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DEVELOPING PROJECT PORTFOLIO MANAGEMENT MODEL FOR INNOVATION PROJECTS USING GROUNDED THEORY: A CASE OF IRAN'S POWER INDUSTRY

The aim of this paper is discover the causal relationship of IPPM performance. This paper shows that performance of IPPM consist of an integrated elements of strategic alignment, portfolio balance, resource fit and value maximization. Qualitative research design was chosen for this study and through using semi-structured and in-depth interviews with 24 experts in five Iranian organizations producing equipment of the power industry. According to the findings from these qualitative data, effective IPPM is the result of three areas of capabilities: IPPM Process, IPPM structure, IPPM people. These causal relationships are moderated by project context. Finally, we develop a set of propositions regarding the key performance drivers of IPPM.

Keywords: project portfolio management, capability, innovation projects, innovation project portfolio, project context.

Formulation of the problem generally. Firms which use innovation project portfolio for development of new products encounter special challenges. In modern and dynamic competitive environment which is changing rapidly, the survival of these organizations depends on permanent chain of new successful products [1]. Doing the right projects is critical to firm's success [2; 3]. Although huge sums are invested in these project to develop new services products as well as new manufacturing products, significant number of these products is not successful.

Innovation project portfolio management (IPPM) is about ensuring the right amount of projects in the portfolio in proportion to the resources available, aligning projects with business's strategy and maintaining balance between project types [4]. IPPM aims at maximizing the value of the portfolio and the return on R&D spending and avoiding pipeline gridlocks. IPPM is a dynamic decision process, whereby innovation projects are evaluated, selected, and prioritized, and existing projects may be accelerated, killed, or deprioritized [4; 5].

Even though scientists and practitioners have realized the importance of IPPM and conducted much research on certain issues in IPPM literature, valid empirical evidence and understanding on the use, outcomes, and most important success drivers of portfolio methods in innovation management is rare. However, Cooper et al. [4] and Kester et al. [6; 7] have delivered first empirical evidence of the linkage between IPPM and firms' performance.

In this study we conducted personalized interviews in order to gain a deeper understanding of IPPM in general and its practical implication [8]. Using a qualitative

research design and following grounded theory facilitates an interpretive approach, understanding the context of phenomena, identifying unanticipated phenomena and influences, and generating new "grounded" theories [9-11]. Therefore, we conducted 24 interviews in 5 five Iranian organizations producing equipment of the power industry.

This paper proceeds as follows. First, we present a short literature review on IPPM with a particular focus on IPPM capabilities. Applying a coding system, as well as a grounded theory approach, we develop a set of propositions regarding the key performance drivers of IPPM: IPPM Process, IPPM structure, IPPM people and project context. Additionally, we are also interested in deriving propositions regarding IPPM performance's impact on both project performance and firms' business performance. This paper is concluded with a discussion of our findings, limitations, as well as implications for management practice and further research.

Analysis of recent researches and publications. *Theoretical Background.* In recent years, many efforts have been made in Iranian power industry to achieve expertise and technology in various fields, including the design and manufacture of required equipment. The result of these efforts has been the development of domestic production and self-sufficiency in some areas, increased employment, reduced outflow of currency and even export of electricity. Nevertheless, the rate of innovation in this industry is far from optimal and there are many problems in the way of innovation (from generating ideas to making the final product).

Implementation of IPPM in the studied companies requires actions such as good analysis of the market, proper prioritization of projects and resources in the organization, recognition of the right time to release the product to market, analysis and categorization of projects, application of risk management system for portfolio risk assessment and will increase the success rate of these projects.

Therefore, the main problem of this study is the low performance of NPD projects due to the dynamic environment of power industry, the existing challenges, the need for innovation project portfolios and NPD and their effective management in order to achieve competitive advantage in the organizations. Therefore, it seems essential to identify IPPM capabilities as a guideline for organizations to improve the success rate of their new products.

The modern perception of portfolio management is mainly based on the finance-oriented portfolio theory by Galloppo [12] and Markowitz [13]. Since then, portfolio management has gained increasing importance in industrial application and especially in innovation management. There is growing awareness and application of portfolio methods in practice and Hunt and Killen [3] state that portfolio management is a rapidly developing field of research and practice. The importance of IPPM is grounded in the firm's ongoing challenge to balance its available resources with its number of projects [4]. IPPM is important because of the rapidity at which resources are consumed in the innovation process and the need to control this consumption.

In this paper, we use the term "innovation project portfolio management" aligned to Cooper et al. [4] and Killen et al. [5]: IPPM is the process of evaluating, selecting, and prioritizing new or existing innovation projects according to its main objectives, namely resource allocation, strategy execution, balance achievement, and value maximization. IPPM determines the future projects in which the company will invest and how to invest scarce resource, such as time, people, and money.

