

Innoframe: a project and portfolio management multilayer framework to support innovation-driven SMEs

Tereso, A.P.¹⁾ and Mishly, M.A.²⁾

¹⁾ Production and Systems Department/Centre ALGORITMI, University of Minho, Campus of Azurém, 4804-533, Guimarães, Portugal

²⁾ Doctoral Program in Industrial and Systems Engineering, University of Minho, Campus of Azurém, 4804-533, Guimarães, Portugal /

SchemaZone, 18 Yonge Street, Toronto, Ontario, M5E 1Z8, Canada

STRUCTURED ABSTRACT

Purpose – The purpose of this research was to discover what frameworks for project, portfolio, and innovation management there are and if necessary to propose a new framework useful for SMEs of the construction and building materials industry.

Design/methodology/approach – The methodology used in this research was the case study, in which the Canadian construction and building materials industry was selected. The research was based on literature review, interviews, group discussion and survey.

Findings – Although there are currently many frameworks available for the three management areas (project, portfolio and innovation), research has shown that a framework that helps companies to follow an approach that supports their business at these three levels is lacking.

Originality/value – Innoframe is a new framework for project, portfolio, and innovation management that incorporates a pipeline and two phases as well as a performance management matrix, that can be used for project and portfolio management, to support innovation-driven SMEs.

Keywords: Project management, Portfolio management, Innovation, Framework.

Paper type: Research paper

INTRODUCTION

Currently, project, portfolio and innovation management are widely used terms to discuss companies' success and failure. Project management is the narrowest of the three. For a company to succeed, it must have a vision through defining its long-term goals and setting projects that meet it. Portfolio management is broader, looking at the interactions and combined importance of projects undertaken by an organization so that the development of these portfolios matches the goals and constraints of the company (Dutta, 2019). Portfolios can be made within a single firm or they can be alliance portfolios, or inter-organizational alliances which provide a wealth of capabilities and resources to be drawn from (Vasudeva, 2010). Firms that visualize their portfolios in the context of their entire industry and external environment, are more likely to develop high portfolios that increase the firm's value to any potential industry partners (Ozcan and Eisenhardt, 2009). Finally, innovation management is the broadest and used to foster productivity. Innovation facilitates success in SMEs and fosters sustainable competitive advantage if new innovations are capitalized on (Broersma, Van Gils and De Grip, 2016). A good strategy lies in the integration between projects within a certain portfolio through an innovation-support model. So this paper presents a multilayer framework to support innovation-driven SMEs in their project and portfolio management practices, developed during a PhD project based on the case of the industry of construction and building materials of Canada (Mishly, 2019), giving the answer to the following research question: How can an integration among project, portfolio and innovation management create a multidimensional framework to support SMEs for better end results on the three levels?

After this introduction, a literature review is presented introducing the basic concepts discussed and some frameworks available for project portfolio management and innovation management. The following section presents the main aspects of the research methodology adopted. Then the results of the data collection are presented followed by the framework development. The final section presents some conclusions and suggestions for future research.

LITERATURE REVIEW

Project management is the act of applying knowledge, skills, tools and various techniques to project activities to ensure that they meet project requirements (PMI, 2017). Portfolio management focuses on doing the right projects at the right time by selecting and managing projects as a portfolio of investments (Oltmann, 2008). It is used to organize the projects a company is looking to implement, to prioritize them, and to maintain them so that the group of projects undertaken aligns with the organizational strategy. Portfolios are important because they provide aggregate properties, such as increasing diversity, that affect performance, and because they drive network evolution through

constant adjustments to satisfy overall strategy (Ozcan and Eisenhardt, 2009). The third integrated concept of interest is innovation management which is the management of technological or broad-scope innovations which can supplement project and portfolio management (McAdam *et al.*, 2007).

