are dedicated to planning and estimations. The middle phases concentrated on knowledge gaining and information collection, control and monitoring actions. However, the later project phases are the most active, because of already existing ground to work on, advanced personnel commitment and intensive interactions with different actors. On closing phase main focus from resources distribution moves to actual project completion (Morris, 1988). After projects completion the main direction of the managers and whole company personnel is directed towards results. Then the level of satisfaction is measured and evaluations are made, e.g. outcome measurements (TCQ), problems and their solutions pinpointing, which allow gaining knowledge and experience for future projects (Tyson, 1997; Tidd et.al., 2001).

However, to respond effectively to market dynamics and external changes management needs to involve external actors and facilitate intensive interactions into projects.

Interactions with external actors

The relationship theory says that interaction is about individuals/ participants from various organizations answering two main questions, when being involved in collaborative projects: “1) who should do what activities; 2) how should they be done” (Ford et. al., 1998), i. e.

how companies interact with other market actors, how roles of market actors are distributed, which information is of importance, and how company management should manage those relations to achieve performance.

In a project a successful outcome requires intensive interactions, supported by continuous information flow, access to and exchange of professional expertise and investment (Griffin & Hauser, 1996), which suggests that a number of both internal and external actors should be involved. However, we limit the group external participants to customer, supplier, other business partners (consultancies, industry experts) and academia. The reason for such a focus is that there has been generated an extensive amount of literature and research on the influence of internal interactions and collaborative activities on performance (e. g. Tushman, 1978; Tushman & Katz, 1980; Cooper, 1990; Danilovic, 1999; Smulder, Lousberg & Dorst, 2008) and in today's market dynamics the question of the value-added of external participants had been raised.

Scholars who support the idea of effectiveness of external interactions for project performance suggest the following advantages of them:

- *strategic*: to survive in the market, further develop and grow (Dickson, 1992; Zander & Kogut, 1995; Bonaccorsi, 1997);
- *economic*: access to complementary resources (physical and financial), risk leverage, etc. (Danilovic & Winroth, 2005; Teece, 1986; Harrison & John, 1996)
- *learning*: access to complementary knowledge stocks and other information sources, exchanging of experiences, gaining access to other innovative ideas (Danilovic & Winroth, 2005; Kyriakopoulos & de Ruyter, 2004, Prahalad, 2004);
- *opportunistic*: identify business opportunities (new product development, access to new markets, etc.) (Wind & Mahajan, 1997);
- *creation of synergies* among stakeholders for new technology adoption, product success rate increase, etc. (Harrison & John, 1996).
- maintaining credible *long-term* business *relationships* (Rindfleisch & Moorman, 2001, Ford et. al., 2003).

However, there is usually one pre-requisite to reaching one of these goals. It is a “win-win” situation, where the value can be created for both parties (Morris & Pinto, 2007). Thus, intentions of project participants should shift from isolated to connected, from unaware to informed, from passive to active in order to derive benefits from the projects.

Morris & Pinto (2007) stress the importance of the project interactions with external actors, but admit that in practice there is no clear suggestion on how to generate effective messages and receive maximum benefit from them. Although there has been developed various communication (Giffin 2002; Giffin & Stankovsky, 2000) and transmitting information tools (Olivera, 2000; Griffin, 2002), there is still a challenge to successfully manage dynamic and multifaceted project interactions. This can be due to the fact that the increased number of external actors can increase the complexity of interactions (Garaldi & Gerald, 2007), and in project dynamics managers do not have a clear picture of how and when actors can contribute for reaching better project performance. They are not equipped with a systematic and a holistic view over interactions and their advantages. Therefore, after reviewing contributions of each of the suggested external actor, we develop a model of interaction management for improved project performance.

Customer

Contemporary companies organize their projects by adjusting to customer's requirements and needs in multi-project settings. Customer sets project deliverables, which facilitate adequate projects design: technology and products improvement, PM techniques, interactions and

involvement, team work, commitment, trust, etc. In this way, scholars depict two philosophies of approaching the aspect of customer involvement in projects: customer-driven (Barkley & Saylor, 2001; Zemke & Schaaf, 1989; Mhala, 2007; Seiling, 2008) or customer-lead and customer-orientated (Narver & Slater, 1998) concepts. Where customer-oriented concept has an advantage of guiding company processes close to customer requirements and internal procedures, however allowing for company's flexibility in terms of problem-solving and decision-making.

Customer is considered as a new source of competence for the company (Pralhad & Ramaswamy, 2000) and usually involved and interact heavily from the concept to delivery in business projects ("fuzzy front-end of innovation"). Reinertsen (1999) calls such kind of involvement as ideal. Interactions with many potential or active customers provide with idea generation, novel information, build right products, reduce chances for requirements misunderstanding, increase process efficiency, reduce uncertainty in projects, and create situation of making better relations with other actors (Dahlsten, 2004).

The customer input is needed on different projects phases and there are many models suggested in which way it is possible (White & Pearson, 2001; May-Plumlee & Little, 2006). At many points in the project customer involvement is absolutely necessary: on planning, design, testing phases for development superior and differentiated product. Hall (1993) supports the point and in view of that calls 'procumer' to stress the importance of customer involvement in the early phases of product development (design and prototyping). Lundkvist (2003) goes deeper and enlarges customer's role to the one of a creator and problem-solver. We have notices that customers are often directing and even controlling the project process and companies are creating many possibilities to encourage such interference, through formal dialogs, which presumes active involvement of customer into product designing, appointed them as team-leaders, etc. (Kaulio, 1998; Barkley & Saylor, 2001).

Gruner & Homburg (2000) in their studies indicate that customer interaction during several phases of new product development affect positively process outcome. Though, more effective results of the customer involvement if the later is brought in from very early phases in NPD process (Veryzer, 1998). Moreover, interactions conducted with "financially attractive customers" and "close customers" have better outcome than interactions with "technically attractive customers." It tells us that proactiveness, geographical proximity and resource sufficiency are the one of the most important of the criteria while choosing the right customer for right projects.

Supplier

In industrial settings suppliers have their own advantages, which they bring into projects. For example, these are professional skills, respective knowledge about technology and other materials/ products transferred from supplier to other interactive party increase the potential of later to create new product/process ideas and their realization, capture rapidly technological changes and ways to deal with novelty (Hakansson, 1987).

Supplier involvement helps to access greater technological improvements, to differentiate their products from competitors, to enhance product quality, to reduce development costs and to gain competitive advantage in the market. Moreover, they assist in decreasing the complexity of development processes and provide long-term, strategic direction and operational support (Liker et al., 1996, van Echtelt et.al., 2008). The most necessary time for supplier involvement is at early project phases, on later phases just casual involvement is needed. The supplier involvement at project phases of planning, executing and closing is leading to projects short- and long-time benefits. Some of the more attractive for the companies are long-time benefits are: technical

performance, control over the cost price, evaluation of product design, timely solutions (van Echtelt et.al., 2008; LaBahn & Krapfel, 2000).

Other business partners

Consultants are called “bearers of the needed knowledge” (driven or image managers, cooperative problem solvers or crisis managers), because they are experts in particular areas and diffuse their experience and knowledge from other companies in managing similar problems (Kieser, 1997). They help to solve products/process problems and improve company position on the market. The involvement of consultants/ industrial experts can be divided into provision of content and provision of process, which are often interrelated (Kubr, 1996). Content-focused consulting is connected with a delivery of needed information and designing new systems in projects for satisfaction customer preferences; process-focused consulting includes actions which help the management to understand and to act according to environmental changes and company objectives (Schein, 1987).

The moment of involvement of other business partners into the process is decided by the management. When the problem occurs then consultants/experts are called (problem-solving approach). Apart from that, the other approach of “primary learning” is in practice also. In real world mostly used is the problem-solving approach where consultants play “Mages” role (Hofmann, 1995), which drastically slows down the learning process as one of the outcomes of more beneficial and long-lasting “preliminary learning.”

The consultants/experts involvement can be required at any project phase, but the competencies needed for problem-solving vary. On early phases the consultant’s competencies in strategic direction are needed; on later phases the operational management (quality assurance and products fit with customer needs) experts are in demand (Bessant & Rush, 1993).

Academia

Bell’s et.al. (1994) study shows that firms tend to view relationships with academia as valuable and worthwhile, because universities/ researchers help to develop company capabilities though fertile in ideas and industry expertise. New ideas come from university campus and it is a direct source of industrially relevant technologies. This fact shows the importance of involvement academia on preproject and initiation project phases. Then their involvement can fulfil the need in innovativeness.

There are several known types of the researchers/students involvement into projects. These are: participatory action-research, action-science, cooperative-inquiry, dialogue-oriented action and co-generative learning research approaches (Greenwood & Levin, 1998; Gustavsen, 1992; Argyris et al, 1985; Heron & Reason, 2001). These approaches represent different roles, which researchers/students are hired for and dedicated to within the company processes (co-researcher, observer, etc.). Often the company-innovators prefer to interact with closely located academic institutions in order to keep frequent and personal contacts. Academia for these market players is the most frequently used after customer and supplier. For the followers (late innovators), in contrary, universities and other partners, except customer and supplier, play insignificant role (Kaufmann & Todtling, 2000). Recently a new form of science appeared, which is called “entrepreneurial science”. It highlights “Business-Science” or “Industry-Science” interactions (Etzkowitz et al., 2000). This trend shows the eagerness of the academia to interact with real-world business, from which they intake entrepreneurial working principle.

METHODOLOGY

Our research is based on the principle of methodological triangulation. Such research strategy “is largely a vehicle for cross validation when two or more distinct methods are found to be congruent and yield comparable data” (Jick, 1979). This means that to obtain trustworthy and credible data on the selected area of investigation we utilized both quantitative and qualitative methods. Strategically, mixed-methods approach was chosen as fundamental, because it gives holistic view over the examined research problem (Thogersen-Ntoumani & Fox, 2005). The strategy behind utilization of both methods aimed to capture patterns and tendencies within the investigated area, with stress on quantitative method for capturing “hard facts” (numerical evidences), which was enriched by qualitative method for capturing in depth information. Thus, the two-way data collection method were undertaken in the sequential order. The quantitative study lead the process, which was intertwined by qualitative case study.

The research was undertaken in three steps (Appendix 2): literature review, quantitative survey and qualitative case study. The review of the literature on the area of project management, interaction management and performance unveiled that each type of external participants can enrich project execution by one’s own competences and/ or resources (valuable information about market environment, assistance in problem-solving, etc.), which can eventually be crucial for project success. However, the literature did not provide the overall picture of how the main actors contribute to projects and whether it can be beneficial to the project performance. This gap we addressed by developing the survey for the field research (Blaxter, Hughes & Tight, 1997) both quantitative and qualitative.

Sample was comprised of companies matching the following characteristics: project-intense organization type (more than 5 running projects), from the private sector, located across Europe and Asia, with the size of employees higher than 50 from the manufacturing sectors. Since the unit of analysis is the project, the participants were representatives of company management. The particular group of employees is central to the research problem, since they are one of the main internal participants of dynamic project environment who have the responsibility and power to influence project decision-making, administration and change introduction aspects, and they create a meaning of external interactions, which, in the end, influence project performance.

The final sample consisted of 290 participants who fitted the research requirements. The number of participants was reduced (out of 1850 companies selected) due to various limitations. Firstly, dynamics of the company development (number of running project, number of people employed, positions occupied) did not correspond to the information provided in the World Wide Web resources. Secondly, the number of people were not available or resisted to participate. Thirdly, language barriers together with the fear of putting internal security system under threat prevented people from taking part in the research.

The final version of the survey comprised of 23 questions in a range from one choice type of question to matrix questions with multiple choices. The questions were partially based on the previously reviewed theoretical aspects: 1) interaction questions, asking the respondents about the participation of the different actors in the projects; 3) project dynamics questions and how the interactions and actors interact within project life-cycle; 4) performance: main criteria for project success and 5) individual assumption about project performance and its dependence on interactions. Having developed the survey with the aid of middle and senior management, the final (after corrections) copy was delivered to the sample group by means of Quick Search software.

35 questionnaires (12%) were completed. Relying on Aczel & Sounderpandian (2009) argument that a sample with 30 or more responses is considered to be sufficient to draw credible conclusions we continued our analysis.