In this context, "innovation projects" are used to develop new products including new manufactured products; new services products or combination of manufactured and services

products. These projects can be defined in three areas including "product development", "development of technology and processes" and "product improvement". Any organization is able to define and implement a portfolio of those projects.

Looking at prior research, the most recent study in the field of IPPM focuses on the linkage between cultural factors and decision-making processes as well as their impact on portfolio decision-making effectiveness [1; 6]. Two well-known studies in the field of IPPM are the exploratory study by Cooper et al. [2; 4] in the U.S. and the Australian study conducted by Killen et al. [14]. However, only few authors have delivered empirical evidence for the linkage between IPPM and firms' performance [4; 6]. Kester et al. [1; 6; 7] focus on the decision-making processes, while Cooper et al. [4] identify proficient methods by conducting a benchmark analysis using data from 205 diverse businesses. Several best practice, multi and single case studies aim to further develop the understanding of IPPM [15; 16].

However, the literature still lacks insights into the potential correlating relationships between the IPPM capabilities and performance indicators in IPPM. Looking at empirical and theoretical literature, there still remains a large gap in understanding what constitutes effective and efficient IPPM. Further research is needed to deepen the understanding of IPPM as a whole and of specific methods and activities for managing innovation project portfolios in particular [17].

Definition and Components of IPPM Capabilities. Killen et al. [18] defined IPPM capabilities as an organizational capability including IPPM structures, IPPM processes and IPPM people which influence the effective implementation of IPPM processes. Figure 1 presents these three components.

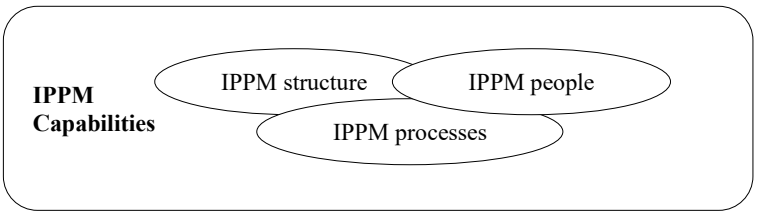

Figure 1 **– Three components of IPPM capabilities** (based on [18])

1. *IPPM Structures* includes organizational structure to support IPPM capabilities. IPPM structures involve the review board of project portfolios as well as the roles defined for IPPM. IPPM structure improves a holistic vision in the level of portfolio, responsibilities and accountability for IPPM [18].

2. *IPPM Processes* involves practices, experiences, procedures, methods and tools which are used by managers for continuously allocation and reallocation of resources among a portfolio of innovation projects in order to increase the level of participation in the ultimate success of organization. These processes are used for centralized coordination of projects within the portfolio [18].

3. *IPPM People* involves people and cultural aspects required to support IPPM capabilities. IPPM people refers to organizational culture, people skills, incentive systems of participators in IPPM, as well as the role of politics and management support for IPPM. In fact, this component involves activities which develop human resources of an organization

for the best support for PPM capabilities. Aside from structures and processes, people are responsible for IPPM capabilities and group decisions essential for IPPM capability [18].

The aim of this paper is to propose an effective Project Portfolio Management in the organization which can improve innovation decisions and outcomes of new products, thereby lead to higher competitive advantage. This Paper aims at discovering the causal relationship of Innovation Project Portfolio Management (IPPM) performance.

Basic material. *Research Design.* A qualitative research design was chosen to achieve the research goals of gaining a deeper understanding of IPPM in general and its practical implication through personal interviews [8]. Using a qualitative research design and following a grounded theory approach facilitates an interpretive approach, exploring and understanding the context of phenomena, identifying unanticipated phenomena and influences, and generating new "grounded" theories [9-11]. The openness and flexibility of qualitative approach allows for the modification of design and focus during the research and enhances the researcher's understanding of new discoveries and relationships [10]. Therefore, the chosen qualitative approach is useful to uncover the contextual dimensions of IPPM and to develop research ideas, questions, and propositions addressing the practical applications and implications of IPPM [16].

Data Collection. This paper investigates IPPM by means of 24 semi-structured and in-depth interviews in 5 Iranian organizations in the field of manufacturing and production of equipment in the power industry during 2014-2015. However, any organization is leading and successful in its industry in at least a 5-year period. Table 1 gives overview information on the companies' characteristics.