There are frameworks for project portfolio management: Portfolio management and enterprise management framework (Georgia Tech Strategic Consulting, 2018); Agile portfolio management framework (Portman, 2016); Project portfolio management framework (Aleksandrova-Boshnakova, 2018); PortfolioStep Portfolio Management Framework (TenStep Inc., 2007); Innovation portfolio management process (Williams, 2011); IT Portfolio Management Framework (PWC, 2018), among others (Mishly and Tereso, 2016; Mishly, 2019). And frameworks for innovation management: Channelvation innovation framework (Dancer, 2017); Business model innovation framework (Frankenberger *et al.*, 2013); Stage-gate innovation diamond framework (Shenhar and Dvir, 2007); Decision driven innovation framework (Decision Driven, 2008); Frost innovation framework (GasLabs, 2017); EFQM Innovation Lens (CenterCompet, 2020), among others (Mishly, 2019) (see Table 1 for comparative insights into existing frameworks). Although these frameworks are unable to combine key approaches to project, portfolio and innovation management being both structured enough to provide a useful process and flexible enough for any type of SME. Some are too vague, like general models, which are fine as guidance, but without expertise in the area will not be useful. Some are too specific, turning them too rigid, reducing its applicability. And there are missing pieces, not taking into consideration some key factors. So a gap has been revealed leading to further research (Mishly, 2019).

Table 1 – Comparative insights into existing frameworks.

Project Portfolio frameworks	Innovation management frameworks
Portfolio management and enterprise management framework (specific applicability) (cross-over with project management) (Georgia Tech Strategic Consulting, 2018)	Channelvation innovation framework (Broadly applicable) (Dancer, 2017)
Agile portfolio management framework (broadly applicable) (Portman, 2016)	Business model innovation (Broadly applicable) (Frankenberger <i>et al.</i> , 2013)
Project portfolio management framework (broadly applicable) (some cross-over with project management) (Aleksandrova-Boshnakova, 2018)	Stage-gate innovation diamond framework (specific applicability) (Shenhar and Dvir, 2007)
PortfolioStep Portfolio Management Framework (broadly applicable) (TenStep Inc., 2007)	Decision driven innovation framework (specific applicability) (Decision Driven, 2008)
Innovation portfolio management process (broadly applicable) (cross-over with innovation management) (Williams, 2011)	Frost innovation framework (broadly applicable) (GasLabs, 2017)
IT Portfolio Management Framework (specific applicability) (PWC, 2018)	EFQM Innovation Lens (broadly applicable) (CenterCompet, 2020)

RESEARCH METHODOLOGY

The methodology used in this research was case study where the case selected was the case of the industry of construction and building materials of Canada. The target group was made up of seven SMEs which work in this area, with a focus on suppliers (see the field and location of the companies selected in table 2).

Table 2 – Field and location of the companies selected.

Company	Field	Location
1	Metals fabrication and installation	North York, Ontario (Canada)
2	Construction and building materials preparation	Ottawa, Ontario (Canada)
3	Construction and renovation	North York, Ontario (Canada)
4	Construction	Toronto, Ontario, (Canada)
5	Construction and renovations	Mississauga, Ontario (Canada)
6	Paintings / Preparation and installation	Mississauga, Ontario (Canada)
7	Construction	Toronto, Ontario (Canada)

As the research is targeted towards project, portfolio and innovation management, the selected organizations were contacted, and interviews were arranged with a project manager in the company. It was important to ensure that the chosen companies had enough projects and at least one project manager in charge of these projects. A minimum of six projects per organization was a prerequisite to ensure that every company, and the project managers, had sufficient experience (see companies profile in table 3).

Table 3 – Companies profiles.

Company	Profile
1	A small-sized company with a team ranging between ten and twenty personnel working to offer the Canadian market top metal-related projects. Their projects encompass fabrication, designing, installation and other kinds of work.
2	A small-sized renovation and contracting company located in Ottawa and running projects in all of Ontario including greater Toronto area. A team of 10 people led by an experienced man work in two main domains, making some building materials and running renovation projects.
3	A medium sized organization that is part of a widespread chain having around 5 branches in Canada. The engineering department is quite busy running several constructions, renovations and other projects. They have a special team of over 30 technical, manager and other personnel working in this area.
4	A medium-sized construction company that brings together twenty plus years of construction experience. A privately owned and operated company that prides itself on an unshakeable reputation in the industry as reliable, dependable and honest. It has multiple small, medium and big projects all over greater Toronto area.
5	A recognized leader in the industry. It provides general contracting, design build, construction management and preconstruction services to all sectors of the business world.

Company	Profile
6	Construction and renovation company specializing in the painting line with strong capabilities to handle big and complexed projects within Ontario province. More than 6 years of services in this domain have enabled this company to enter joint venture projects with huge construction companies in the market.
7	A construction focus company with broad portfolio of projects and contracting modes including general contracting, design-build, bid-build, and public-private ventures.