Survey measures were conducted by means of a 5-point Likert scale (from “always” to “never”, from “definitely agree” to “definitely disagree”) and relational percentages of people responded on the questions to all people participated in the survey were provided for the analysis by the software. The collected data was analysed by using the statistical tools provided by the Quick Search software, which allowed us to conduct descriptive statistics (For extended methodology see Appendix 1-3) in order to find the patterns and tendencies within the researched area. Additionally, the parametric multivariate analysis method was performed by means of cross-tabulation (provided by the same software) in order to examine answers frequency belonging to aspects between several categories in the questionnaire and find the interrelations between them. The cross-tabulation is used because it minimized the interpretation difficulties and kept us closely concentrated on the collected data, reflected in percentages which are easy understood.

The purpose of the intertwined qualitative study was to narrow down research to the automotive industry settings and the country borders to Swedish due to that fact that it would ease the process of data collection and provide more in-depth data on the questions highlighted in the survey. Company and research participants were selected on the basis of the ‘snowball effect’ and matched all the established sampling criteria. For the qualitative case study we facilitated interviews and a workshop on the premises of the chosen organization.

Pre-formulation of interview questions, majority of which were extracted from the survey, allowed us to conduct semi-structured interviews. The interviews and workshop questions consisted of both open and closed questions. The former were organized with the representative of the upper management (Portfolio Quality Manager) and in the workshop participated 7 project managers. Follow up interview were also facilitated to clarify certain research questions.

FINDINGS AND INTERPRETATION OF DATA

Why do interactions take place in multi-project settings?

Our research findings support the notion that companies organize their activities on the basis of multiple projects (Figure 1 in Appendix 5). By establishing multi-project settings and interacting with other market actors, such as customer, supplier, other business partners, and academia companies solve the problem of scarce resources and complexity. Each of them contributes differently to project performance. Considering that, managers manipulate interaction activities, prioritize communication and involvement of external actors in project dynamics in order to “squeeze” the most out of them.

In the survey and case study we raise the question of the companies’ aims for interactions with external actors. Since we see the direct relationship between performance in projects and discontinuous company involvement in collaborative activities, we intended the survey participants to reflect on the aim of interactions, i. e. why they seek interactions with external actors. Linking the aim of interactions and project performance together, companies see a positive relation. If the external actors would not assist company in achieving project success in terms of reaching estimated time, cost and quality and/ or in increasing innovations and actor satisfaction, why would they need to keep so many people involved into projects? The provided below answers to the question indicate that organizations reflect on the contribution of each of

the actors by drawing on previously reached performance goals, and repeat the undertaken practices with every launched project.

The main aims for interacting with the customer is to understand one's requirements (100%), to identify new opportunities (78%), and to discover new technology (61%) (Figure 2). The qualitative study results further elaborate on interactions with customer and highlight:

The more communication with customer, the better. Interactions with them help to understand customer expectations, internal processes, needs, milestones and build up personal relations, since in many cases they can help you a lot.

This shows that companies are interested in interactions with customer because understanding requirements of the latter can reduce the problem of resource allocation throughout project life-cycle, and, in the end, can save time and expenses by developing the right or close to that product specifications. A sophisticated and experienced customer can improve internal processes by updating with the latest market information and techniques of managing projects and relations. Eventually, a satisfied customer can increase the possibility of initiating new projects.

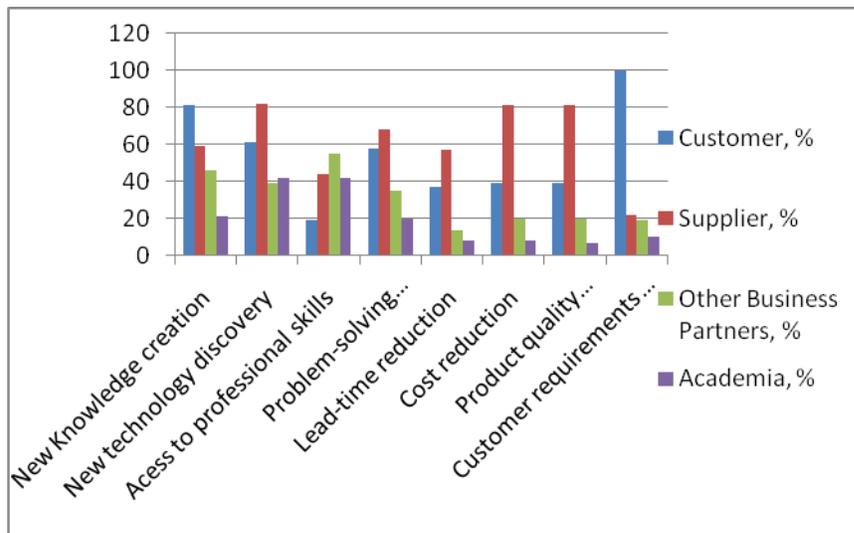


Figure 2. Aims of interactions

With the supplier, project managers value interactions due to one's fair contribution to new technology discovery (82%), cost reduction (81%), product quality improvement (81%) and problem-solving improvement (68%) (Figure 2). Supplier is not only a source of raw materials; one can help to reach performance by suggesting cost- and time-effective solutions. Qualitative interview results add that suppliers can be involved quite often as consultants, when it comes to new technologies, recommendations for new design. The study shows that both customer and supplier roles have been enlarged. The supplier becomes involved not only for procurement reasons, but in many cases can represent a source of valuable professional knowledge ('technology experts') and problem-solving capacity. The customer can act as a new source of competency in projects, a creator and a problem-solver due to one's increased interest in reducing project complexities in order to foster product introduction to the market. They contribute not only with their internal professional resources (competencies and skills) but also with their own outsourced industry experts and consultants.

Academia and Other Business Partners represent an access to professional skills (55% and 42%), new knowledge creation (21% and 46%), and new technology discovery (42% and

39%) (Figure 2). It should be noticed that interactions with academia and other business partners has received little attention from the respondents. Academia, according to them, is not directly involved in running projects. Mostly at a pre-project stage, when a company develops new concepts for future technological advancements and innovations, it interacts intensively with students and academics.

The results from both survey and case study indicate that the involvement of consultants, and experts is rather limited in projects. They are mainly involved for adding extra man-hours and knowledge about technology at the beginning of projects. At the same time new big projects can require dedication of all needed resources, where other business partners contribute with knowledge and experience:

Sometimes, 40% of the design team can be consultants, but they are only included on the man-hour basis.

On the contrary, to increased interactions with the customer and the supplier, academia and other business partners (consultants and industry experts) are perceived to add less value to project dynamics. Interactions with them are of unsystematic and occasional nature. Nevertheless, the latter, due to one's closeness to the industrial operations are more often interacted with and involved into projects than the former.

These findings illustrate that the aims for interactions with external actors in projects outlined in the theoretical framework (Zander & Kogut, 1995; Bonaccorsi, 1997; Danilovic & Winroth, 2005; etc.) apply to the actual organizational practices. With the customer, the project management intends to achieve its strategic and opportunistic aims; with the supplier, the aims of interactions are learning, economic and synergy creation (Hakansson, 1987; Liker et al., 1996; van Echtelt et.al., 2008). With both other business partners and academia it seeks learning and economic (human resource) contribution.

Which of the external actors interact on different phases and which information do they provide in the multiprojects context?

The results demonstrate that the customer is involved on each project phase (Figure 3): initiation (85%), planning (73%), execution (38%), monitoring (23%), closing (60%). When being involved at these phases the latter provides information about product improvement (95%), new ideas for projects (88%), about new products (71%) and quality improvement (66%) and information about markets (56%). The qualitative study supports the notion that the most intensive interactions take place at the beginning and at the end of projects, which require more business negotiations and meetings, since according to project managers the stress level at those phases is high. Interactions with customer throughout project phases depend on a type of the project and customer's willingness to communicate.

Most of our customers are involved from the beginning to the end of the project. They can also add some new people with special skills either at final phases or from day one.

From qualitative and quantitative (Figure 3) results the tendency of heavy involvement and interactions with customer throughout project dynamics can be identified due to one's capacity to provide information about product and its quality improvements, new markets and other valuable ideas.

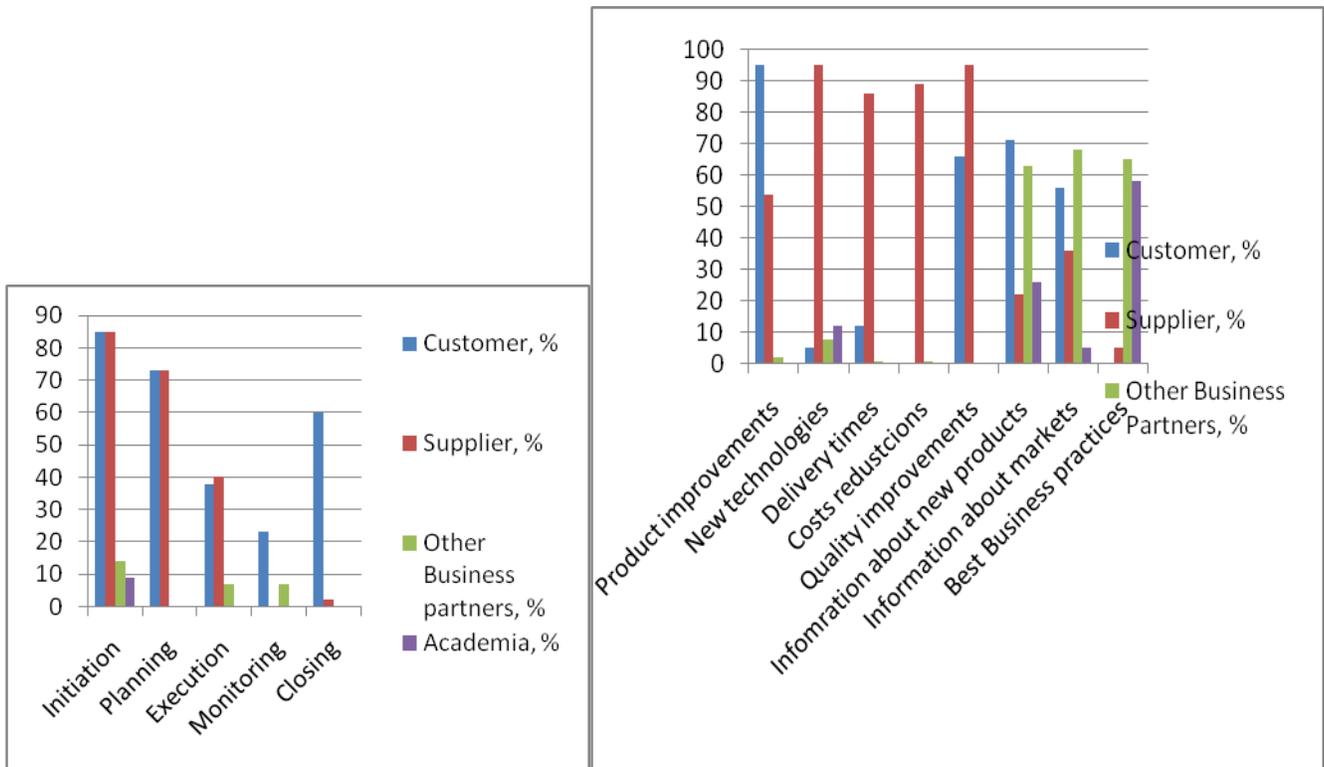


Figure 3. Interactions at phases and information provided

This can have both positive and negative effect on project performance depending on company's approach to managing projects. If the company runs more customer-oriented projects (Barkley & Saylor, 2001), it puts customer perspective at the heart of project execution, however does not allow full control of operations by the latter and does not leave out the rest of the external participants. Compared to the customer-driven/ customer-lead approach to project management, the former has a more positive impact on performance, since company remain flexible in its activities and stays opened to incoming information from supplier, other business partners and academia (Narver & Slater, 1998).

Companies involve suppliers mainly at the beginning of projects (initiation 85%, planning 73%), less in the middle (execution 40%) and seldom at the end phases (monitoring 0%, closing 2%) (Figure 3). Supplier suggests new technologies (95%), delivery times (86%), cost reduction (89%) and quality improvement (95%). Supplier mostly involved in suggestion of process improvement (99%) and product improvement (65%). Workshop participants admit that the supplier is mainly involved at the stages of quoting (initiation) and they are usually involved as a part of a cross-functional team at the beginning. They can also take part in projects when special skills are required and when 'something goes wrong in projects.'

This underlines the problem of company-supplier interactions in project dynamics. Although they are valued for the added knowledge, competencies and resources they bring in, they are acquired in projects mainly on the 'problem call' basis. This makes relations rather short-term oriented with limited commitment to project execution. Supplier's 'journey' in projects does not go further than initiation and planning phases; with exceptions for additional involvement in cases when problems occur. By rarely participating at monitoring and closing phases, the latter can not learn whether their suggested solution was implemented, whether it was effective and performance improving or not.