Table 1 **– Overview of Companies**

Company	Industry Specific Field	Types of Innovation Projects	Employee	Role of Interviewees
1	Turbines and related auxiliary equipments for power plants	Product,Services,Processes, Technology	>1,000	Engineering deputy, R&D manager, Technology Manager
2	Generators and related auxiliary equipments for power plants	Product,Services,Processes, Technology	>1,000	R&D manager, product development manager
3	Turbines blades for power plants	Product,Services,Processes, Technology	>500	R&D manager, product development manager
4	Electrical & Control Systems for power plants	Product,Services,Processes, Technology	>300	Product development deputy, Head of R&D management
5	Steam Boilers for power plants	Product,Services,Processes, Technology	>500	R&D manager, engineering deputy

The experts which participated in interviews included NPD and R&D project portfolio managers, R&D managers, business development managers, R&D project expeditor and product development managers. In addition to the publicly available documents as well as confidential documents, internal memos and process diagrams were analyzed and reviewed to understand the role of IPPM capability in overall organization.

The sampling method used for semi-structured and in-depth interviews was snowball sampling. Theoretical sampling was used for sampling adequacy. For the purpose of triangulating and to ensure the validity of the identified factors, the interviews were reviewed several times by the researcher and once by the independent expert.

We asked open questions as well as theory-driven questions that refer to the scientific literature [19]. The open questions accounted for the openness, flexibility, and iterative character of grounded theory methods. Thereby, we were able to also focus on emergent and unanticipated phenomena in our interviews and so build up a comprehensive framework of IPPM. This strategy for data collection helped to enhance the quality of the discussions and increased the efficiency of our interviews [19; 20]. Each interview took about 45-70 min. The interviews were audio taped and transcribed by a professional transcription service.

Data Analysis. Interview data's were analyzed with the help of ATLAS.ti software, using the grounded theory approach [21; 22]. Using the grounded theory framework, data were analyzed and represented in three steps: open coding, axial coding, selective coding, and the transferal of findings into a set of theoretical propositions [21]. Following the systematic comparative approach by Strauss and Corbin, the analysis was iterative. Knowledge from the literature was compared to findings from the interviews and, thereby, led to more specific theoretical explanations. After organizing the data and making initial notes, we used an open-coding process to identify concepts. The main issue during this coding process is to identify the main idea brought out in each sentence or paragraph. In the following step, codes are summarized into categories, grouping certain ideas and events [22]. Through this process, we identified certain central phenomena and engaged in the axial-coding process which was used to review and analyze the data in order to identify specific coding categories that explain central phenomena and identify causal conditions [21].

We focused on codes explaining high or low IPPM performance as well as high or low management support of IPPM and tried to gain a comprehensive understanding of how IPPM capabilities interrelate and affect certain performance factors. Interrelations between certain concepts were identified, analyzed, and compared to existing literature. Encompassing similar and conflicting literature builds validity, raises theoretical level, sharpens generalizability, and improves construct definitions [8].

We discussed the results during a workshop conducted with the majority of our interviewees. Thereby, we confirmed the correctness and practicability of our results, even though the summarized results did not necessarily reflect each single opinion. This process resulted in 23 core theoretical categories, forming the basis of our theoretical model (see Figure 2).

Findings. Our analysis of interviews and literature shows that so far IPPM performance is mostly seen as being dependent on the process in use. However, interviews revealed that other factors, such as structure in terms of its degree of formalization or transparency as well as the people including culture & skills can significantly affect IPPM performance. Furthermore, we find out that the acceptance of the methods by management might also depend on these factors and might be crucial in achieving IPPM's objectives. Even though there is hardly any empirical evidence of the linkage between IPPM, project, and firms' business performance in literature, our observations from the conducted interviews provide arguments for a strong relationship between these constructs. Companies strive for finding ways on how to further develop their IPPM capabilities and how to set up routines and processes. The study extends current empirical research (e.g., [1; 4; 6]) by identifying certain IPPM structure, process and people enhancing IPPM performance.

This is achieved by correlating the IPPM capabilities (Structure, People, Process) to certain performance indicators and by finding arguments for the linkage between IPPM performance and business and project performance. We highlight the importance of management support and commitment in the context of IPPM and provide first evidence for

its linkage to methods, processes, and project context as well as its impact on IPPM performance.