Given the time constraint of the project, it was difficult to contact and interview a large number of companies and so it was crucial to choose sample organizations with care. A geographic limit on the location of the companies' physical office(s) and their operations was set. Although companies who provide services throughout Canada or even internationally could be contacted, but they should have an office in Ontario (Canada). A clause was included to consider companies with offices located more specifically in the GTA (Greater Toronto Area), Ontario.

In order to identify an appropriate sample size, the target was first set, and its components classified. Once again, the research aimed to identify how to improve SMEs in the Canadian building materials industry by integrating innovative project portfolio management. Therefore, it was important to first understand the challenges that SMEs in this sector face. To get an in depth understanding of these challenges, it was important to get a rich amount of information during the research. Obtaining the depth of information necessary for this type of qualitative research requires a higher investment of time and cost, meaning that the sample size had to be smaller to ensure that the research was not overwhelming and was completed on time and on budget.

Qualitative sampling was chosen as it seemed the most appropriate method for improving the quality of management integration in SMEs. Recently, it has been recognized that basic quantitative indicators of business performance and measures of client satisfaction fail to generate sufficient insights into client needs or the effectiveness of client support (Sparrow, 1999). There is a need to get closer to the world of business owner-managers to identify how they see situations and how they might best be facilitated to develop their practices (Sparrow, 1999). We need to develop to a more sophisticated sampling process which will help in minimizing the risks facing those enterprises. While using qualitative analysis, there's an in-depth review and detailed observation for questions to understand the gap between different managements and the effect of adding innovation management to their frameworks, thus building a final comprehensive analysis. Through qualitative business research, a critical and reflexive view of the business world and its processes can be formed. It also helped to understand the acute risks accurately and structure them within a new framework.

After selecting the companies, the chosen methods to collect data were interviews, surveys/questionnaires, group discussions and observation. Table 4 presents some insights into the chosen methods.

Table 4 – Insights into the chosen methods.

Method	Importance
Interviews	Allowed researchers to ask in-depth questions to individuals without worry of anyone else influencing the response. Non-verbal cues also helped to further the information gleaned from the participants. High response rates to questions meaning a complete data-set was more likely to be achieved.
Surveys/Questionnaires	Questions can be targeted and structured so that only the pertinent information is gathered from the participants. Participants have time to think about the answers they give to researchers and often genuine feedback is common since identity is rarely necessary.
Group Discussions	Cultural and environmental insights on the workplace can be gained through viewing the interactions between the group of individuals. They are helpful for gathering information on complex issues through open discussion among the participants. Non-verbal cues can also help to increase the amount of knowledge gleaned from the interactions.
Observation	In-depth information could be collected through the viewing interactions as they would occur normally in a day-to-day setting. Easy to focus on the relevant parameters to the study. Behavioral and non-verbal cues add to the value of the study.

The interviews were done to a project manager or similar in each of the selected seven organizations. There were structured interviews with a set of 13 questions. These questions and a sample of the answers given will be presented in the next section.

In group discussion, the following topics were discussed:

1. The impact of the three concepts, project, portfolio and innovation management on the tasks of the audience;
2. The opinion of each member of the audience about the current frameworks being used nowadays;
3. The characteristics of an ideal useful framework, according to the opinions of each member of the audience.

This group discussion was made with three members of company 3, the ones that showed more interest in participating further.

A survey questionnaire was applied to several members of the selected companies by facilitators. This survey was conducted on 80 participants. The participants were managers and team members

in the field of construction and building materials. Five statements were made and the participants could agree, be neutral or disagree. Results from the survey will be presented in the next section.

Finally, observation took place in an ongoing working situation. Over a period of some days the team member's actions, discussions, communications, and decisions that pertains to a certain phase of the project were observed in their working area. The purpose of this observation was to collect data about how team members of a business field deal with a real project in a real setting. Also, this observation allowed to know how the team members and managers interact together during the meeting. The observation provides useful information about the steps that occur in the planning phase and the execution phase in authentic situations.

RESULTS OF THE DATA COLLECTION

In this study, primary data collected inferred significant issues that are worth discussing related to the concepts of project management, portfolio management, and innovation management. The discussion covered three main areas:

1. The impact of project, portfolio and innovation management on the tasks of the participants;
2. The opinion of each participant about the current frameworks in use;
3. The characteristics of an ideal framework, according to the opinions of participants.

All the data collected during the interviews was transcribed and can be seen in Mishly (2019). Due to size restrictions, in this paper only the questions and a summary answer for each is presented below. The main focus was to summarize the practical needs of the interviewees which they didn't find in other models.