Other Business Partners are involved mainly at the phases of initiation - 14%, execution and monitoring – 7% (Figure 3). They provide information about new markets (68%), best business practices (65%), information about new products (63%) and process improvements (51%). Such results illustrate that other business partners are interacted with on occasional basis (first and last phases) on the basis of their knowledge of industrial operations and products. The reasons for their poor participation in project dynamics is that they offer cost- and time-consuming services, which provided suggestions and implications can be rather inappropriate and confusing.

Companies involve academia at the initiation phase (9%). It brings in knowledge about new technologies (12%), new products (25%), best business practices (58%) and provides idea generation (10%). Reflecting further on academia's involvement, project managers argue that they provide, which solutions can not deal with such a high level of project complexity: "It is seldom a brand new technique, and if it is we have them at pre-project stage." The upper management interviewee extended to this point that in the project processes there is no time and no resources available for such relations (since it involves providing the learning process of the involved academia people to understand all the details). However, in contrast with project managers one claims that the academia provides solutions that are "too general" or on a "too advanced level." For project participants information provided by them should be easier to comprehend and implement.

Company's experience of interacting with other business partners and academia can be dissatisfying due to several reasons. It can be either because companies are poorly communicating their needs and do not have clear objective for involving them or because partners/ academia need to be more committed and develop better techniques of interacting with companies and provide more company-oriented and industry-related solutions.

Summarizing the yielded results from the quantitative and qualitative the following tendencies can be drawn. On the initiation phase, which sometimes follows the pre-project stage, companies actively interact with all external actors. This period of time may involve much business meetings and negotiations which facilitate understanding about how ambitious and resource-demanding customer's novel idea is and consult with supplier on the most cost- and time-effective process ways of delivering a defined product (Von Hippel, 1988). Services of other business partners can be acquired in a way of providing strategic directions (Bessant & Rush, 1993) and assessing process-focused consulting (e.g. IT/ IS systems, economic and financial simulations), and academia assists in technology discoveries. At this point interacting with external actors can help project managers to execute projects and foresee how future performance can be achieved in the best possible way. When the phase is finalized, the participation of consultants drastically reduces until the next 'call' unless they represent customer's interests (quality assurance, operational management) and granted the authority to monitor and control project execution. Whereas, academia becomes excluded from the rest of the phases. On the planning phase results show that both supplier and customer are involved. However, companies can negotiate more with supplier due to the need to solve issues of technical performance of products, future respective expenses and delivery times. Moving towards monitoring and closing phases customer interacts with project managers by providing feedback on the developed product and/ or its prototype. At these phases product changes occur, however, they can negatively influence performance by adding extra costs and further product and process complexities. Project managers from the workshop admit that such problems can be very much customer-related.

Intensiveness and effectiveness of interactions in project dynamics, and, consequently, project performance can be threatened due to various reasons.

Which barriers hinder interaction effectiveness?

In our research we attained the following results on the challenges of interacting in projects. The most recalled barriers which arise when interacting with customer are geographical location (98%), lack of resources (97%), lack of commitment (81%), communication of priorities (81%) and too high ongoing projects (80%) (Figure 5). The workshop participants highlight two reasons for why information is lacking from the external actors, customer in particular. They are a level of competencies of the person/employee they are interacting with and the timely provision of the relevant information. The quality of just-in-time delivered information depends on competencies and abilities of individuals to exchange and understanding messages sent to each other. The better these abilities and skills of the employees in interactions, the better the outcome of projects can be expected. That is why training of interaction skills of the project participants could decrease the above mentioned barriers.

Therefore, customer also needs to improve one's communication in terms earlier provision of information about product changes and expectations of project outcome, because by suddenly changing product specifications customer can prolong project execution time, increase operational costs:

Bad relationship can ruin the entire project.

Customer can negatively influence projects, mainly by changing requirements.

Sometimes customer views relationships with a company as "paid-received" issues and does not intend to dedicate additional efforts and resources to project performance improvement. These problems are rooted in the "adversarial attitudinal problem" (Childerhouse et. al., 2003, p. 140), when customer can make changes in projects, leave problem-solving issues to the project management and at the same time decrease interactions.

The workshop participants admit that within national borders possibility to effectively interact with the customer is higher than on the international level. One project manager gave an example of building a barrier on the basis of the geographical proximity:

During tougher times of my project we still met twice per year only. Once or twice at their place, once at our place. A lot of tension had been built up during 2-6 months and then everything ended up with a huge list of problems to be solved. We went through them in one or 1,5 days. After this heavy-heavy meeting we really cleared out the air. If we would have done this more often, we would not have these peaks with aggression and frustration and lack of information in between.

This example illustrates poor interaction skills both from the company and the customer. Although they are aware of this problem that can eventually lead to a declined performance, they or company management did not anticipate any changes to improve the situation.

Barriers, which arise between supplier and a company are geographical proximity (100%), lack of resources (87%), lack of commitment (81%) too many ongoing projects (80%), and lack of priorities communication (76%), lack of communication techniques (78%), and information misinterpretation (61%). According to case study results, such barriers in relations with suppliers can take their roots from two issues: low transparency of aims and expectations, and competence level (both project and social) of the supplier. The same as with the customer, the lack of diversified employee training leads to a higher level of misunderstandings and misinterpretation of information. By analyzing the length and level of relationships development and level of trustworthiness between project participants company would be able to prioritize one's interactions with them, find the right tactic to communicate established aims and

individually approach each actor. This will eventually lead to saving company resources and time on communications not prioritized by the management.

Barriers identified with other business partners are lack of training (36%), lack of commitment (34%) and misinterpretation of information (34%). With academia these barriers are lack of communication techniques (17%), lack of resources (15%) and geographical location (17%). These are similar to the barriers, which are often met with the previous two actors, but their frequency and number is lower due to under-developed of interactions with other business partners. They are perceived to provide irrelevant and misleading advice, which confuse companies and take long time for the idea application to projects. The basis for that can be the limited time and access to companies' internal information. In interactions with academia, the lack of resources in terms of competent people with knowledge about industrial markets and developed tools and methods of communication with the business world leads to decreased company will to further develop relations. Even if a company require the assistance of researchers, it mainly turns to previously established contacts with local educational institutions.

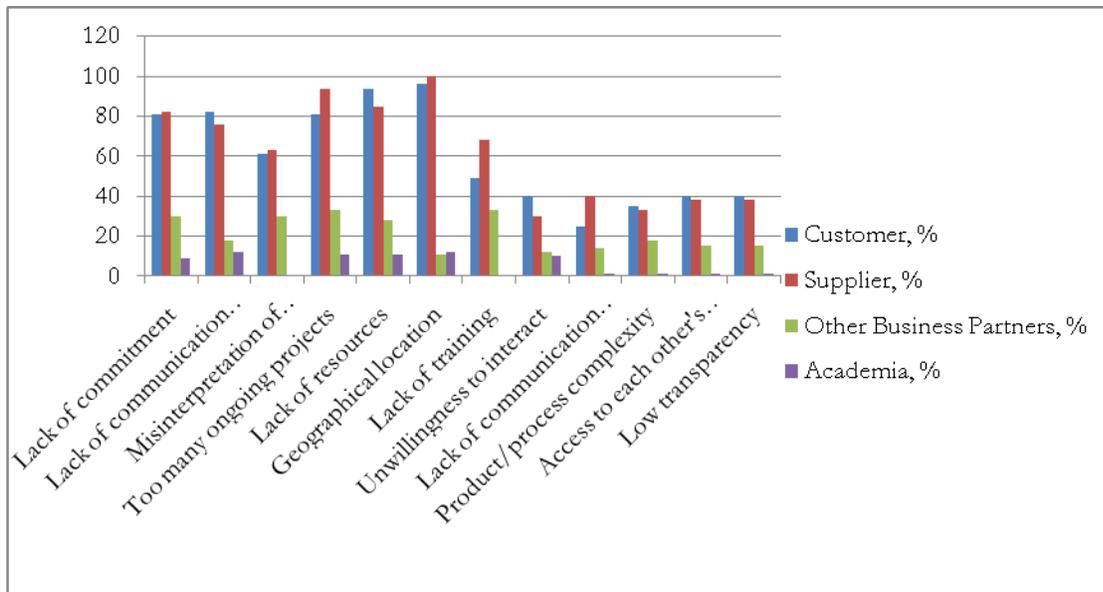


Figure 5. Interaction barriers

The most common and often claimed by the respondents barriers are lack of commitment and communication techniques, and too many ongoing projects, where the lack of commitment can be a linking pin for the rest of the barriers. For instance, low organizational commitment can lead to restricted allocation of physical and human resources, slow down the development of communication techniques and tools in project dynamics. The case study highlights the fact that poor interactions and problem-solving capacity is very much person-related. Margerum (2001) explains that a personal commitment of each actor requires personal intensives for interactions by means of utilizing an individual-focused strategy. This implies that for managers to enable personal commitment, it is vital to establish mutual trust and shared interests with the particular person they are interacting with.

The problem of 'too many on-going projects' actually characterizes the whole paradigm of multiproject environment. Companies eagerly and unsystematically start up new projects with many actors without realizing whether they possess enough resources to support currently running projects and sustain all the collaborative activities throughout the project life-cycle. When management understands that projects do not correspond with company objectives and/ or

have significant contribution to performance, their commitment and intensity of interactions decreases, prioritization of relations with actors remains without attention. In order to diminish this barrier management needs to introduce the procedure of ‘starting’ and ‘killing’ projects, which would reduce the number of low value-adding projects, and provide managers with the time and other resources for maintaining effective interactions (Cooper, Edgett & Kleinschmidt, 2002).

We also take a look at the barriers encountered at each project phase (Figure 6).

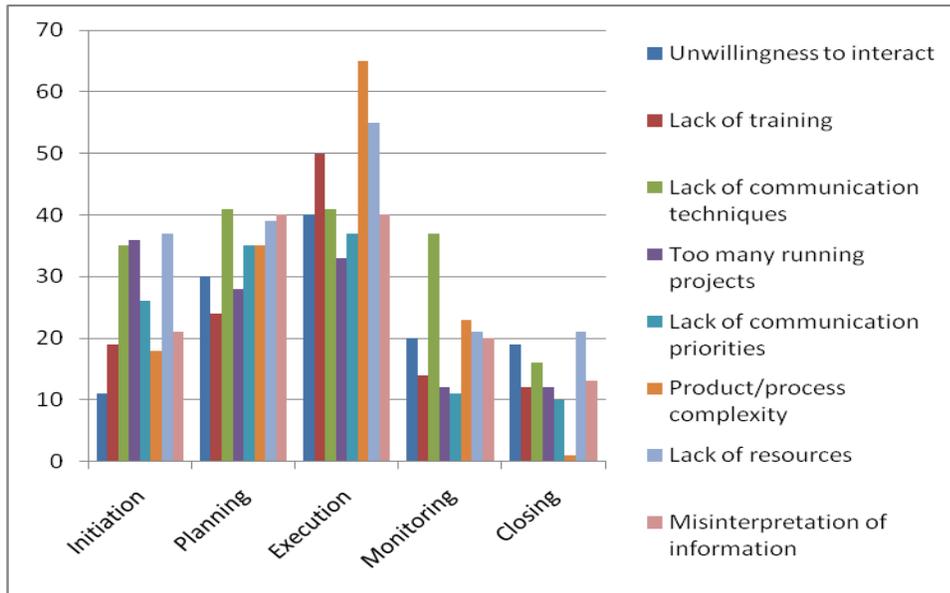


Figure 6. Barriers in project dynamics

The most problematic and loaded with barriers of high altitude phase in project dynamics is an execution phase. 66% of respondents think that product/process complexity accompanied by lack of resources and training (50 and 55 % respectively) at this point of time creates challenges for achieving positive performance. Here the company and external actors can see the gaps and disadvantages of actions and decisions undertaken at previous phases together with already existing high level of complex tasks. However, planning and initiation phases are also barrier intense. On the initiation phase they are lack of resources (38%), large number of running projects (36%) and lack of communication techniques (35%). On the planning phase to previously mentioned barriers adds the problem of information misinterpretation (40%). The less stressful of all those seems to be a closing phase, because it involves insignificant product modifications and final tests due to the fact that management is eager to finalize projects and realize resources for new endeavors and customer is determined to speed the process of product introduction to the market.

Do interactions with external actors influence performance?