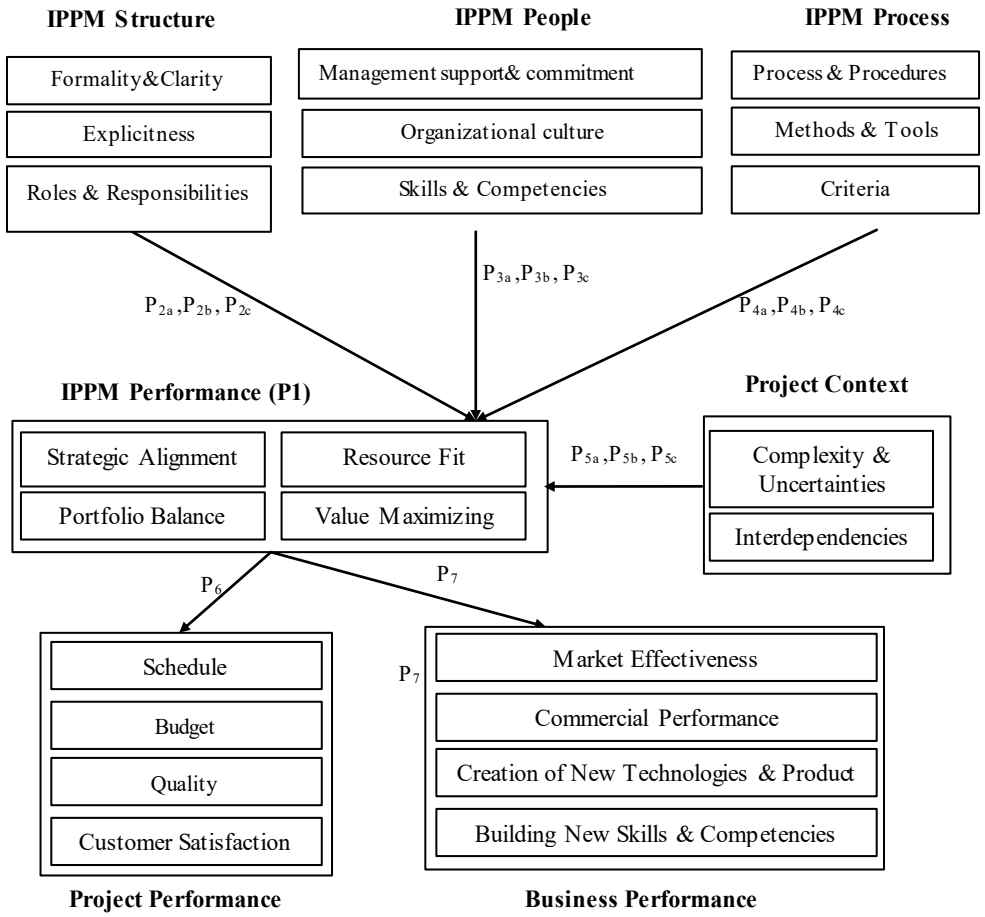

Figure 2 – **IPPM Model**

IPPM Performance. Representative for the majority of the interviewees, a Head of engineering and R&D deputy stresses the importance of IPPM for optimizing the innovation project portfolio and providing financial benefits to the firm stating: "We try to composing an optimal portfolio for the firm. Our objective is to guarantee that investments are effective for our business" (Company 2).

According to our observations, IPPM performance is measured by a majority of the companies. Interviews confirmed prior findings stating that IPPM performance has to be measured according to its main goals [23]. Our interviews revealed that strategic alignment of projects, balance, resource fit, and value maximization are the main goals of IPPM. Other goals mentioned were financial growth and efficiency. Financial growth and efficiency

can be defined as sub goals of value maximization as both aims at optimizing financial resources. This confirms earlier studies' findings that IPPM's goals are [14; 23; 24] 1) to maximize value in terms of long term profitability, the probability of success, and returns on investment; 2) to gain the right balance between high- and low-risk projects, incremental versus radical innovation projects, as well as short-term and long-term projects and ensuring that number and kind of projects fit with the organizational capacity; and 3) to align the innovation project portfolio with the firm's strategy. Thus we suggest the following proposition:

Proposition 1. IPPM Performance consists of Strategic Alignment, Portfolio Balance, Resource Fit and Value Maximizing.

Influence of IPPM Structure capabilities on IPPM Performance. Our interviews show that the IPPM structure is determined by the three factors: formality, explicitness, and roles & responsibilities. For a high performing IPPM, it is essential that the involved management understands the process and is aware of their role and responsibility in it. According to the majority of interviewees, a formalized structure facilitates achieving high IPPM performance as well as high management acceptance. A Head of Technology management states that "one has to formalize structure in order to implementing a PPM, which improves coordination" (Company 4). Referring to our interviews, it is necessary to formalize IPPM and to set up a framework of clearly communicated and well-known responsibilities. Project and innovation management literature reveals first evidence of the linkage between systematic and formalized decision making and IPPM performance [4; 25].

We argue that formality guarantees that all projects are treated in the same way and that this consistency increases quality of evaluation and selection and IPPM performance.

