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**ORGANIZATIONAL DETERMINANTS OF THE  
DECLINE IN THE BUSINESS VALUE OF A  
RESEARCH AND DEVELOPMENT PROJECT IN  
INDUSTRIAL ENTERPRISES**

Doctoral dissertation  
written in the Department of Design of Management Systems  
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# Introduction

With the increase of competition, enterprises attach more and more importance to innovation. This is indicated by literature<sup>1</sup> studies and author's observations. One of the ways to strive to achieve innovation is the implementation of research and development projects. Thanks to them, companies may launch products with new functionalities, cheaper or meeting new customer needs. The overriding goal of these projects is always to provide business value<sup>2</sup>, as there are no material goods that customers want<sup>3</sup>. What they desire is the value they bring them<sup>4</sup>.

The author's professional experience and observations indicate that projects often do not generate the expected business value. Therefore, a question arises about the reasons for this state of affairs. Literature studies carried out do not provide an answer to the problem formulated in this way. There is therefore a need for systematic research to explain this phenomenon, as the issue of innovation is constantly gaining importance. As a result, the role of research and development projects is also growing.

## The purpose of the treatise

The author's main goal is to learn about the reasons for the decline in business value during the implementation of a research and development project in industrial enterprises. The results of research, in addition to expanding knowledge in the field of management science, should provide an indication of how to prevent the loss of business value.

- The main objective is accomplished by achieving cognitive goals. Those include:
- identification of the main determinants of business value in project management,
- identification of the impact of selected determinants on business value,
- identification of interactions between selected determinants influencing business value.

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<sup>1</sup> Ahn Shanghoon, 2002, *Competition, Innovation and Productivity Growth. A Review of Theory and Evidence*, Organisation for Economic Co-operation and Development, <http://applied.oecd.org>; P.W. Roberts, 2016, *Product innovation, product-market competition and persistent profitability in the U.P. pharmaceutical industry*, *Strategic Management Journal*, vol. 20, nr 7, p. 655-670.

<sup>2</sup> R.K. Wysocki, 2013, *Efektywne zarządzanie projektami. Tradycyjne, zwinne, ekstremalne*, Helion, Gliwice, p. 51.

<sup>3</sup> R.F. Lusch, S.L. Vargo, 2006, *The Service-Dominant Logic of Marketing. Dialog, Debate, and Directions.*, M.E. Sharpe, New York, p. 29-42.

<sup>4</sup> M. Randmaa, T.J. Howard, T. Otto, *From Product Centered Design to Value Centered Design. Understanding the Value System*, 8th International DAAAM Baltic Conference "Industrial Engineering", Tallinn 2012, p. 2.

- The results of the literature analysis suggest that the business value achieved during the project is determined mainly by:
- level of company's project maturity<sup>5</sup>,
- project management cycle model<sup>6</sup>,
- organizational structure of the project<sup>7</sup>.

Due to the use of case study as the research method, research hypotheses take the form of research questions. After determining the purpose of the study, the author asked the following main research question: what are the reasons for the decrease in business value during the implementation of selected research and development projects? Explanations are provided by answers to two cognitive questions:

- What is the impact on the loss of business value of:
  - the level of project maturity,
  - the project management cycle model,
  - the organizational structure of the project?
- How does the level of project maturity, the project management cycle model and the organizational structure of the project interfere with the loss of business value?

## Work structure

The dissertation is of a theoretical and empirical nature and consists of six chapters. The first chapter was devoted to explaining the concept of business value in project management. It also contains the systematics of the function and a description of the role of business value, how it is created and measured.