The majority of the respondents view their companies as highly interactive organizations (Appendix 4). They admit that there a positive relation between performance and interactions: 65% acknowledge that interactions influence performance; 28% (“probably”) are not exactly sure about the correlation between the two; whereas 7% do not see it at all. This shows that participants consider interactions with customer, supplier, other business partners and academia as a sources of performance achievement (Figure 7).

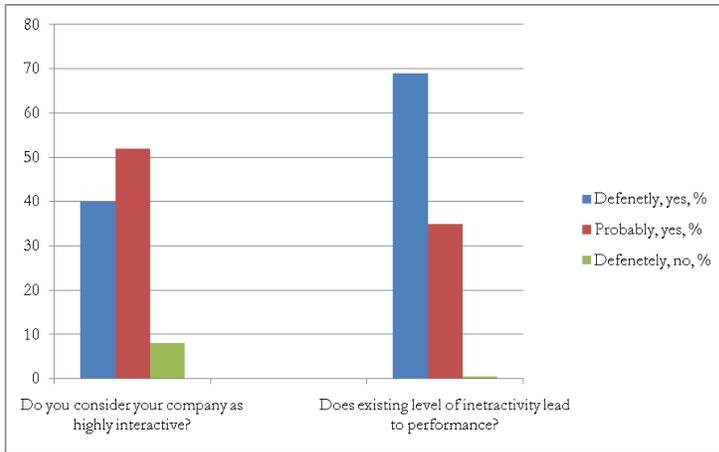


Figure 7. Interactivity and influence of external interactions on performance

All the participants from the case study agree that

interactions in projects is the foundation of the successful project outcome. For instance, the right supplier can speed up the time of project execution by providing the right solution; decrease costs, if the latter finds the alternatives to the existing materials or technologies. Generally, interactions with all external actors in one way or another lead to achieving better performance in multi-project settings.

In the theoretical framework we suggested that the criteria of the “Iron Triangle”, innovation and patents (their number) and actor satisfaction are those criteria, by means of which we reflect the relation between interactions and performance. The survey and case study provide us with the following findings.

Reflecting on the “Iron Triangle” performance criteria the research results indicated that more than a half of the respondents reach success in projects: 63% admit that they achieve estimated time, 52% manage to keep the expenses within the planned budget, 59% are able to deliver products within the established specifications (Figure 8).

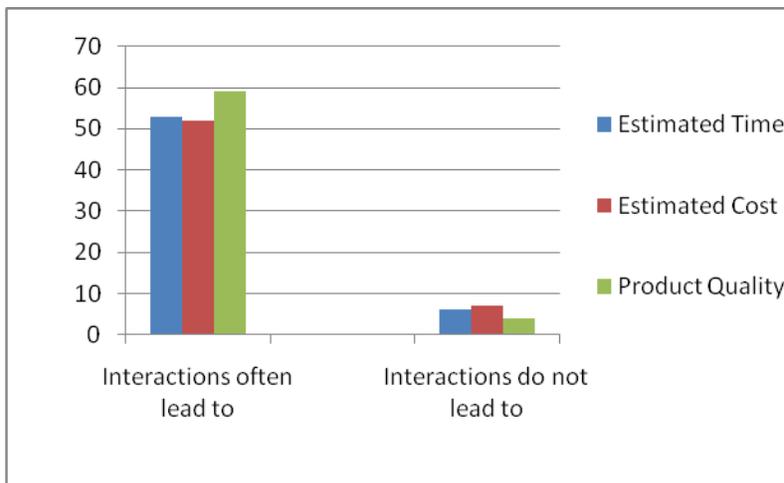


Figure 8. Interactions and project performance

Our findings contradict to the argument of Sterman (1992) that today performance can not be reached without over-running costs, estimated time-schedule and defined product specifications. This can be due to the fact that companies have realized the significance of interactions in the project dynamics, the importance of information about and from the external

environment. Only 6% of companies do not reach the time-limit, 7% struggle with keeping costs within the planned budget and 4% fail in delivering quality of products. It appears that the product quality is easier to achieve out of all three success criteria, which can be once again connected with the ability of project managers to interact and negotiate on the product/ process improvement with each of the actors. The other two are harder to reach, since they are more complex and less negotiable issues.

To see the relation between the contribution of each actor to performance, the cross-tabulation analysis was conducted, where the information for product and process improvements provided by customer, suppliers, other business partners and academia was related to time-cost-quality criteria (Table 1).

Table 1. Cross-tabulation of actor participation and performance (“Iron Triangle”)

Interactions/Performance(TCQ)	Time (T), %	Cost (C), %	Quality (Q), %
Relation between information provided by each of the actors for product improvement and performance criteria			
Customer	77/23/0*	77/23/0	90/10/0
Supplier	74/20/6	73/17/10	81/17/2
Other Business Partners	25/25/50	10/10/80	10/10/80
Academia	5/30/65	0/0/100	10/10/70
Relation between information provided by each of the actors for process improvement and performance criteria			
Customer	55/35/10	53/27/20	65/15/20
Supplier	83/10/7	70/18/12	85/12/3
Other Business Partners	24/10/66	10/21/69	20/30/50
Academia	1/10/89	0/0/100	2/10/88

*77% of cases in information provided by customer leads to estimated time achievement/ 23% of cases seldom achieve the estimated time line when receiving information for product improvement from customer/ 0% of respondents see influence of provided information on the time-line.

When looking at the table we can see how each actor influences the performance (time, cost and quality criteria) by providing information either for product and process improvement. Drawing on the issue of reaching the estimated time, one can notice that this criteria is very much influenced by the customer: 77% of respondents correlate the provided information for product development with the estimated time-line. However, supplier is can also considerably influence the time achievement (74%). The cost criteria is achieved by interactions with customer and supplier (77% and 73% respectively) over product improvements. The quality criteria is heavily related to the product information provided by customer (90%).

Relating time-cost-quality to the issue of information provision about process improvement, one can see the following: supplier is the source of valuable information for performance achievement (83% time, 70% cost and 85% quality), whereas customer contributes to performance in a less significant way (55%, 53% and 65%).

Contribution of other business partners to the three performance criteria achievement is minor, however is much higher than the one of academia. The former provide a more valuable information about possible process improvements, which in 24% of responses leads to reaching the estimated time-line, in 10% assists company in keeping project budget within the estimated cost limitations, in 20% cases assists in reaching improved product quality. Information provided by the academia appears to have little relation to project performance. Information provided for product improvements correlates with time, cost and quality criteria a little extent (25%, 10%

and 10%). Whereas academia's information for product improvement has a bigger impact on time (5%) and quality (10%).

From the findings, we can conclude that the estimated time-line, budget and product quality of projects appears to be strongly affected by customer. This may imply that by changing the requirements, for instance, to product functionality, the latter influences each of the performance criteria. Customer is the one who influences quality criteria mostly. Since the customer establishes and modifies one's expectations and specifications of future products, they can contribute by providing timely updates on the changes they make in product specification and by coming to the consensus with the company on product functionality, design, etc. However, if the customer provides information, which can at times negatively impact the process (prolong established performance criteria), the supplier is the one who can influence product quality (performance) positively by providing information about the possible process improvements. The supplier contributes the most to the improved time and reduced costs by suggesting new technologies, new ways of producing and processing, by adjusting one's operations to the partner they are interacting with.

Other business partners can be perceived as the one who can provide information about best business practices, new products and technologies in the market for product and process improvement, however it does not significantly echo in the final project outcome. A worse situation is visible with the academia, since their information is almost not reflected on the project performance.

When the respondents were directly asked whether interactions with external actors lead to more innovations in products and processes, they replied that in the case with the customer 57% of them reach a higher number of innovations, with the supplier - 56%, with the other business partners - 42% and academia - 20% (Figure 9).

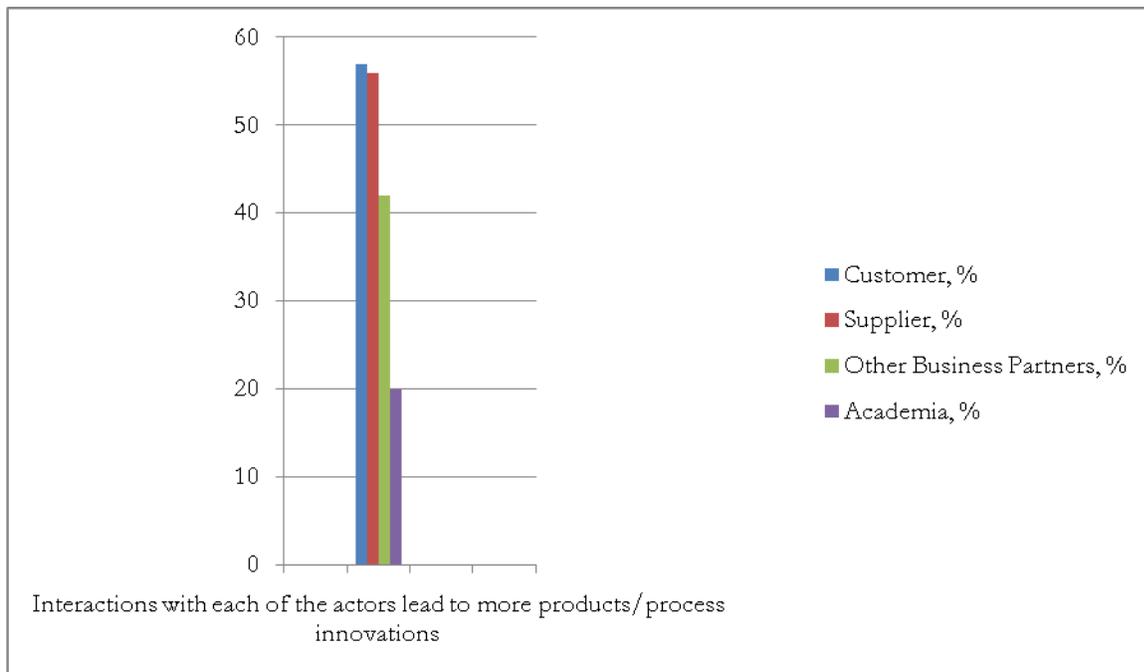


Figure 9. The interrelation of interactions and innovation (performance)

Such figures highlight company's understanding of how strongly external interactions influence performance (innovations) in multiprojects settings. Although customer and supplier

are in the lead, there still exists considerable contribution of other business partners and academia.

The number of innovations achieved by the surveyed companies is 0 innovations in 12% of cases, 1 – in 12%, 2 – in 20%, 3 – in 7%, 4 or more – in 10%, in 39% of cases innovations are not measured at all (Figure 10). Such figure shows a few tendencies. Firstly, a half of the participants admit that they reach innovativeness from the interactions, and 37% are even able to achieve more than one innovation solution. Secondly, there are nearly as many companies that do not measure their innovations as the ones that innovate. This means that those 39% of the respondents either consider innovation as an unimportant indicator of performance in projects or have not yet developed a sufficient evaluation system that would capture such information.

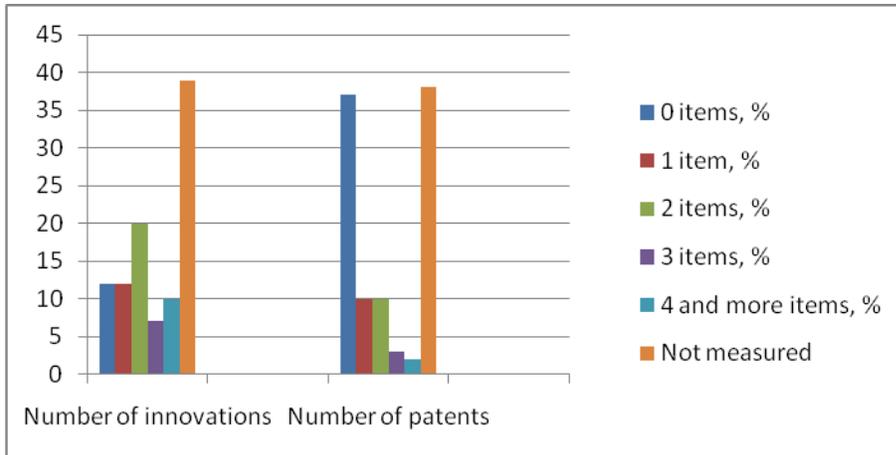


Figure 10. Number of innovations and patents

Other data from the survey show the distribution of how each external actor contribute to project innovations (obviously for those who measure and achieve innovations). Interactions with customer yield 60% of product/ process innovations of companies, with supplier they lead to 58%, with other business partners – to 35% and to 20% with academia. Such results underline the intensiveness of information, experience and knowledge exchange across companies and their external project participants. Moreover, although partners and academia contribute visibly to company’s ability to innovate, a bigger share of innovations in products and processes is achieved by interacting with customer and supplier, which draws us back to the previously highlighted conclusion that the roles of the former in projects have increased. This means that, when supplier and customer is intensively involved into project dynamics there is a higher chance in reaching innovative solutions. Thus, our results support the general notion about the positive influence of interactions with external actors on project performance in terms of innovations (e. g. Havnes & Senneneth 2001; Hagedoorn, 2002; Graf, 2006), where the industrial knowledge represents a great source for innovation success (Klomp & Leeuwen’s, 2001).