1. Question (Q): Taking into account the three main concepts that are the core of this research: project management, portfolio management and innovation management; what does each of them mean to you in terms of business processes?

Answer (A): Those three concepts are meant to organize and streamline the processes in any business. Innovation management is essential to the company's success, without innovation companies cannot compete in the market. Portfolio management is more treated on a scale higher than project management, it is more to help assess the priorities of the projects and what projects make more sense for us. Project management goes more into streamlining the processes of achieving something, what is step A, B and C and who is in charge of each one.

2. Q: How can you generally relate each of them to your company's objective, your tasks within the company, and your industry (construction and building materials) in general?

A: The nature of the industry pushes us to offer the best and to be innovative as much as we can. Portfolio management has more to do with the company's mid and long-term objectives. The chosen portfolio has to be in line with the business objectives or else the portfolio will be rejected from the management. Project management practices used depend on the type of project.

3. Q: Do you see these three concepts as interrelated concepts that need to be handled together sometimes or as separate entities that should be treated each alone?

A: Portfolio and project management have many things in common. And innovation should fall into both of them. In our company we emphasize the coherency among the personnel who are looking after each of these areas.

4. Q: From your point of view as a project manager in the construction and building materials industry, what makes each of these concepts important?

A: Innovation management to increase competitive advantage; portfolio management to optimize resources; project management to ensure effective management for projects.

5. Q: Let us assume that the three concepts are put on one scale, how would you rank them in terms of importance for your job?

A: From a project manager point of view I would rank project management in the first place, innovation management in the second place, and the last is portfolio management.

6. Q: What is your opinion on using business frameworks in general and would you recommend using it?

A: Frameworks are considered important to businesses since they serve as defined guidelines to achieving certain process, goal, or situation.

7. Q: Does abiding to a framework facilitate or complicate the process in your opinion?

A: It depends on the framework but a good framework should facilitate, smoothen, and accelerate the approach of any operation.

8. Q: Do frameworks have more impact on organizing teams and raising their performances, or on the final outcomes and sales of the company?

A: The team deals with the framework directly, so the impact should be direct. And if the performance of the team is impacted definitely, it will affect the final business outcomes.

9. Q: Do you currently use a specific framework with your team?

A: We have built our own approach but are open to improvements.

10. Q: Does your management recommend using frameworks to enhance your operations and processes? Or they are only concerned about end results?

A: If you mean by management the top management or the executive level, they don't involve too much into the tools and processes that we use.

11. Q: In your opinion, why do some companies avoid using frameworks in the context of project, portfolio and innovation management?

A: Some are unidimensional and some are too complex.

12. Q: How does an ideal framework look like in terms of your tasks as a manager, your team's performance, and your company's business objectives?

A: One roadmap that can help us manage our projects while ensuring innovation and meeting our portfolio strategy.

13. Q: Briefly and in one sentence if possible, in what sense would such a framework help you and your company?

A: Performance perhaps. It helps in lifting our key performance indicators on all levels.

The data collected during the group discussion can be summarized in the following five points:

1. An ideal useful framework should integrate the three concepts, portfolio, innovation and project management;
2. It should allow communication and collaboration among different teams in the company;
3. An ideal framework is more like a roadmap that keeps every single step aligned with the portfolio guidelines, which were defined in the plan;
4. It should provide a clear approach, in order to enhance the ways of measuring success;
5. Finally, there should be some sort of universality in a sense that it can be used in different contexts.

As for the surveys, the results can be seen in table 5.

Table 5 – Survey responses.

Statement	Agree	Neutral	Disagree
In terms of the business process: project, portfolio, and innovation management are interrelated concepts.	81%	14%	5%
Using business frameworks is important for making the operations and processes more efficient.	94%	5%	1%
Business frameworks impact the performance of the teams who are using it more than impacting the final outcomes of the business.	79%	5%	% 16

Statement	Agree	Neutral	Disagree
Many companies avoid using frameworks because they believe it consumes time and effort more than when avoiding it.	65%	9%	26%
A new framework that supports integration, flexibility, and universality would be a good option for companies who currently avoid using frameworks.	94%	2%	4%

The observation showed that the authoritarian style of management in certain companies decreases communication between the upper management and the working teams. This results in a more obedience style of the working team instead of an innovative style, and more time is wasted in trying to solve urgent problems due to reduced organization and the absence of a defined, clear and flexible framework.