The second chapter deals with the subject of research and development project management. There is a description of research and development projects and their

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<sup>5</sup> M.in. H. Kerzner, 2015, *Project Management 2.0. Leveraging Tools, Distributed Collaboration, and Metrics for Project Success*, Wiley, Hoboken, p. 283-294; H. Kerzner, 2013, *Project Management Metrics, KPIs, and Dashboard. A Guide to Measuring and Monitoring Project Performance*, Wiley, Hoboken, p. 32-35; M. Juchniewicz, 2009, *Dojrzałość projektowa organizacji*, Bizarre, Warszawa, p. 45; M. Trocki, *Nowoczesne zarządzanie projektami*, PWE, Warszawa 2012, p. 373; J. Charvat, 2003, *Project Management Methodologiep. Selecting, Implementing, and Supporting Methodologies, and Processes for Projects*, Wiley, New York, p. 54.

<sup>6</sup> M.in. R.K. Wysocki, 2013, op. cit., p. 78-110; H. Kerzner, F.P. Saladis, 2009, *Value-Driven Project Management*, Wiley, Hoboken p. 170; H. Kerzner, *Project management metrics*, 2013, op. cit., p. 193; J. Charvat, 2003, op. cit., p. 25.

<sup>7</sup> M.in. M. Trocki, 2014, *Organizacja projektowa. Podstawy, modele, rozwiązania*, Polskie Wydawnictwo Ekonomiczne, Warszawa, p. 42-44; H. Kerzner, 2005, *Advanced Project Management. Edycja polska*, Helion, Gliwice, p. 722; H. Fołtyn, 2007, *Klasyczne i nowoczesne struktury organizacji*, Key Text, Warszawa p. 118--151.

location in the typology of projects. In addition, the concept of project and project management has been clarified, as well as methods for managing both projects and the project portfolio.

The third chapter contains a detailed description of three selected determinants of business value in projects, i.e. models of project management cycles, project maturity and project organizational structures. This part of the study also includes a discussion about the concept of project maturity and its criticism, and the most popular models of project maturity testing. At the end, the organizational structures of the project were reviewed, detailing their benefits and disadvantages for the success of the project.

The fourth chapter was devoted to the methodology of conducting research proceedings. A detailed description of the method of selection of research methods and justification of the choice of determinants of business value is presented.

The above chapters have a theoretical form and their task is to implement the first of cognitive goals.

Chapters five and six are empirical. The first one contains a description of the results of individual case studies, the second one - the results of analyses of data from the previous chapter and conclusions drawn on their basis. Thus, it implements the remaining cognitive goals and the main goal of the work.

The work is completed by a summary and attachments at the end of the work.

## **Research assumptions**

The level of complexity of enterprises implemented in the automotive industry for many years exceeds the possibilities of their efficient implementation without the use of knowledge in the field of management and without the use of supporting tools. Projects lasting often for several years, involving many people from various organizational units of the company, clients and suppliers, require more and more attention to their planning, organization, management and control in order to meet the expectations they face. In connection with the above, the standard has become the application of various project management methods by enterprises - applicable only in certain areas of project management and covering the entire project management process. From the observations of the author and his professional experience gained while working in several international corporations, it is apparent that, due to the complexity of problems, comprehensive management of research and development projects involves solely project



management methodologies, i.e. comprehensive and detailed methods<sup>8</sup>. Although many companies use proprietary solutions in this area, the processes that make them up are included in the project management methodology presented in the paper entitled "A Guide to the Project Management Body of Knowledge"<sup>9</sup>, published by the Project Management Institute (PMI). In the United States of America, this publication was recognized by the American National Standards Institute as the national standard for project management. Also in Europe it is considered a model of the project management methodology, comprehensively discussing its individual elements and describing the numerous processes included in its composition. For this reason, for the purposes of this dissertation, this methodology was considered by the author as a reference point in terms of the processes that make it up and their classification.

Despite the relatively short history of project management standards initiated by Procter & Gamble in 1920<sup>10</sup>, they have undergone numerous changes, reflecting the changing approaches to management strategies<sup>11</sup>. Due to the time needed to carry out changes in project management methods, inertia of enterprises and following up-to-date trends in this area, many companies applied project management methods at the same time, that did not reflect the needs resulting from their management strategies. The author's experience indicates that the perception of business value and project management among small and medium enterprises operating on the local market is different from their perception by corporations operating in several countries. Therefore, to reduce the possibility of influence of the approach to management strategy on the attitudes of companies in the field of project management, the author chose for this study the companies conducting their activities on the international market.