Another element of innovative activity that we decided to track down in our survey is the number of patents that companies file. We received the following distribution of the number of filed patents: 0 patents filed in 37% of cases, 1 – in 10%, 2 – in 10%, 3 – in 3%, 4 and more – in 2%, not measured – in 38% (Figure 10). These results show that, once again, one third of companies (38%) do not seek filing patents, generally or do not yield innovative solutions that they could file. However, there are those persistent innovation leaders (Duguet & Monjon, 2004) who decide to apply for patents when they achieve innovations.

The data gathered on the third criteria of project performance achievement, i. e. actor satisfaction, provides us with the following results. Firstly, companies value and measure actor satisfaction as an important outcome of their interactions with the external actors:

- customer satisfaction: with product functionality - 87%, with the cost of products - 61%, with the delivery time - 95%;
- supplier satisfaction with joint activities - 63%, and
- partners and academia satisfaction with project outcome - 40%.

However, the qualitative case study provides with the evidence that during or at the end of projects actor satisfaction is rarely evaluated. In cases when evaluations occur they are done more in the way of “lessons learned” by filling in standard forms which shows the level of satisfaction. As the case study points out company management monitors actor satisfaction rather rarely:

Manager 1: In the company we have form where we generate “lessons learned” where we check satisfaction of customer, and our other partners (supplier, business units)...

Manager 2: I have never done that... I just have a meeting with my project team and may be sometimes with external participants.

Manager 1: Exactly! That’s a common practice in our company - none really does it.

Such immature procedure can be rooted in the point that a few companies have not developed appropriate techniques of capturing such information and/ or have no time for it. However, the absence of satisfaction evaluation can be due to the matter of ‘mutual adjustment’ (Mintzberg & Engellewood, 1999) between project participants, which often take place in long-termed and trustworthy relations.

In the question about external participant satisfaction we wanted to see whether companies consider interactions to have a direct impact on performance in terms of satisfaction. When asked about satisfaction, respondents answered in the following way (Figure 11): 48% of companies’ interactions lead to customer’s satisfaction, 30% admit that they reach supplier satisfaction, and 13% and 9% had satisfying interactions with other business partners and academia.

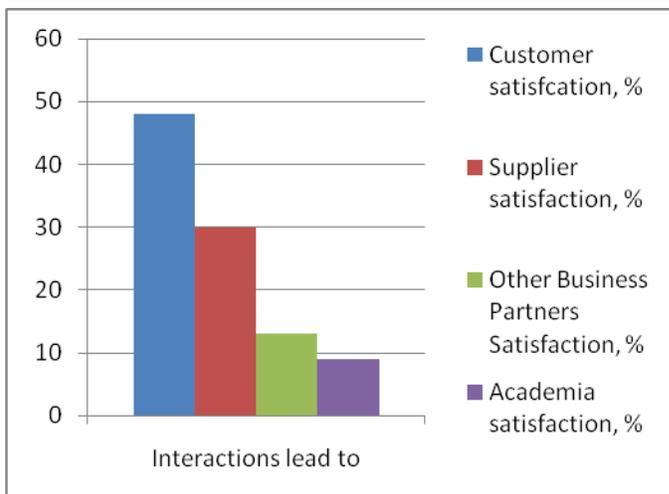


Figure 11. Actor satisfaction

Such low level of customer and other actors satisfaction leads mainly to one conclusion. Since satisfaction measurement in industrial markets has not been well-developed and

formulated, actor satisfaction issue remains a subjective variable of project performance. This can be very much rooted to company internal routines and objectives.

Generated empirical findings and analysis will be further elaborated on in the next section, where we discuss the significance of the interaction management and its influence on project performance.

DISCUSSION

The aim of this article is to explore the dynamics of interactions with external actors, such as customers, suppliers, other business partners and academia and investigate the effect of interactions on performance in multi-project settings. The findings of our study contribute to the multi-project management theory by analysing and drawing a comprehensive picture of the way interactions are related to performance. It is obvious that through interactions with customer, supplier, other business partners and academia companies gain access to valuable, information, knowledge and other resources (Nahapiet & Ghoshal, 1998; Hansen, 1999; Tsai, 2002; Adler & Kwon, 2002).

Interactions with customer has been made the centre of multiprojects settings, which influences the project dynamics. Customer satisfaction and requirements drive project objectives and has to be fulfilled in its best possible way since the one provides financial resources for projects. From customer's experience in organizing and leading projects company management can learn how to improve internal processes and procedures, which would increase one's efficiency in product development, foster project life-cycle and increase customer satisfaction. However, if customer is not able to provide clear product specifications company can loose much time and eventually money by adjusting to those preferences and changes. Interactions with supplier are considered by organizations to be the source of the problem-solving capacity. They rarely go further than planning phase though, which prevents the latter from bonding with the former and committing more to collaborative activities. By involving suppliers at the beginning of project dynamics companies make assumptions about future expenses and their reduction, possible delivery times and product quality; though by not interacting with the ones' on the rest of the phases companies limits supplier knowledge from the collaborative activities and, thus, decreases the chance for future project improvements.

Interactions with other business partners (consultants and industry experts) are providing strategic and operational support to projects, despite the fact that they are rather limited. Since consultants and experts require access to company's internal information, which can be a time-consuming and risky procedure, companies are not always willing to commit to joint activities. Moreover, when interacting with other business partners companies do not often clearly communicate their requirements, problems and expected outcome. To overcome those challenges and achieve both actors satisfaction there should be established two pre-requisites: companies should provide clear tasks and evaluations of performance to other business partners; the latter should have a more in-depth understanding of company (acquired preliminary) procedures and communicate the ambition for trustworthy and reliable relations. Similar situation can be seen when companies interact with academia. It is the actor, which is more isolated from the industrial relations than the rest of the actors. It is involved merely at the initiation phase of project dynamics. There can be indentified an unseen wall between academia and real business world, which the latter has recently tried to diminish by introducing the concept of "entrepreneurial science" (Etzkowitz et al., 2000), where the main idea is to interact closer with the business world and adjust scientific logic to the logic of the industry.

Thus, interactions with those external actors have become an inevitable part of projects. Comparing with the times when the potential effect of interactions on performance was not fully

realized, the project management suffered “from numerous problems of costing and scheduling; cost over-runs of 100 to 200%” were common, “projects were often delayed to the point where the market conditions for which they were designed have changed” (Sterman, 1992, p. 2). Drawing on the results from our research we can say that the project management has moved to the next stage of the development, where project dynamics have become opened for and welcome interference of the external environment, represented by customers, suppliers, other business partners and academia. Such interference entails a ‘synergetic effect’ (Filippini, Salmaso & Tassarolo, 2004) on performance in terms of decreasing cost over-runs, delivering product of the required quality within the estimated time-line, stimulating innovations and reaching actor satisfaction; and assists project management in solving the problem of resource scarcity.

However, to enable the ‘synergetic effect’ on performance company management has to develop internal procedures (routines), which would support the desired level of interactions by continuously evaluating, enriching the knowledge gained from interactions and redesigning them. Pinho (2007) supports this notion by claiming that a standard procedure of interactions, training of competencies, benchmarking lead to cost reduction, reduced number of follow-ups and stimulate innovation. The establishment of interaction routines in terms of developing communication tools and techniques; benchmarking interaction practices; reflecting on the characteristics of business actors; identifying and storing knowledge/ experience of working with them can improve project performance and facilitate discontinuous learning. The performance aspect is very much dependent on the ability of company management to identify clear project success criteria and communicate them to all the project participants. The learning aspect, in its turn, is dependent on company organizational capabilities in assembling a feedback on the experience of interacting with each particular actor.

Poorly developed and maintained internal procedures of interactions with external actors, can hinder their positive effect on performance. For instance, the under-developed communication tools and techniques utilized when interacting with a supplier, can lead to decreased intensity of interactions and information exchange, which can alienate the latter from the company. A consequence of that would be a decreased number of alternatives and suggestions for product and process improvements, which could eventually prevent the company management from achieving performance (time-cost-quality, innovations and satisfaction) in the best possible way. This shows that internal procedures can be a barrier to effective interactions and improved performance.

Introducing multi-project settings aim to increase project performance by gaining access to value-adding activities, imposes opening boundaries to interfere of external actors. Companies and their external participants have not yet learned how to organize collaborative work in the effective way: to adjust internal procedures of each other or to ‘kill’ those relations and/ or activities at the early stages. The process of adjustment requires setting the scope and shared rules of interactions, redesigning procedures of working in cross-functional and multi-professional teams, comprised of both internal and external participants, accompanied by developing training programs for them. Effective interactions can attract more potential value-adding participants and improve company image in the market.

CONCLUSION

Do interactions have a effect on performance in multi-project dynamics? Definitely, yes.

A large number of reasons push companies to interact: economic, learning, strategic, etc. to cope with multi-project complexities. Each interactive actor is involved differently at various project phases. Customer is a ‘procumer’, ‘new idea creator’ and sometimes a ‘problem-solver’,

which is the most valued in interactions, and takes part throughout all project life-cycle. Customer's satisfaction is an important criteria for project success in modern companies. Supplier, other business partners and academia are involved into the project life-cycle occasionally, on a 'problem-call' basis. Supplier is viewed as 'a technology expert' and 'problem-solver', and involved at the first phases of projects. One is perceived to have a potential to influence time-cost-quality success criteria and company process innovativeness. Consultants and industry experts can also be 'problem-solvers', but are perceived to be less effective for project performance. They are involved at the beginning and occasionally at the end of the project life-cycle and provide strategic and operational advice for process and to a less extent product improvements. Academia is surprisingly distant from the industrial relations and interactions. They have minor impact on company performance (on product innovations), which is reflected in their involvement merely at the initiation phase.

Knowing each actor's advantages and disadvantages, possible encountered barriers, which could influence project outcome, management would be able to manipulate the time, methods of involvement and interactions with external actors, and establish best possible set of practices to reach project performance. At the same time reviewing interactions in project dynamics and continuous learning from it is vital for further improvements of newly launched projects.

Implications for management and future research

The interaction management and actor involvement remain poorly established, unstructured and under-estimated issue. Each actor contribution is perceived on the surface level due to intense project dynamics, which prevents managers from deepening their experience of interactions with the external actors. Analyzing the effect of interactions with customers, suppliers, other business partners and academia and the effect of encountered barriers on project dynamics can serve project managers as a forecasting tool, which can help them anticipate future project complexities and uncertainties.

The issue of interaction management practices in organizations from various countries and industries is an interesting research issue. Further studies of the influence of interactions on project performance in companies across the international and industrial settings could provide the project management scholars and practitioners with a broader picture of best company practices and their possible improvements. Moreover, the criteria for performance evaluation in projects could be widened by financial as well as other strategic and operational criteria.

The framework of interactions in project dynamics can be further developed by applying the research findings from the area of Project stakeholder management to it. This study has focused only on four external actors, however, the picture can be enlarged by adding the other participants, such as end-users, competitors, labour unions, public authorities, etc. Together these frameworks would equip project management with techniques of and approaches to handling the interactions with external actors for improved performance.

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Appendix

1. Extended Methodology
2. Quantitative survey
3. Qualitative case study (company information and study questions)
4. Lessons learned

Appendix

1. Extended Methodology

Our research is based on the principle of methodological triangulation (Figure 11). Such research strategy “is largely a vehicle for cross validation when two or more distinct methods are found to be congruent and yield comparable data” (Jick, 1979). This means that to obtain trustworthy and credible data on the selected area of investigation we utilized both quantitative and qualitative methods. Strategically, mixed-methods approach was chosen as fundamental, because it gives holistic view over the examined research problem (Thøgersen-Ntoumani and Fox, 2005). The strategy behind utilization of both methods aimed to capture patterns and tendencies within the investigated area, with stress on quantitative method for capturing “hard facts” (numerical evidences), which was enriched by qualitative method for capturing in depth information. Thus, the two-way data collection method were undertaken in the sequential order. The quantitative study lead the process, which was intertwined by qualitative case study.