Furthermore, interviews revealed that the IPPM structure's transparency might play an important role in increasing the IPPM performance. Potential reasons for this relationship can be found in a statement by a Deputy of Innovation & research Management, stating: "Yes, I am sure that the quality of work and the motivation of employees are increased when it is known what is the roles and responsibilities of certain members in the projects and Portfolio" (Company 1). We argue that a transparent IPPM structure increases acceptance, since managers experience the process to be reproducible and traceable. Most interviewees consider making decisions transparent to and traceable for the whole company a main objective of IPPM. Thus, this paper implies the following propositions:

Proposition 2a. A high degree of "Formality & Clarity" positively influences the IPPM performance.

Proposition 2b. A high degree of "Explicitness" positively influences the IPPM performance.

Proposition 2c. The more transparency of "Roles & Responsibilities" positively influences the IPPM performance.

Influence of IPPM People capabilities on IPPM Performance. In answering the question on the characteristics of a well performing IPPM, a Head of R&D department states: "IPPM should be well known, accepted, lived, and understood by the company's top management. It should be communicated, lived, and applied. Every process is only as good as its real application" (Company 3). The construct "management support and commitment" developed by Cooper et al. [4] describes how IPPM methods are perceived by the management and whether the management accepts the IPPM routines in use.

Based on our findings from interviews, we argue that innovation and team working culture is directly influence on portfolio performance. Furthermore, skills and competencies

of employees plays significant role in improving the portfolio performance. So, the following propositions are stated:

Proposition 3a. A high degree of "Management Support & Commitment" is positively related to high IPPM performance measures.

Proposition 3b. A high degree of "Organizational Culture" is positively related to high IPPM performance measures.

Proposition 3c. A high degree of "Skills & Competencies" is positively related to high IPPM performance measures.

Influence of IPPM Process capabilities on IPPM Performance. In our interviews, we asked interviewees to indicate which methods they applied during the process of evaluating, selecting, and prioritizing innovation projects. We could confirm earlier observations stating that companies use more than two methods [4]. Many companies prefer the combination of team decisions and scoring models in IPPM, because these methods seem to perfectly combine qualitative (e.g., discussions, expert involvement, and experience) and quantitative (e.g., fixed set of known criteria and objectivity) elements of decision making.

Stressing the high importance of the IPPM methods in use, one of the interviewees states that "The acceptance of IPPM within the company is low due to insufficient methods being used". Comparing answers to method preferences and performance ratings shows that especially the usage of team decision making leads to a higher acceptance of IPPM methods and higher IPMM performance than, for example, the usage of check lists. We did not find significant differences between the methods used for project selection and prioritization.

For criteria used within these methods, we differentiate between strategy (and market)-oriented criteria, process-oriented criteria, and finance-oriented criteria [26]. The interviews confirmed the appropriateness of this differentiation. Most companies use a combination of criteria referring to all three categories. While the usage of strategic criteria for the selection of projects tends to be positively correlated with IPPM performance, financial criteria seem to be more appropriate for the prioritization of projects. Accordingly, we will differentiate between the criteria used for selection and criteria used for prioritization.

The observation that the usage of certain methods and criteria leads to specific performance outcomes confirms earlier observations revealing that portfolio performance depends on the methods and criteria used for project selection [4; 27]. Thus, we propose the following propositions:

Proposition 4a. A strong usage of "Process & Procedures" leads to higher IPPM performance.

Proposition 4b. A strong usage of proper "Methods & Tools" leads to higher IPPM performance.

Proposition 4c. A strong usage of proper & combined "Criteria" leads to higher IPPM performance.

Influence of Project Context on IPPM Performance. Our interviews revealed that project characteristics can significantly impact IPPM performance. Combining findings from the literature and observations from interviews, we identified two main characteristics (Complexity & Uncertainties and Interdependencies) that might significantly impact IPPM performance.

In answering the question on the characteristics of a well performing IPPM, a Head of R&D department states: "In our innovation projects, the uncertainties and unknown items especially in technical aspects are very high and we do not have much control about them. In this regard we must pay special attention about risk management in project and portfolio

level" (Company 4). Based on our findings from interviews, we argue that uncertainty and complexity of projects is directly influence on portfolio performance.

Our study additionally uncovers the importance of Interdependencies due to the multi project environment of IPPM. A Project Manager state: "There are nearly no single projects that do not depend on each other. That is what makes portfolio management so important in the end" (Company 5). Based on findings from the literature and conducted interviews, we argue that the interaction between projects within a portfolio can impact IPPM performance (e.g., [28]). Projects may exhibit resource interdependences and input/output interdependences, resulting in a substitution or complementation on the market side [28]. Eilat et al. [28] identify three types of interactions: resource interaction (projects share the same resources), benefit interaction (projects can be complementary or competitive), and outcome interaction (the probability of a given project's success depends on whether another project is undertaken).