The data collected allowed to identify the characteristics of an ideal framework, that can be summarized into 5 main points:

1. It should integrate the three concepts, portfolio, innovation and project management;
2. It should allow communication and collaboration among different teams in the company;
3. It should be setup like a roadmap that keeps every step aligned with the portfolio guidelines, which were defined in the plan;
4. It should provide a clear approach, in order to enhance the ways of measuring success;
5. And, there should be universality in the sense that it can be used in different contexts.

FRAMEWORK DEVELOPMENT

This section highlights the roadmap for designing the framework proposed, Innoframe, revealing the concepts and meanings behind the parts that will make up this framework. It has been taken into consideration that the framework shall be useful for companies with different sizes and in different industries. Yet it is important to mention that this framework was created to best fit small and medium sized businesses. It is also beneficial to reemphasize that this specific research and any similar studies are not only designed to solve a problem, but to shape, map out, and clarify the methods, approaches, models, and frameworks used, so that the whole industry can use it to solve similar problems.

Innoframe was developed with the purpose of guiding companies through three areas: project management, portfolio management and innovation management. The framework can be used as a tool that helps that these firms manage their projects in line with their portfolio strategy, while maintaining a high level of innovation.

The framework development process first took into account who the framework was being developed for, in this case SMEs in the construction and building materials industry. Then a pipeline, or an outline of the project path, was developed. Theoretical foundation of the framework was considered. This was especially important given the multidimensionality of the proposed framework. Value prerequisites were identified, and ideas on how the performance would be managed were discussed as well.

First, the foundation of the framework needed to be identified. Given the information gathered throughout the research, it was clear that the framework needed to be agile and adaptable. Innoframe however provides flexibility and teamwork due to the fact that it contains open statements that require intensive contribution of the teams. Innoframe was designed to allow for the alteration or modification of the statements without necessarily having to alter the scoring model, thus it was built considering the agile manifesto and to embrace the ever-changing business world. It was also designed to ensure that all stakeholders are engaged and in full support of the project given the overwhelming research supporting stakeholder engagement.

Creativity and innovation are also key facets of the Innoframe framework. This is due to the research supporting the importance of these elements to projects, project management, and frameworks. As well, conceptualization of a project is key. To satisfy this, Innoframe relies on a numerical scoring system so that the framework is more tangible than many frameworks used today. Of the two levels of project implementation, those being operational and strategic, the majority of frameworks are specific in the sense that they can only be used at one level or another – not both.

Now, the components of Innoframe shall be presented.

The first part of the framework is the pipeline. This can be seen below in figure 1. It shows several entrances to visualize the reality that project plan ideas come from several departments and get escalated to management for final discussion and approval. The plan is prepared by the assigned project manager, yet it needs to be reviewed and approved. And this explains why the pipeline has only one exit, meaning that the management will receive the suggested plans from several teams or departments, and they will have all to be reviewed and approved by top management before moving into the application phase. The main importance of using the pipeline is the concept of streamlining the projects through one defined route.

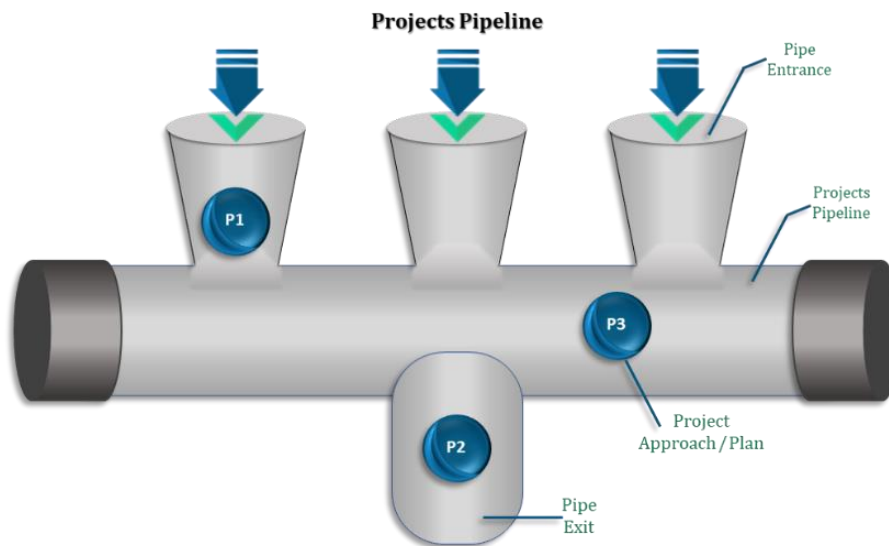


Figure 1 – Innoframe – The Pipeline.