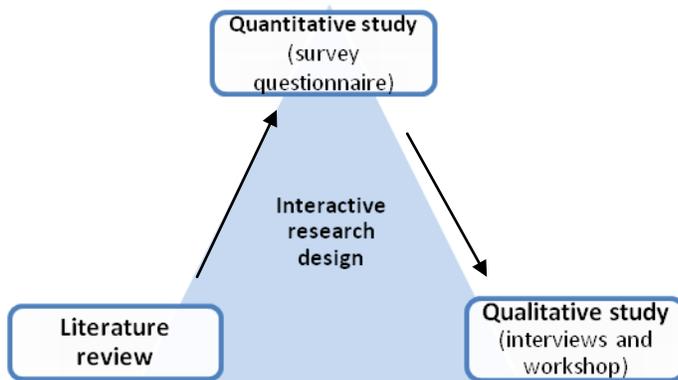


Figure 11. *Methodological triangulation*

The research was undertaken in three steps: literature review, quantitative survey and qualitative case study. The review of the literature on the area of project management, interaction management and performance unveiled that each type of external participants can enrich project execution by one’s own competences and/ or resources (valuable information about market environment, assistance in problem-solving, etc.), which can eventually be crucial for project success. However, the literature did not provide the overall picture of how the main actors contribute to projects and whether it can be beneficial to the project performance. This gap we addressed by developing the survey for the field research (Blaxter, Hughes & Tight, 1997) both quantitative and qualitative.

Quantitative method

Questionnaire design

Based on the Business Acceleration project conducted previously by Inessa Laur (2009), the survey for this article was developed. The first version of the questionnaire was an extended set of questions covering the proposed research area. Every new version of the questionnaire was tested by managers and academics. By the end of formatting of the questions a clearer structure of the survey was conveyed, which finally contained 23 questions assumed by having the same value in information collection. They were accordingly worded to the understanding of the

sample group in order to escape misinterpretations by the respondents and vice versa. A scale of five choices (Likert scale), ranging from “always” to “never” and other similar variations in matrix questions. Some questions provided multiple choice alternatives. To ensure that people who received the survey match the sample, we started the questionnaires with the general information questions.

The final version of the survey comprised of 23 questions in a range from one choice type of question to matrix questions with multiple choices. The questions were partially based on the previously reviewed theoretical aspects: 1) interaction questions, asking the respondents about the participation of the different actors in the projects; 3) project dynamics questions and how the interactions and actors interact within project life-cycle; 4) performance: main criteria for project success and 5) individual assumption about project performance and its dependence on interactions. After creation of each chapters of the survey the questions in it has been continuously tested by two professors involved in this research from Jönköping International Business School and eight middle and senior managers from different countries and industries. It means that we were following pilot testing, the actual test of the survey before sending it out to respondents. This strategy enabled us for feedback receive about its quality, problems and structure.

Sample and Procedure

Sample was comprised of companies matching the following characteristics: project-intense organization type (more than 5 running projects), from the private sector, located across Europe and Asia (i.e. Scandinavia (Sweden, Denmark, Norway, Finland), EU (UK and Germany), Asia (Hong Kong, Singapore, China, Japan), Eastern Europe (Russia)), with the size of employees higher than 50 from the automotive, pharmaceutical and medical, energy, telecommunication, and manufacturing industries. Since the unit of analysis is the project, the participants were representatives of company management (CEO, person from PMO, project manager, functional and quality manager). The particular group of employees is central to the research problem, since they are one of the main internal participants of dynamic project environment who have the responsibility and power to influence project decision-making, administration and change introduction aspects, and they create a meaning of external interactions, which, in the end, influence project performance.

These samplings were collected randomly with help of Kompas database. The final sample consisted of 290 participants who fitted the research requirements. The number of participants was reduced (from starting point until 290 companies) due to various limitations. Firstly, dynamics of the company development (number of running project, number of people employed, positions occupied) did not correspond to the information provided in the World Wide Web resources. Secondly, the number of people were not available or resisted to participate. Thirdly, cultural and language barriers together with the fear of putting internal security system under threat prevented people from taking part in the research.

Data collection

The final on-line survey has been sent out on March, 22 (2010) by using Quick Search internet software. A web-link of the questionnaire was sent to the participants in a form of an e-mail with the letter supporting it. This letter contained the problem, study purpose, the areas of data collection, number of research participants in order to give clear understanding to respondents the purpose, significance of the study and potential valuable outcome of it. In our opinion, on-line questionnaire was the best choice for respondents to save time and more time effective for us.

The responses have been collected throughout one month time, while which three periodic reminders were sent and phone calls to participants made for increase response rate. As the first letter accompanied the survey link, the text in reminders also contained the main purpose, planned process (respondents) and its outcomes of the study. In order to increase the response rate the phone calls to respondents had been made. Because of the wide research focus, the available resources only allowed us to make phone contacts to respondents from Sweden and to very limited number abroad.

The process of data collection was closed by 22 of April (2010). 35 questionnaires (12%) were completed. High security level of computer systems within the companies reduced number of expected responses, it means that even if the email with link went through the spam filter it was immediately directed to Spam (junk) box, the letters from which, of course, were deleted without giving attention by the respondents. Many letters, phone calls we received from executives, who were willing to respond, contained concerns about security of company IT system.

Method of analysis

The first part of the analysis of the empirical findings examined quantitative data quantitatively, using percentages about the responses tendency, commonalities and differences. The collected data was taken directly from Quick Search software and analysed by using provided by the same software statistical tool. The type of analysis provided by Quick Search Statistics allowed us to conduct descriptive statistics type of analysis. The percentage was counted by the software program respectively, where the overall number of choices to one alternative were put in relation to the total number of respondents. Such measures allowed us to conduct descriptive statistics in order to find the patterns and tendencies within the researched area.

Additionally, the parametric multivariate analysis method was performed by means of crosstabulation (provided by the same software) in order to examine answers frequency belonging to aspects between several categories in the questionnaire and find the interrelations between them. The crosstabulation is used because it minimized the interpretation difficulties and kept us closely concentrated on the collected data, reflected in percentages which are easy understood. Both approaches to analysis helped us to find tendencies and trends in multiple projects management and interrelation between interactions with external actors and their influence on achievement of different performance criteria. In its turn the data gathered from descriptive statistics and parametric multivariate crosstabulation.

The non-numerical data collected based on of a 5-point Likert scale (from “always” to “never”, from “definitely agree” to “definitely disagree”) was analysed qualitatively, the purpose of which was to elaborate on and verify the assumption that right interactions management leads to achievement of improved performance.

Pros and Cons of Quantitative study

The advantages of using survey questionnaires as a tool for data collection are the capability to get responses from anyone in large geographical area either locally, nationally or internationally or from business executives and other employees as well as other respondents groups. The respondents are able to complete surveys in defined by you (or together with respondents) period of time regardless their location on the moment when they are answering. Though apart from pros there are and cons which might be experienced while using the quantitative methods. These are: there is no clarity during the survey completion, i.e. the number of people answered and responses collected and it is impossible to see tendencies before the

survey closing; inability to measure the motivation of the potential respondents to return the completed survey; impossibility to clear identification of respondents which would be able to read and respond on the questions and etc. By applying this on our study we can say that we have experienced it also.

The quantitative research conducted is very advantageous in relation to the aspects discussed in this article. Firstly, the captured international focus within this area of interactions is valuable for possible corrections, updates and lessons learning for local practices. Second, there is the limitation in using quantitative methods in the recent research. These aspects driven us to the final decision to conduct such study. But the time-length and efforts required for framing easy understandable and precise questions; the barriers met while distributing the survey and reaching the respondents made the process challengeable. By knowing these pros and cons we have built our research strategy predominantly on two study methods, which one fulfilling the gaps of another. Finally, we can say that usage of mix-methods approach allowed us to secure the overall study outcome and gain even more knowledge.

Qualitative method

The sample was drawn on the basis of the ‘snowball effect’. For the in-depth analysis we chose a company from the automotive industry, which matched the established sampling criteria. We used case study method of qualitative research to investigate the meaning of interactions and project performance. Yin (2003 in Myers, 2009) defines several elements of case study. As an empirical inquiry it takes a look at the identified phenomenon within the real-life context, provided rather unclear distinction between that context and phenomenon. Case study provide little control for the researcher over the situation, it involves multiple sources of data and utilizes theoretical propositions in order to stay on track in the research. The advantages of ‘case study’ research is that it is a contemporary study of the well-known organization, in many cases, which provides analysis of the situation, which other companies might be facing. Moreover, “it allows researchers to explore or test theories within the context of messy real-life situations” (Myers, 2009. p. 80). This researcher has an opportunity to get close to exploring complex organizational problems. However, its main shortcomings of case study method is that it is time-consuming, it requires clear focus on the relevancy of the collected data in large volumes of information, its quality is dependable on the access to an organizational information, and, as mentioned before, it keeps researchers in little control over the situation.

Having developed the theoretical framework from various areas (project management, internal and external interaction, organizational theory, etc.), it allowed us to outline several patterns (working hypothesis), upon which we further develop theory. These are the main elements of the exploratory case study outlined by (McCutcheon & Meredith, 1993). By conducting this type of qualitative research we primarily focus on ‘how’ and ‘why’ various types of interactions affect project performance, lead to better project outcome, ‘who’ is involved at various phases of project evolvment and ‘how’ they increase problem-solving effectiveness in challenging times.

Qualitative data collection on project management level included a workshop with company project management (survey questions designed for quantitative research were sent to them) and two face-to-face interviews with the senior management.

Secondary data such as newspaper articles, corporate documents, company representation on the Internet homepage and other internal data were utilized in order to provide background and understanding of company evolvment and development. Primary data were comprised of interviews and focus groups surveying. Information was gathered from the head office, situated in Sweden, and some managers from decentralized offices took part nominated by the

cooperating employees. According to Myers (2009, p. 121) “interviews are one the most important data gathering techniques for qualitative researchers in business and management.” Lindlof & Taylor (2002, p. 173) add that interviews suit well for the researcher if one wants to understand ‘the social actor’s experience and perspective’. Interview questions were pre-formulated on the basis of the analysis of the gathered data from quantitative research in order to keep the red thread across the research project. Pre-formulation of interview question was also due to the limited timing provided for the interview.

Semi-structured interview type was used to assist data collection process. Such type of interviewing is beneficial for the number of reasons (Myers, 2009): it facilitates a certain structure of conversation, on the one hand, and opportunity for improvisation allowing emerging questions and interviewee thoughts, on the other; moreover, provided introducing the same set of questions it gives the foundation for the consistency and structure when comparing different viewpoints of interviewees. On top of that, Myers (2009) argues that semi-structured interviews combine best practices from both structured and unstructured interview types and minimize risks. They are also the mostly widely utilized type of interview in business and management.

Two groups for further investigation were chosen: project management and upper management, to provide us with capturing two viewpoints towards an aspect of maintaining interactions and routines. According to Rubin & Rubin (2005, p. 67) ‘triangulation of subjects’ facilitate acquisition of diverse views on the described problem. We tried to catch both success and failure project experiences to better understand the role of interactive activities and routines establishment in project outcome. Thus, the unit of study were project management and upper/senior management. The particular subjects are central to the research problem, since they are one of the main internal participants of product development projects; they have the responsibility and power to influence project decision-making, administration and change introduction aspects; and they create a meaning of internal and external interactions and routines, which, in the end, influence project performance.

The interview consisted of both open and closed questions. It is assumed that to obtain a bigger volume of qualitative data, using open questions is the way to go. Closed questions type is more beneficial for acquiring confirming facts information and for closing the interview conversation down (Myers, 2009).

However, the limitations that might evolve while collecting data for the research can be due to the lack of time from the participants, lack of trust, elite bias, constructing knowledge issues (Myers, 2009), ambiguity of language, and language barrier.

Both interviews and workshop was carried out in a semi-structured format. The interview analysis followed a thematic approach. After each interview a brief summary of the case was conducted to facilitate better analysis outcome.

The gathered qualitative and quantitative material was further structured, interpreted and explained in connection to the review literature.