We argue that resource dependences can impact a portfolio in terms of balance (e.g., "right number of projects for the resources available"). Outcome interactions might increase the risk in a portfolio as certain projects depend on other projects' success. Complementary projects might increase whereas competitive projects might decrease the value of a portfolio. In a first step, we suggest controlling for benefit and resource interactions as controlling for outcome interactions might require a longitudinal perspective. Thus, this paper implies the following propositions:

Proposition 5a. A high degree of "Complexity & Uncertainties" negatively influences the IPPM performance.

Proposition 5b. A high degree of "Interdependencies" negatively influences the IPPM performance.

Influence of IPPM Performance on Innovation Project Performance. Interviews reveal that IPPM performance can significantly impact single project performance. For example, one of the interviewees argues that "bringing together false projects in a portfolio negatively impacts individual projects" (Company 3). From literature, we know that not conducting IPPM can result in conducting too many projects for the limited resources, which can result in longer cycle times, poor quality projects, or underperforming new products [4]. The application IPPM can increase the success rate of innovation projects and help to avoid expensive failures. According to earlier studies, in efficient portfolios, projects are done on time [2, 4]. Interviewees stressed how important it is to evaluate ideas for innovation projects at an early stage in the process and, thereby, delete ideas that could have become expensive failures. The coordination of multiple projects and balancing the number of projects with available resources help firms to avoid time lags. Interviewees differentiate between a direct impact of innovation projects (e.g., time, budget and quality) and an indirect impact (e.g., customer satisfaction). There is a variety of works on how to measure (innovation) projects' success (e.g., [27]). The different perspectives mostly focus on dealing with customer or stakeholder satisfaction on the one hand and dealing with budget or time-related issues on the other. We define innovation project success in accordance with following Shenhar et al. [29] using four dimensions: budget and schedule, quality as well as customer satisfaction. According to the aforementioned arguments, this paper implies the following proposition:

Proposition 6. IPPM performance correlates positively with "innovation project success" consisting of Schedule, Budget, Quality and Customer Satisfaction.

Influence of IPPM Performance on Business Performance. Interviewees highlighted the importance of IPPM for the company's overall performance. One manager argues that every advancement leading to a more efficient and goal-oriented selection can lead to direct success. This confirms findings from literature stating that IPPM "is increasingly regarded as a potentially important driver of a firm's innovation performance and it constitutes an important dimension of a firm's technology planning activities" [17]. According to current literature, IPPM aims to allocate available resources to maximize the firm's profit and Killen et al. [14] argue that the "effective management of the innovation project portfolio is increasingly important to organizational survival" [14]. According to Kerka et al. [30] executives "are increasingly estimating the effectiveness and efficiency in the R&D portfolio management as a strategic competitive advantage" [30]. The right balance within a portfolio enables a firm to realize its profit and growth objectives without facing high risk and that the right composition of projects is critical for a firm's competitive advantage [31].

Interviewees stated that they would measure company performance according to qualitative and quantitative criteria. Literature provides a variety of measures for company performance, using a qualitative (e.g., competitive position) as well as a quantitative (e.g., financial ratios) perspective [2; 14; 30-32]. According to the aforementioned arguments, we state the following proposition:

Proposition 7. IPPM performance correlates positively to "Business performance" consisting of Market Effectiveness, Commercial Performance, Creation of New Technologies & Product and Building New Skills & Competencies.

Conclusions. *Contribution.* Based on our qualitative analysis, we derived a variety of propositions, building a potential foundation for further research on IPPM. We were able to identify the three components of IPPM capabilities (i.e., People, Process and Structure) as key performance drivers of IPPM. Furthermore, these causal relationships are moderated by project context.

Designing IPPM methods and processes that will lead to higher IPPM performance is an ability companies need to possess in order to increase innovation outputs and achieve competitive advantages [33]. Furthermore, we learned about the IPPM's importance as an ability or process to allocate resources to the most beneficial projects in a multi project environment. Also, we find out that IPPM can be understood as the capability to acquire and control resources in order to set up an organization that can absorb and apply these resources to achieve competitive advantage [34]. We showed that IPPM structure and selection of IPPM methods impact IPPM performance and the ability to achieve high firm and project performance. Our paper contributes to theoretically positioning IPPM and provides new insights into the dynamic capabilities approach.

The qualitative research design was appropriate for gaining an in-depth understanding how the IPPM capabilities and project context, and certain performance constructs are linked to each other. Our interviews revealed the importance of integrating model consist of the IPPM capabilities and project context.

Limitations. This study provides propositions aiming at enriching the current understanding of IPPM and developing a framework for further research. Although the richness arising from qualitative research design and the appropriateness of an inductive approach for our purposes is key strengths of this study, the results are limited due to the research design in terms of its representativeness, unavoidably retrospective nature, and potential informant biases.