Innoframe’s project pipeline contains two essential elements. The project entrance and project exit. The project entrance is the first point at which the firm interacts with the project. This may be the person that initiates the project, or the project manager that is assigned to the project. The pipeline exit, on the other hand, represents the beginning of another project phase. The exit symbolizes that the project has moved through its initial phase and that all the requisite departments and individuals have evaluated the plan. In order to efficiently balance Innoframe’s project pipeline, project managers will be required to thoroughly evaluate their resources to identify the firm’s capability to handle projects and, by extension, the pipeline’s capability. In doing so, they will also identify any limitations for the project which can be beneficial.

The first phase in Innoframe is the project management phase, seen below in figure 2. This is the main phase in the business framework. It uses a Likert Scale (5-point) or a numerical scoring scale, with the following interpretation: “SA: Strongly Agree” or 5, “A: Agree” or 4, “N: Neutral” or 3, “D: Disagree” or 2 and, “SD: Strongly Disagree” or 1.

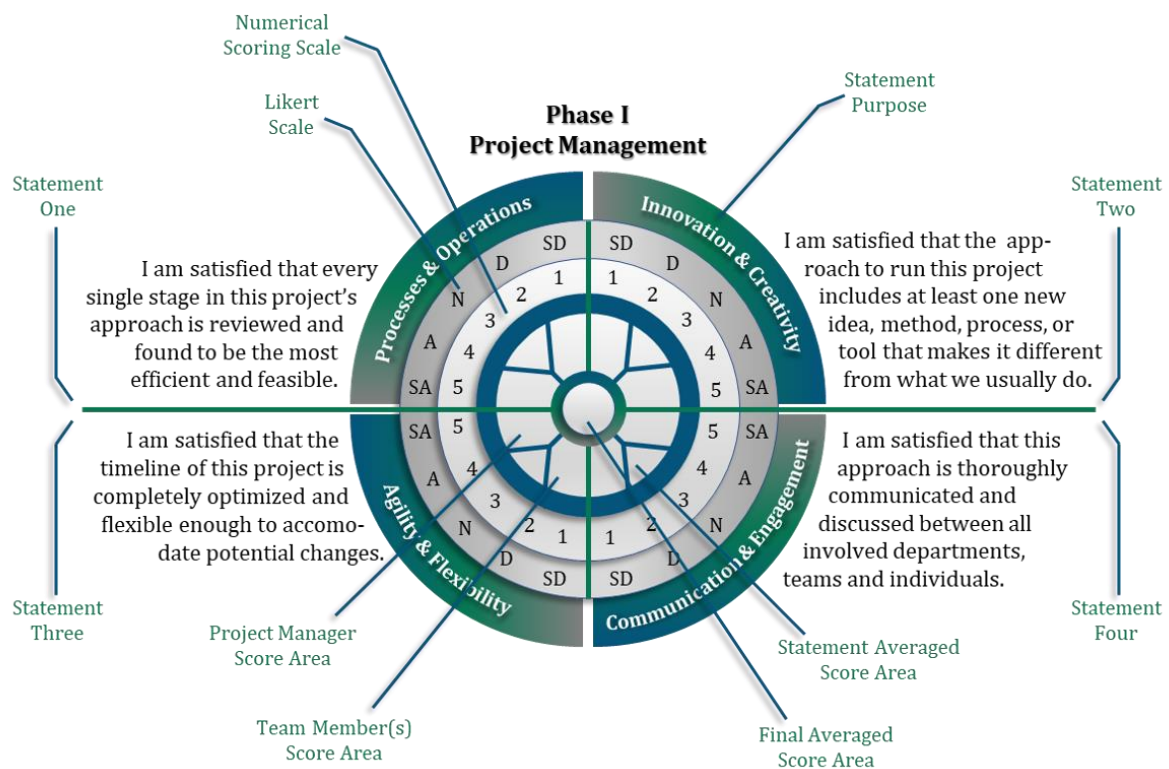


Figure 2 – Innoframe – Phase I.