2. Quantitative survey

1. General information Please provide information about
Company name:
First name:
Last name:
Your position in the company:
Country of company location:

2. Which type of industry does your company belong to? (click on box to proceed)
<input type="checkbox"/> Manufacturing
<input type="checkbox"/> Pharmaceutical
<input type="checkbox"/> Automotive
<input type="checkbox"/> Telecommunication
<input type="checkbox"/> Energy
<input type="checkbox"/> Other

3. Number of company employees: (click on box to proceed)
<input type="checkbox"/> 50-100
<input type="checkbox"/> 100-250
<input type="checkbox"/> 250-500
<input type="checkbox"/> 500-1000
<input type="checkbox"/> more than 1000

4. Number of currently running projects: (click on box to proceed)
<input type="checkbox"/> less than 5
<input type="checkbox"/> 5-10
<input type="checkbox"/> 10-30
<input type="checkbox"/> 30-50
<input type="checkbox"/> 50-100
<input type="checkbox"/> more than 100

5.

Interaction and Project Management

The purpose of this set of questions is to understand how your company arranges interaction process internally and with other market actors.

6. 1. What are the aims for interaction in your company? (multiple answers are possible)

	Within the company	With customers	With suppliers	With other business partners	With academia
New knowledge creation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New technology discovery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to professional skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Problem-solving improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improvement of working atmosphere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lead time reduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product quality improvement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost reduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer's requirements understanding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sales increase	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk reduction of product introduction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

New business opportunities identification	<input type="checkbox"/>				
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7. 2. Who of the following participants are the most important for problem-solving at each project phase? (multiple answers are possible)					
	Initiation	Planning	Execution (including designing)	Monitoring and Reporting	Closing and Reviewing
Top management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PMO (Project Management Office)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steering/ Reference committee	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aligning process group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Monitoring (Control group)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Portfolio/ Program manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operational/Functional manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Project team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Team members from other projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accounting/finance department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product development/ R&D department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Production department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marketing department	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. 3. Which information provided by internal and external actors is important for company problem-solving? (multiple answers are possible)					
	Within the company	Customers	Suppliers	Other business partners	Academia
About possible product/service improvements	<input type="checkbox"/>				
About market actors' needs	<input type="checkbox"/>				
About prices of new products	<input type="checkbox"/>				
About products delivery time	<input type="checkbox"/>				
About quality of new products	<input type="checkbox"/>				
About new technologies	<input type="checkbox"/>				
About new products/services	<input type="checkbox"/>				
About new production/manufacturing techniques	<input type="checkbox"/>				
About competitors	<input type="checkbox"/>				
About new markets (offers and demands)	<input type="checkbox"/>				
About business best practices	<input type="checkbox"/>				
About current research/ study	<input type="checkbox"/>				

9. 4. How do the following actors participate in the projects? (multiple answers are possible)				
	Customers	Suppliers	Other business partners	Academia

Take part in seminars/conferences/ workshops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Initiate new projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide ideas for product improvements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provide ideas for process improvements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take part in products validation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take part in business negotiations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take part in project evaluations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Take part in studies/ research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. 5. When are comments/suggestions of the following actors implemented into projects? (multiple answers are possible)				
	Customers	Suppliers	Other business partners	Academia
Immediately (no approval needed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
After discussion between project members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
After approval by top managers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
After approval by company experts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not implemented, but informally followed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not implemented, not followed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. 6. Which of these barriers are the most common while interacting at each

project phase? (multiple answers are possible)					
	Initiation	Planning	Execution (including designing)	Monitoring and Reporting	Closing and Reviewing
Lack of cross-functional interaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unwillingness of employees to interact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of internal communication techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of internal communication tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of project goals communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many ongoing projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Frequent project goal/milestones changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of communication of company's priorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High product/ process complexity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unclear monitoring procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unclear reporting procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of valuable information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Misinterpretations of available information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. **7. Which of these barriers are the most common while**

interacting with the following actors? (multiple answers are possible)				
	Customers	Suppliers	Other business partners	Academia
Lack of cross-functional interaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Actors' unwillingness to interact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of actors commitment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of external communication techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of external communication tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of project goal communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poor communication of priorities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too many ongoing projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High level of product/ process complexity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unclear monitoring procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unclear reporting procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Limited access to each other's information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Misinterpretations of available information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of valuable information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Geographical distance of actors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Lack of actors' resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Low transparency level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. 8. What do you rely on when executing projects?					
	Always	Often	Seldom	Never	No answer
On company guide-books/ manuals, etc.	<input type="checkbox"/>				
On company goals/purposes	<input type="checkbox"/>				
On orders/instructions from management	<input type="checkbox"/>				
Improvising, based on suggestions/comments from management	<input type="checkbox"/>				
Improvising, based on own experience	<input type="checkbox"/>				

14. 9. To what extent are the following project standards used in your company?					
	Always	Often	Seldom	Never	No answer
PMI standard	<input type="checkbox"/>				
PMBok/OPM3	<input type="checkbox"/>				
Prince	<input type="checkbox"/>				
PPS	<input type="checkbox"/>				
Props	<input type="checkbox"/>				
Any type of the ISO standards	<input type="checkbox"/>				

Toyota Project Handbook	<input type="checkbox"/>				
Other standards	<input type="checkbox"/>				
Internally developed standards/procedures	<input type="checkbox"/>				
No standards/procedures used	<input type="checkbox"/>				

15. 10. To what extent are the following IT tools/software used in your company?

	Always	Often	Seldom	Never	No answer
Artemis International	<input type="checkbox"/>				
MSP Project	<input type="checkbox"/>				
Primavera	<input type="checkbox"/>				
Agile	<input type="checkbox"/>				
Microsoft Project	<input type="checkbox"/>				
Excel	<input type="checkbox"/>				
Other IT tools	<input type="checkbox"/>				
Internally developed IT tool	<input type="checkbox"/>				
No IT tools used	<input type="checkbox"/>				

16. 11. How often does your company change existing working procedures in the following areas?

	Always	Often	Seldom	Never	No answer

In project management	<input type="checkbox"/>				
In Information Technologies/ Information Systems	<input type="checkbox"/>				
In production	<input type="checkbox"/>				
In product development	<input type="checkbox"/>				
In marketing	<input type="checkbox"/>				
In internal communication	<input type="checkbox"/>				
In external communication	<input type="checkbox"/>				

17.	12. Do the established rules help your company to				
	Always	Often	Seldom	Never	No answer
Ease internal communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease external communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Save time on decision-making	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boost employees creativity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Facilitate idea generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improve company innovativeness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. **13. What does interaction with the following actors lead to? (multiple choice is possible)**

	Customers	Suppliers	Other business partners	Academia
Friendly/trustful relationship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satisfaction of company's stakeholders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Achievement of strategic goals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Company's financial well-being	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Valuable feedback for further product development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost reduction in information collection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minimization of new product introduction risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More innovations in products/services/processes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keeping updated with developing market trends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gaining competitive advantage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sustaining competitive advantage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New businesses creation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

19. Interaction and Performance

The purpose of this set of questions is to understand how internal and external interactions influence company's performance

20. 14. Do your projects meet the following criteria?

	Always	Often	Seldom	Never	No answer

The estimated time-line	<input type="checkbox"/>				
The estimated budget	<input type="checkbox"/>				
The estimated product specifications	<input type="checkbox"/>				

21. 15. Do your projects result with?						
	0	1	2	3	4 and more	Not measured
Number of innovations	<input type="checkbox"/>					
Number of patents	<input type="checkbox"/>					

22. 16. Is the satisfaction of the following actors perceived as a key performance indicator?					
	Always	Often	Seldom	Never	No answer
Customer's satisfaction with functionality of the products	<input type="checkbox"/>				
Customer's satisfaction with services supporting the products	<input type="checkbox"/>				
Customer's satisfaction with prices of the products	<input type="checkbox"/>				
Customer's satisfaction with products delivery time	<input type="checkbox"/>				
Supplier's satisfaction with the joint project outcome	<input type="checkbox"/>				
Other business partners' satisfaction with the joint project outcome	<input type="checkbox"/>				

23. 17. When are your projects evaluated?				
	Every project	Majority of projects	Some projects	None
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Shortly after the project has started	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
After each milestone is achieved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In the middle of project execution time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
At the end of the project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometime after the project is finished	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. 18. Who usually evaluates the projects in your company?

	Always	Often	Seldom	Never	No answer
Top management	<input type="checkbox"/>				
Functional/ operational managers	<input type="checkbox"/>				
Project managers	<input type="checkbox"/>				
Internal experts	<input type="checkbox"/>				
External experts	<input type="checkbox"/>				

25. 19. To what extent are project members involved in project evaluation?

	Always	Often	Seldom	Never	No answer
Provide information for evaluation	<input type="checkbox"/>				
Participate in the evaluation process	<input type="checkbox"/>				

Review the evaluation results	<input type="checkbox"/>				
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26. 20. The information for project evaluation is captured in

	Always	Often	Seldom	Never	No answer
Extensive project management reports	<input type="checkbox"/>				
Brief project management reports	<input type="checkbox"/>				
Not captured	<input type="checkbox"/>				

27. 21. The project evaluation results improve next projects by

	Always	Often	Seldom	Never	No answer
Modifications of existing project procedures	<input type="checkbox"/>				
Creation of new project procedures	<input type="checkbox"/>				
Valuable knowledge input	<input type="checkbox"/>				

28. Concluding questions 22. Do you consider your company as highly interactive?

	Defenetely, yes	Probably	Deferenely, no
Internally	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Externally	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29. 23. In your opinion, do these interaction types influence your company performance?

	Defenetely, yes	Probably	Defetely, no
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Internal interaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
External interaction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Qualitative case study (company information and study questions)

Industry description

Automotive industry is the one of the intense industries, which can be characterized by dynamic changes and adverse competition. It is dependant on various external factors: customization and increasing customer demands, environmental legislation and globalization of companies operations (projects), increasing outsourcing (von Corswant & Fredriksson, 2002) and “large variety of products on offer (typically 5000 upwards, with some suppliers having a catalogue of 100000 items)” (Childerhouse et. al. 2003, p. 138). Product development projects need to meet targets of shortening development times, reducing cost of products, and matching the required quality. In such business environment much focus is placed on interactions with external actors and their involvement for achievement of project performance.

This type of business is the most dynamic in terms of the large number of external actors involved and because of the high speed of new product introduction, intensity of new idea generation, a large number of simultaneously running projects, automotive industry with the chosen company matched the sample, which was developed for the quantitative study.

Company description

Since the studied in the qualitative case study company required to be treated anonymously, the information provided about it would be rather restricted and the source of information about the company and information about participants would be disclosed.

The sample of the company taken is a growing organization in the automotive industry, which develops and manufactures components for automobiles and provides solutions to vehicle makers around the world. It develops, manufactures and markets systems for gearshift, seat comfort, seat heaters, head restraints, pedals, electronics and displays, cables, and other component for automotive, commercial and industrial vehicles. The international area where it is operating in covers almost 50 facilities in 20 countries. 9000 employees are employed there and revenues contain MEUR 623 (2009). Such revenues come from the service for over 70 customers within the market for passenger cars, commercial vehicles and off-highway vehicles. The investigated company has over 50 years of experience and is among the top 100 automotive suppliers world-wide.

According to § 2 in mission statement “the company’s objective is to engage in engineering industry and other activities naturally related to, and the company shall emphasize development, marketing and manufacturing products to the car industry.” Thus, the company invests into significant research and development to maintain and expand its technological leadership. The products offered and internal policies keep the company position advantageous in product development, security and technology.

The company has a long history, starting from 1957, when it was founded. In 1995 is was remarked by development road of its own network trough acquisitions with companies from USA, UK, Korea and transfer of the main facilities into more suitable destinations China, India, Eastern Europe, Brazil, Mexico in terms of costs reductions and higher function abilities. For many years, Volvo remained the largest customer of studied, but today it provides systems and components to most of the world’s automakers, including Mercedes Benz, Audi, VW, Peugeot, Toyota, Nissan, Honda, GM, Ford, Scania, Iveco and MAN. The current company focus is on developing products suited for the next generation of vehicles such as new segment of electric vehicles and plug-in hybrids. Safety, comfortability, light, cost-effective, space-saving systems, light weight and packaging space are the products offered and will be offered in near future by the company.

KA's full spectrum of capabilities dispersed across driveline systems (includes custom-engineered cable controls, complete shift systems, fluid bulk hoses and engineered hose assemblies); interior systems (includes seat adjusters, side bolsters, cables, seat heating, ventilation, massage systems, arm rests and head restraints); power products systems (vehicle control systems, quality engineered pedal systems, steering systems, electronic displays and cable controls); and actuations systems (control mechanism for industrial vehicles) and supports all areas of the business in all regions. In our investigation we focus mainly on driveline systems.