To minimize potential informant biases, we conducted two or three interviews in most of the companies. While our findings may be partial and biased, they still constitute the interviewees' reality in the firms and constitute the basis for their future action. We provide a broad picture by conducting 24 interviews in 5 companies from different Iran's power industry sectors and provide a framework for future studies to build on. We sought to make our analysis and judgments as transparent as possible in order to validate the findings. The IPPM model can be used for future studies investigating the linkages between IPPM performance and methods, process, and project elements as independent and firm and project performance as dependent variables, as well as for deepening the understanding of IPPM's role as a dynamic capability.

Future research. In conclusion, this study contributes new insights to the emerging research on IPPM. While most IPPM literature is still a theoretical, our paper develops IPPM in the context of the Iran's power industry. This study reveals potential relationships between identified independent and dependent constructs aiming to sophistically extend the current knowledge of IPPM. Consequently, our paper provides a framework for future empirical research in other industries in developing countries, which will potentially have significant implications for academia and managerial practice.

1. Kester, L., Griffin, A., Hultink, E.J., & Lauche, K. (2011). Exploring portfolio decision-making processes. *J Prod Innov Manage. 28*, 641-661 [in English].

2. Cooper, R.G., Edgett, S.J., & Kleinschmidt, E.J. (2001). Portfolio management for new product development: Results of an industry practices study. *R&D Manage, 31(4)*, 361-380 [in English].

3. Hunt, R.A., & Killen, C.P. (2008). Best practice project portfolio management. *Int J Qual Reliab Manage, 25(1)*, 1-6 [in English].

4. Cooper, R.G. (1999). Edgett S J, Kleinschmidt E J. New product portfolio management: Practices and performance, *J Prod Innov Manage, 16,* 333-351 [in English].

5. Killen, C.P., & Hunt, R.A. (2007). Kleinschmidt E J. Managing the new product development project portfolio: A review of the literature and empirical evidence. *In: Proc Portland Int Center Manage Eng Technol,* 1864-1874 [in English].

6. Kester, L., Griffin, A., & Hultink, E.J. (2011). *An empirical test of the antecedents and consequences of portfolio decision-making effectiveness.* 18th Int Prod Develop Manage Conf; Delft, The Netherlands [in English].

7. Kester, L., & Hultink, E.J. (2009). Lauche K. Portfolio decision-making genres: A case study. *J Eng Technol Manage, 26(4),* 327-341 [in English].

8. Eisenhardt, K.M. (1989). Building theories from case study research. *Acad Manage Rev, 14(4),* 532-550 [in English].

9. Glaser, B.G. (2010). The future of grounded theory. *Grounded Theory Rev, 9(2),* 1-14 [in English].

10. Maxwell, J.A. (2005). *Qualitative Research Design:* An Interactive Approach. 2nd ed. Thousand Oaks, CA: SAGE [in English].

11. Holloway, I. (1997). *Basic Concepts for Qualitative Research*. Oxford, UK: Blackwell [in English].

12. Galloppo, G. (2010). A comparison of pre and post modern portfolio theory using resembling. *Global J Bus Res, 4(1)*, 1-17 [in English].

13. Markowitz, H. (1952). Portfolio selection. *J Finance, 7(1)*, 77-91 [in English].

14. Killen, C.P., Hunt, R.A., & Kleinschmidt, E.J. (2006). *Benchmarking innovation portfolio management practices*: Methods and outcomes. In: Proc Int Conf Manage Technol, 1-10 [in English].

15. Barczak, G., Griffin, A., & Kenneth, B.K. (2009). Perspective: Trends and drivers of success in NPD practices: Results of the 2003 PDMA best practices study. *J Prod Innov Manage, 26*, 3-23 [in English].

16. Miguel, P.C. (2008). Portfolio management and new product development implementation: A case study in a manufacturing firm. *Int J Qual Reliab Manage, 25(1)*,10-23 [in English].

17. Ernst, H., & Lichtenthaler, U. (2009). Innovation portfolio management: An understudied driver of innovation success? *Int J Technol Intell Planning, 5(2)*, 111-117 [in English].

18. Killen, C.P., Hunt, R.A., & Kleinschmidt, E.J. (2008). Learning investments and organizational capabilities: Case studies on the development of project portfolio management capabilities. *Int J Manage Proj in Buss. 1(3)*, 334-351[in English].

19. Flick, U. (2009). *An Introduction to Qualitative Research*. 4th ed. Los Angeles, CA: SAGE [in English].

20. Merton, R.K., Kendall, P.L. (2007). The focused interview. *Amer J Sociol, 1946*; 51(6), 541-557 [in English].

21. Creswell, J.W. (2007). *Qualitative Inquiry & Research Design*: Choosing Among Five Approaches. 2nd ed. Thousand Oaks, CA: SAGE [in English].