Phase I works to ensure that four key concepts of project management are integrated and maintained. The four concepts are: Processes & Operations, Innovations & Creativity, Agility & Flexibility, and Communications & Engagement. Each of these serves a specific purpose that goes beyond integrating the project management concept into the project, to evaluating how well the strategy is integrated. The statements also serve to provoke discussions, centered on the concept, between the project manager and his team and within the team. This is important to ensure the entire team is on the same page with regards to what is required and the direction that the project is headed in. They also enable team members to have a voice throughout the project. Meetings between project managers and top management, as well as interdepartmental meetings are also important. These facilitate strategic alignment, and smoother transitions for projects when firms change direction.

Phase I has a number of conceptual statements that should be identified. A similarity in all the statements of Phase I is that they require engagement or communication from different levels.

- Statement one: I am satisfied that every single stage in this project's approach is reviewed and found to be the most efficient and feasible;
- Statement two: I am satisfied that the approach to run this project includes at least one new idea, method, process or tool that makes it different from what we usually do;

- Statement three: I am satisfied that the timeline of this project is completely optimized and flexible enough to accommodate potential changes;
- Statement four: I am satisfied that this approach is thoroughly communicated and discussed between all involved departments, teams and individuals.

The next phase in Innoframe is Portfolio management. This phase can be visualized below in figure 3. This phase will ensure that there is a high commitment level and cooperation between the project team and management. Portfolio management ensures that the management of the organization takes the necessary steps to ensure that projects are properly equipped and aligned to strategy which means facilitating the project team in every way possible. The four statements seen in figure 3 are meant to ensure that the project aligns with company strategy. By answering these four questions, the project manager continually keeps the bigger picture in mind and is able to adjust the project accordingly so that all four statements can be made with confidence.

- Statement five: I am satisfied that this approach is planned in line with project’s portfolio strategy and helps in achieving its objectives;
- Statement six: I am satisfied that the project’s approach has been reviewed by all stakeholders and it has their support and engagement;
- Statement seven: I am satisfied that this project ensures a well-rounded portfolio that meets all requirements and delivers a balanced risk-reward spectrum;
- Statement eight: I am satisfied that this project adds a new value to its portfolio in terms of nature, operations and end results.

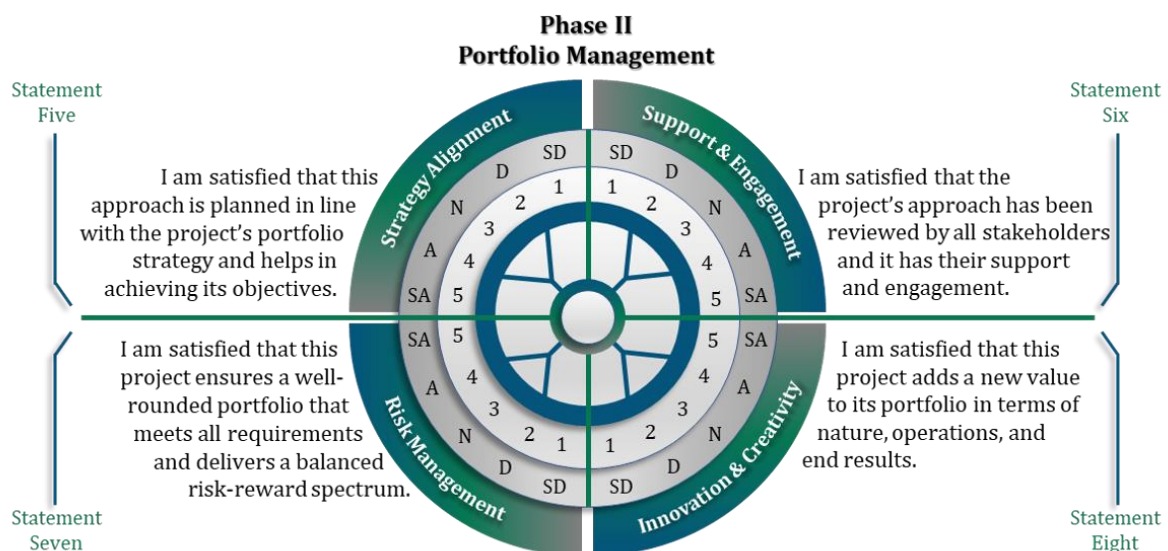


Figure 3 – Innoframe – Phase II.

The final portion of Innoframe is the matrix. This performance matrix is determined based on the final averaged scores for both phases. The results are plotted in a grid to establish how well the project performed in portfolio and project management metrics, as can be seen below in figure 4.