New product development is driven by customer demand (e.g. lumbar systems for comfort), technological developments (e.g. new materials in fluids management) or changing regulation (i.e., to comply with improved air quality and fuel efficiency laws). The company has deep understanding of all these drivers and often anticipates solutions ahead of the market's need. It holds several unique patents in area of operations and considers patents as a valuable asset. More than 600 patent families' worldwide and more than 300 patents are pending, where Automotive Systems owns 62 % of the patents, while Commercial Vehicle Systems and Power Product Systems own 29 % and 9 %, respectively.

Innovations and speed-to-market are significant sources of differentiation of investigated company. The innovation committees created from different departments members, number of universities including the University of Michigan (USA), Rice University (USA), and Aston University (UK), the Technology Council, which help generating and screening the ideas and directs investments towards high-potential opportunities. To support and gain from such kind of cooperation it is important to have extensive and efficient communication and the company is actively seeking a frequent and reliable dialogue with owners, investors, analysts, academia and other actors.

According to article 2 in the company's mission statement "it shall be managed in accordance with general business practices and may co-operate with, establish and participate in other companies. Modular design approach and sub-system standardization reduce time-to-market and decrease development costs, at the same time as maintaining high quality standards". That is why their internal policies are based on transparency, openness, accountability and equal treatment of all stakeholders.

The focus on customers and products is vital in the company. It has the speed, adaptability for helping customers meet their needs. The company resources and dedicated personnel ensure timely innovative product development and high quality manufacturing. The value added by listening, identifying and understanding customer needs moves towards customer satisfaction. A second key priority for the company is to continue improving the company's internal processes, gaining synergies and improving efficiency. Close cooperation with customers facilitates innovative products that set new standards and draws the road for future trends within automotive technology.

Workshop and interview questions

- ✓ Is customer is involved mostly at the every stage of the project development? At which phases they need to be involved? Where could they be involved even more?
- ✓ Does it help that customer add some of their professionals?
- ✓ How these personal relationships are mainly built – formally/ informally? though negotiating specifications more at the beginning or both?

- ✓ What makes communication more effective?
- ✓ Which routines and procedure help you to complete projects better?
- ✓ How could these misunderstandings be erased? What needs to be improved? Who could influence that?
- ✓ What information do you lack? And from what people? when you have problems...
- ✓ When we talk about consultants and academia, how often do you involve them into projects? When and why?
- ✓ Why not?
- ✓ What about your business partners? what is their role?
- ✓ How are you projects mainly evaluated? Apart from time, cost, quality...
- ✓ Would you say that there could be other criteria that could evaluate projects?
- ✓ What about customer satisfaction? or other actors satisfaction?...
- ✓ And could interaction process be improved?
- ✓ So you think that all those interactive activities could improve project activities?...
- ✓ What do you think defines a successful project in terms of interactions?
- ✓ Would you need sometimes top management to communicate these priorities to you?
- ✓ If you feel that you know that they would improve the project, would you suggest that? go to someone? who? and would you implement it?
- ✓ Do the interaction affect the performance? How and to what extent? Who of the actors is affecting each of the performance criteria?
- ✓ Do you think that more actors have to be involved in the projects for performance achievement? Or existing actors have to be involved more intensively into the project process?

4. Extended analysis

Why do interactions take in the project life cycle?

Our research findings support the notion that companies organize their activities on the basis multiprojects. The distribution between the number of running project showed that 56% of companies run simultaneously 5-10 projects, 42% manage 10-30 projects and 2% have more than 100 ongoing projects (Figure 1).

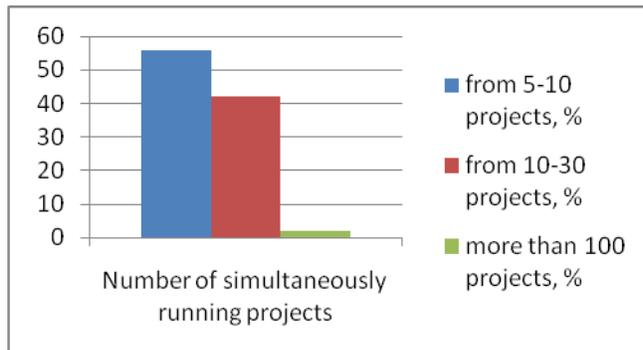


Figure 1. Number of simultaneously running projects

Pressure of delivering products with the right specifications, on time and within the estimated budget require speeding up internal processes in order to come up with competitive products to the market. This explains the tendency of creating a package of simultaneously run projects. However, companies realize that the scarcity of own internal physical and financial resources, but most importantly limited amount of human resources, i. e. few people with the right knowledge and competencies.

Thus, to solve this problem companies are forced to involve and interact with other market actors, such as customer, supplier, other business partners, and academia. Each of them contributes differently to the outcome of projects by bringing in valuable for the company knowledge, information, etc. The value of provided resources has different impact on performance, i. e. some have quicker and more effective results than others. Considering that, project management has to manipulate interaction activities and prioritize communication and involvement of external actors in order to “squeeze” the most out of them.

Do interactions lead to performance?

Despite of the large number of barriers identified companies perceive themselves as highly interactive (40%) or tend to think so (52% - “probably”). 8% admit that they are far from being interactive (Figure 6).

The illustration (Figure 4) maps the participation of each external actor in project phases and information/ knowledge they contribute with. It also shows that project dynamics is very much adjusted to and controlled by customer (“procumer’ paradigm”, Hall, 1993). However, together with the latter supplier has become an integral part of every project phase too. Whereas the rest of the actors are interacted with on the ‘problem-call’ basis (*in italics*).

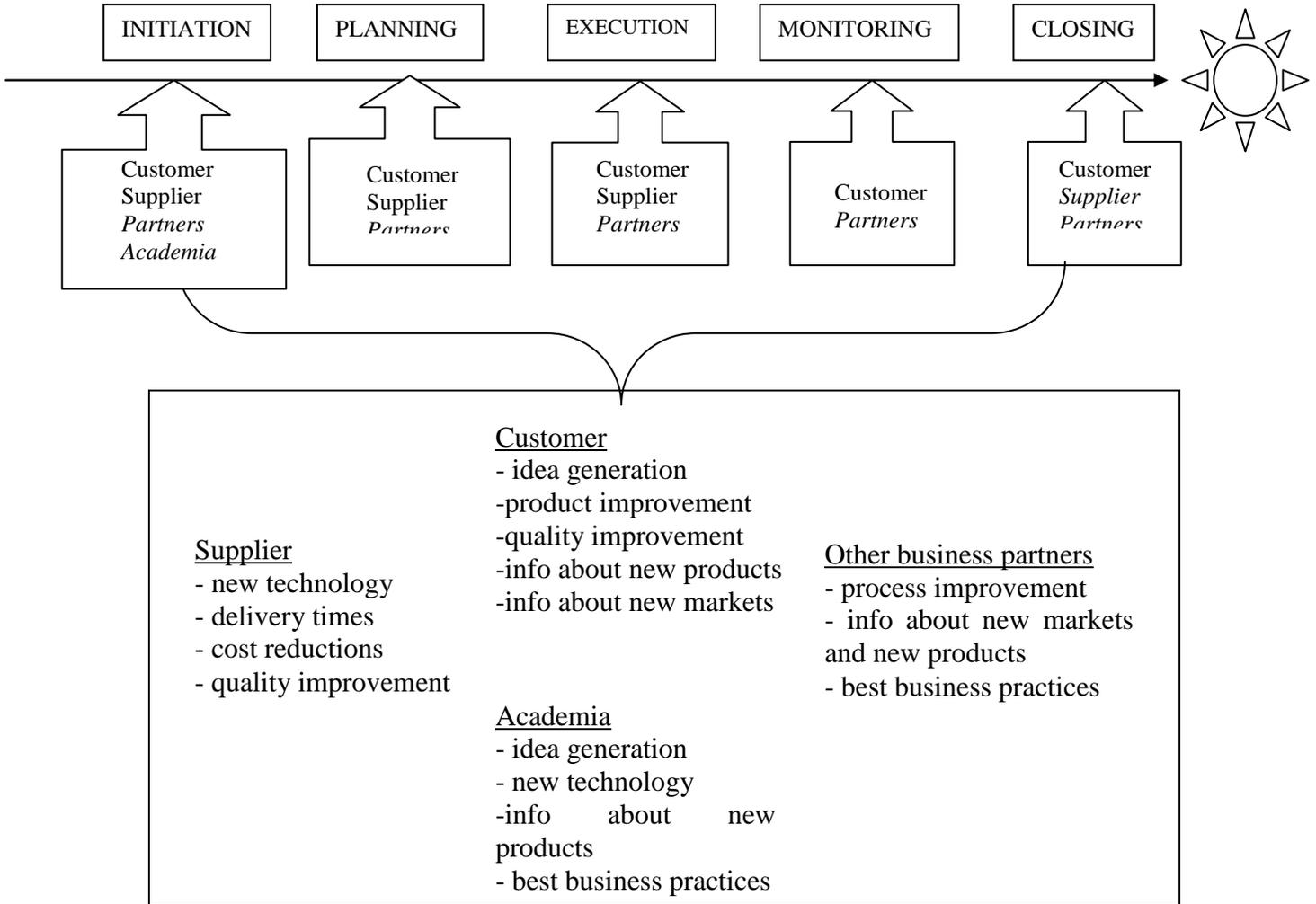


Figure 4. Interactions in project dynamics

5. Lessons learned

We have conducted a scientific research in the area of project management and interaction management. We have collected a sufficient number of data to explore the influence of interactions with external actors, such as customers, suppliers, other business partners and academia on performance in multi-project settings.

From the conducted research we could draw the following conclusions:

1) It is important to set the variables of the research first and decide on the method of data collection. Particularly for the quantitative research the rate of the response has a heavy impact on the research outcome. Deciding on the number and type of variables from the beginning of the research project assist finding the focus of the research, which influences theoretical, conceptual and methodological frameworks of the article. When the variables are set, it is easier to decide on the theoretical framework. Since in our research we joined two topics which have not really been out together in the project management literature, we knew the variables which were important for the research outcome, and we considered the literature on them.

When the focus of the research is set and understood by the project team, the issue of establishing an effective questionnaire requires very close attention. Since respondents are approached via Internet, there is a high risk of mistrust and denial to participate. Therefore, two important implications can be drawn: first, the questionnaire should be 'click'-simple and contain as few questions as possible; secondly, majority of respondents are suggested to be previously contacted and explained the topic of the research and what is required from them. In order to make respondents understand questions without bias and interpret them easily, we used Likert scale of answers for instance, always, often, never; we also established the logical order of questions supported by the introduction to each sections of the questionnaire. Moreover, through the whole survey we worked on the issue of eliminating academic and other analytical terms and phrases.

2) We learned that the research does not develop linearly. Every change in the project affects project execution and, thus, each part of the article and stage of the research. The project execution required constant and cyclical procedure of information collection, analysis and revision. This kept the research project on track both theoretically (literature) and practically (information about the external environment).

3) Realizing that internally established routines in project dynamics are one of the elements of a successful project performance, in our research group we discussed and agreed upon the project organizational issues such as long-term and short-terms goals, our shared values in the project, the project milestones, types of communication between each other, distributed responsibilities, etc. Group work and cross-functionality in a group was an advantage to our research project. However, the established interdependency as an outcome of the group work could have sometimes have a negative effect on the project execution. Since the work was distributed, closer to the analysis and discussion part there grows strong need in group work and approval of thoughts and ideas that are represented in the article, which means that absence of any of the participant could pro-long the execution of certain stages of the research.

4) It should be also mentioned that the process of developing the article relied very much on interactions with respondents (companies), academia and other external to our environment

people. Therefore, the undertaken research problem can be projected and applied to our case. Our research had its own performance criteria: there was set the time-line, budget and quality specifications. The final satisfaction of the examiner as our customer will be the satisfaction in terms of grading our work. However, we can say that interacting with our supervisor led to better paper quality, and reaching the estimated time for the article submission and a decreased cost of respondent information collection; by interacting with the project participants we improved the quality of the quantitative survey; by interacting with other program students we came up to some article improvements; by interacting with people from academic, business and social worlds we came up to several process innovations in terms of approaching the respondents and reaching better quality of the survey and case study results and several article innovations in terms of transforming a thesis into an article.

The outlined facts, challenges and benefits of our research, which comprise our lessons learned section can serve as a good basis for us when we undertake a new research, and it could also be of help to those who conduct the research project for the first time.

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