22. Strauss, A.L, & Corbin, J.M. (1998). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 2nd ed. Thousand Oaks, CA: SAGE [in English].

23. Coulon, M., Ernst, H., Lichtenthaler, U., & Vollmoeller, J. (2009). An overview of tools for managing the corporate innovation portfolio. *Int J Technol Intell Planning, 5(2)*, 221-239 [in English].

24. Cooper, R.G., Edgett, S.J., & Kleinschmidt, E. J. (1997). Portfolio management in new product development: Lessons from the leaders. *I. Res Technol Manage. 40(5),* 16-28 [in English].

25. Martinsuo, M., & Lehtonen, P. (2007). Role of single-project management in achieving portfolio management efficiency. *Int J Project Manage, 25(1),* 56-65 [in English].

26. Roussel, P.A., Saad, K.N., & Erickson, T.J. (1991). *Third Generation R & D: Managing the Link to Corporate Strategy.* Boston, MA: Harvard Business Review Press [in English].

27. Muller, R., Martinsuo, M., & Blomquist, T. (2008). Project portfolio control and management performance in contexts. *Project Manage J., 39,* 28-42 [in English].

28. Eilat, H., Golany, B., & Shtub, A. (2006). Constructing and evaluating balanced portfolios of R&D projects with interactions: A DEA based methodology. *Eur J Oper Res. 172(3)*, 1018-1039 [in English].

29. Shenhar, A. J., Tishler, A., Dvir, D., Lipovetsky, S., & Lechler, T. (2002). Refining the search for project success factors: A multivariate, typological approach. *R&D Manage, 32(2*), 111-126 [in English].

30. Kerka, F., Kriegesmann, B., & Schwering, M.G. (2009). Evaluating innovation ideas: A comprehensive approach to new product development. *Int J Technol Intell Planning, 5(2)*, 118-136 [in English].

31. Mikkola, J.H. (2001). Portfolio management of R&D projects: Implications for innovation management. *Technovation, 21*, 423-435 [in English].

32. Vorhies, D.W., & Morgan, N.A. (2005). Benchmarking marketing capabilities for sustainable competitive advantage. *J Marketing. 69(1),* 80-94 [in English].

33. Ellonen, H.K., Wikstrom, P., & Jantunen A. (2009). Linking dynamic capability portfolios and innovation outcomes. *Technovation. 29,* 753-762 [in English].

34. Kraaijenbrink, J., Spender, J.C., & Groen, A.J. (2010). The resource-based view: A review and assessment of its critiques. *J Manage. 36(1),* 349-372 [in English].

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Розроблення моделі управління портфелем інноваційних проектів з використанням теорії обґрунтування на прикладі галузі енергетики Ірану

Метою дослідження є виявлення причинно-наслідкових зв'язків продуктивності управління портфелем інноваційних проектів (УПІП). Зроблено висновок про те, що продуктивність залежить від інтегрованих елементів стратегічного вирівнювання, портфельних балансів, відповідності ресурсів і максимізації вартості. Для дослідження було обрано якісний аналіз з використанням напівструктурованих і поглиблених інтерв'ю з 24 експертами з п'яти іранських організацій, які виробляють обладнання для енергетики. Згідно якісних даних, ефективне УПІП організації є результатом функціонування трьох структурних елементів: процесу УПІП, структури УПІП і людей УПІП. Ці причинно-наслідкові зв'язки модеруються в контексті проекту. Розроблено низку пропозицій щодо підвищення продуктивності УПІП.

Ключові слова: управління портфелем проектів, потенціал, інноваційні проекти, портфель інноваційних проектів, зміст проекту.

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Разработка модели управления портфелем инновационных проектов с использованием теории обоснования на примере отрасли энергетики Ирана

Целью исследования является определение причинно-следственных связей продуктивности управления портфелем инновационных проекто (УПИП). Сделан вывод о том, что продуктивность зависит от интегрированных элементов стратегического выравнивания, портфельных балансов, соответствия ресурсов и максимизации стоимости. Для исследования был выбран качественный анализ с использованием полуструктурированных и глубинных интервью с 24 экспертами из пяти иранских организаций, которые производят оборудование для энергетики. Согласно качественным данным, эффективное УПИП организации является результатом функционирования трех структурных элементов: процесса УПИП, структуры УПИП и людей УПИП. Эти причинно-следственные связи модерируются в контексте проекта. Разработаны предложения касаемо повышения продуктивности УПИП.

Ключевые слова: управление портфелем проектов, потенциал, инновационные проекты, портфель инновационных проектов, суть проекта.

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