The dynamics of reacting to the changing environment and emerging trends in the approach to management strategies may also be conditioned by the sector of the economy. Companies in the service sector have a lower level of inertia than the production sector. This may result from the proximity and frequency of contacts with the environment, in particular with the client, as well as from production processes, production technology, the use of which undoubtedly does not help in quickly adapting to market changes. As a consequence of the above facts, the production activities in the IT area may show a greater

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<sup>8</sup> Classification of project management method according to M. Trockiego, 2011, op. cit., p. 17.

<sup>9</sup> Project Management Institute, 2013, *A guide to...*, op. cit.

<sup>10</sup> M. Trocki, 2012, op. cit., p. 55.

<sup>11</sup> J. Niemczyk, 2013, *Strategia. Od planu do sieci*, Wydawnictwo Uniwersytetu Ekonomicznego, Wrocław p. 39.

ability to organizational change than heavy industry companies. Due to the above possible determinants of the application of different approaches to the management strategy, the author limited his choice to companies classified under Polish Code of Business under code 2932Z, defined as "Manufacture of other parts and accessories for motor vehicles, excluding motorcycles" or under NACE 29.3.2 code "Manufacture of other parts and accessories for motor vehicles"<sup>12</sup>. Also, the author's professional experience is mainly related to this type of activity.

All companies from the described group known to the author apply project management methodologies, in particular in relation to research and development projects. On the basis of observations, it can be stated that the systematicity and purposefulness of using these methods and the way they are used sometimes differ significantly between individual companies, as well as within one company, using them in separate projects. As a result, the results of the project management process generate different business value for the company, and the project goals are achieved to a different degree. The framework of the project is adhered to at a variable level.

These differences can often be observed when applying the same project management methodology to projects that differ significantly in the clarity of purpose and solution. Sometimes the level of knowledge of the goal and the solution of the project is so clear that it is possible to create a structure of division of work and structure of division of requirements. Therefore, the use of a methodology that fits in the linear model of the project management cycle seems fully justified. Other times, however, the same methodology is used to implement a venture with a decidedly unclear solution and an unspecified purpose of the project. The author's observation shows that such implementation runs along a much worse course. Unfortunately, the selection of the wrong model of the project management cycle does not explain all the decreases in business value from the implemented projects.

Due to the growing competition and increasing costs of developing breakthrough products and technologies, as well as high uncertainty about the possibility of obtaining returns from investments, the pursuit of maximizing business value is more important than ever before. The growing importance of business value is also associated with the perception of the role of intangible assets and increasing competition in this area.

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<sup>12</sup> [http://ec.europa.eu/competition/mergers/cases/index/nace\\_all.html](http://ec.europa.eu/competition/mergers/cases/index/nace_all.html), access 2016.01.01.

Thus, the question arises, why the business value generated during the implementation of certain projects decreases? What factors have a significant impact on it and how do they contribute to maintaining it at a high level? From the point of view of project stakeholders, these are important questions for which there is no unambiguous answer, backed by systematic research. The consequences of responding to them may relate to the broad spectrum of the company's operations and be strategically important to it.

The author's experiences lead to the identification of the main problem of the dissertation, consisting in the belief that there are some major factors determining the decline in business value in research and development projects in industrial enterprises. As suggested by literature on the subject, they may include: the use of a project-relevant model of project management cycle<sup>13</sup>, suited to the project's needs, the level of project maturity<sup>14</sup> and the project's organizational structure adequate to the project's needs, as suggested, among others, by monographs by H. Fołtyn<sup>15</sup>, M. Trocki<sup>16</sup> and H. Kerzner<sup>17</sup>. The detailed justification for choosing these determinants is described in the third chapter.

The above considerations contributed to the development of research in the field of creating business value in the process of managing research and development projects in enterprises of the automotive industry, aimed at finding a response to the formulated problem.

## Summary

The motivation for the creation of this study were frequent observations of the author of the dissonance between the goals of enterprises in the implementation of research and development projects and their effects. During several years of professional practice, the author had the opportunity to participate and observe project works from different perspectives: as a member of a project team, an expert supporting project implementation, project manager, program manager and project sponsor. Although the experiences gathered at work at different positions sometimes significantly differed from each other, their entirety reinforced the belief that the business value created during the project implementation is reduced as a result of errors in the project. The author's assumptions

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<sup>13</sup> H. Kerzner, F.P. Saladis, *Value-driven*, 2009, op. cit., p. 170; R.K. Wysocki, 2013, op. cit., p. 80; H. Kerzner, 2013, *Project Management Metrics...*, op. cit., p. 193; J. Charvat, 2003, op. cit., p. 25.

<sup>14</sup> H. Kerzner, 2013, *Project Management Metrics...*, op. cit., p. 32-35; M. Juchniewicz, 2009, op. cit., p. 45; M. Trocki, 2012, op. cit., p. 373; J. Charvat, 2003, op. cit., p. 54.

<sup>15</sup> H. Fołtyn, 2007, op. cit., p. 118, p. 151.

<sup>16</sup> M. Trocki, 2014, op. cit., p. 42-44.

<sup>17</sup> H. Kerzner, 2005, op. cit., p. 722.

regarding the reasons for these decreases often changed with the change of the reference point, but did not allow to be certain about their validity.

The existence of a practical problem was the reason for undertaking systematic literature studies in search of an answer to the formulated research problem, i.e. learning about the reason for the decline in business value during the implementation of a research and development project in industrial enterprises. The analysis of Polish- and foreign-language literature allowed to identify the main determinants of business value in project management, and at the same time to achieve the first cognitive objective of this work. During the analysis of the literature, the author did not find any studies on the analysis of the power of this influence and the analysis of the power of interaction between selected determinants. Lack of research in the discussed area and the significance of the topic prompted him to undertake research in this area.

Studies conducted as part of this dissertation were preceded by preliminary research, the purpose of which was to answer the questions: why enterprises strive to create business value in research and development projects and why these aspirations are sometimes contrary to their activities<sup>18</sup>. The results of the research consolidated the author's conviction that the subject of business value in research and development projects is particularly important and that it is required to conduct extended studies in order to get to know the essence of the problem.

The completed research confirms that two out of three selected organizational determinants have a significant impact on the decline in business value during the implementation of research and development projects. The third determinant, i.e. the project lifecycle management model, although also showing a significant impact on the decline in business value, according to the statistical assessment, is slightly below the limit of significance. These conclusions implement the second of the cognitive objectives of this work.

Of the three groups of assessment of the decline in business value, the largest of these is the reduction of costs. Obtaining project maturity, choosing the right organizational structure and applying the right model of project management cycle to the project's needs will be most visible in limiting the decline in business value in the area of cost reduction. In turn, these activities will also contribute to reducing the decrease in business value in the area of activity related to the service provided. The smallest effect in the form of

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<sup>18</sup> D. Jasiński, 2016, *Wartość biznesowa w projektach badawczo-rozwojowych*, Nauki o Zarządzaniu, nr 4, p. 58.

decreasing business value will be visible in relation to the decrease in revenues. Analysis of the results of the conducted research also proves that the largest decreases in business value are caused by errors in the project management planning processes. In turn, the start and end processes result in the smallest loss of business value.

According to the last of the cognitive objectives set, correlations between selected determinants of business value have no significant impact on business value. The largest correlation occurs between the model of the project management cycle and the organizational structure of the project. The level of impact of this correlation on business value, however, is significantly lower than selected determinants analyzed individually. The conclusion of these observations is that focusing on improving one of the selected determinants of business value may bring the company greater benefits than actions aimed at partial improvement of several of them. At the same time, it's worth to begin with improving the project maturity, as it has by far the largest impact on business value.

An important conclusion from the conducted research is, in the author's opinion, that in a project-mature company, using the right model of the project management cycle and applying an organizational structure adequate to the project's needs, there was also a decrease in business value by 200 points. This case suggests that in addition to the determinants selected by the author, there are other determinants, not included in these studies, as a result of which the business value decreased by the mentioned value. This can be an argument for further research into the loss of business value in projects.

The model of the project management cycle has the least impact on the business value in research and development projects among the selected determinants. Intuitively, however, this seems to contradict the practice. These assumptions can also be confirmed by extensive literature devoted to various project management methodologies for individual project management cycle models. Many global institutions and companies dealing with project management consider the project management methodology, which is a general and comprehensive method<sup>19</sup>, to be an important factor in creating business value. If project management can be considered a process, then the description of this process is the methodology. For this reason, using the right model of project management process, contrary to the results of research, seems to have a significant impact on business value. Perhaps, however, not only the project management cycle model, but also the methodology that is its derivative, together have a significant impact on business value. Therefore, the question arises how the number and quality of individual project

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<sup>19</sup> M. Trocki, 2017, op. cit., p. 24.

management methodologies influences the business value in research and development projects?

An analysis of all the case studies described in this paper suggests that both extremes of the number of processes in the project management methodology do not serve to build business value. Enterprises that recorded the smallest decrease in business value were characterized by having about 75% of PMBoK methodologies. However, their analysis was not the subject of research. For this reason, it is difficult to determine how their quality and number contribute to the decline in business value. It seems that adapting management methodologies, in terms of processes that form it, to individual project goals, is an important issue - in particular in the case of methodologies that fit into the traditional project cycle model, due to its much lower susceptibility to changes as compared to other models. This issue is undoubtedly an interesting and important topic of the analysis of creating business value in research and development projects, which could be explored during further research.

In the literature on project management, there is a trend towards creating flexible project management processes that would fit into the area of the agile project management cycle model. The project management methodologies available on the market in line with this model are for the most part intended for the IT industry from which they originate. The world's largest institution of theoreticians and practitioners of project management, i.e. PMI, being the owner of PMBoK, in October 2017 issued a new version of PMBoK<sup>20</sup>, taking into account the approach represented by the agile model for project management. In 2015, AXELOS, to which the PRINCE2 methodology belongs, published a PRINCE2 adaptation for the agile approach<sup>21</sup>.

Both the adaptation of PMBoK and the adaptation of PRINCE2 to the needs of agile project management use numerous processes of methodologies from which they derive. These processes were created, however, with the traditional methodologies in mind. For this reason, not all the advantages of agile methodologies have been reflected in these adaptations. As a consequence, if these adaptations of the most recognizable project management methodologies in the world will serve enterprises as a model for creating business agile project management methodologies, these enterprises may not experience all the benefits offered by agile methodologies. As a consequence, not only the choice of the right model of project management cycle will

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<sup>20</sup> Project Management Institute, 2017, *Agile Practice Guide*, Inc, Newton Square, Pennsylvania.

<sup>21</sup> TSO, 2015, op. cit.

have significance for business value, but also the course and number of individual processes of project management methodologies.

The author hopes that the results of this work will induce other researchers to deepen the conducted research and will be a practical guide for project management practitioners in order to reduce the loss of business value during the implementation of research and development projects. An extremely high practical value in the opinion of the author would be gained from research aimed at comparing the losses of business value, presented in this paper in the form of points, with the financial data of enterprises. This would help to determine the financial value of the loss of one point of business value, as a result of which the analysis of the profitability of introducing organizational changes in the area of the mentioned determinants of business value would present a much higher utilitarian value.