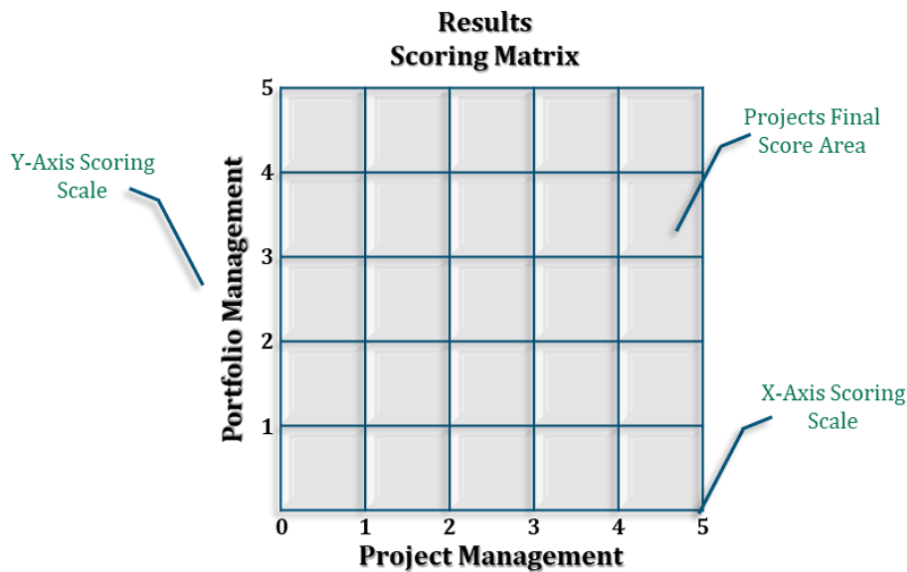


Figure 4 – Innoframe – The Matrix.

Performance management is important as it provides a check that can be used to identify what went right or wrong, where improvements are needed, and which aspects were unnecessary. Thus, Innoframe has included the matrix and scoring system as a performance management indicator. The scoring model consists of two scoring systems, the Likert Scale (5-point) and the numerical scoring scale. In addition to the scoring scales, both phases of Innoframe also consist of scoring areas for both the project manager and the team members to encompass the differing experiences of each group. In addition, all members relay their perceptions of how well the statements have been inculcated into the project, making it a more holistic evaluation. Following scoring from the project manager and team members, the scores are summed and averaged to find the final statement averaged score. Finally, each of the statements' average scores are summed and averaged to produce the final average score. This is placed in the final averaged score area. The final average score is important because it gives a quantitative picture of how the project has performed in terms of inculcating the statement for each phase. The results of each phase are then located on the matrix which provides the full picture on how the project performed during each phase.

CONCLUSIONS AND FUTURE RESEARCH

The research presented in this paper was developed to answer the following research question: How can an integration among project, portfolio and innovation management create a multidimensional framework to support SMEs for better end results on the three levels?

To arrive to the answer to this question, a case study of the Canadian construction and building materials industry was done. The methods used were literature review, interviews, group discussion and survey.

The relevant literature was examined, and although the fields of project, portfolio, and innovation management are growing in importance and recognition, there is still a lack in knowledge acquisition in academic literature. The primary research performed aimed to shed some light on this issue through firsthand experiences of project managers dealing with management challenges and framework implantation throughout their careers.

After data was collected and analyzed, a new framework called Innoframe was development. Innoframe is as a multidimensional framework that combines the main elements that are essential on three levels, project, portfolio and innovation management, and puts them together to give small and medium sized companies a new route for more efficiency and better end results. Innoframe provides a new approach based on the industry needs which none of the models studied provide at once.

The study itself and its outcome opens new paths for further studies and challenges further research to evaluate the usage, propose modifications and embed new enhancements into the framework. The nature of the outcome of this research is something that can be easily subjected to evaluation and assessments throughout the years. Because of this, the continuation of studies on this framework might be tempting to many academic students whether they are studying business or engineering majors. The framework proposes a theoretical and practical approach to companies, which is something that should be tested in the future in a research setting to test the effectiveness of the framework over the short, medium, and long run. As well, the framework can be tested for its effectiveness on a variety of projects to identify under what conditions and for what projects the framework is best suited.

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REFERENCES

- Aleksandrova-Boshnakova, M. (2018) ‘Project portfolio management framework’. University of National and World Economy.
- Broersma, R., Van Gils, A. and De Grip, A. (2016) ‘Ambidextrous innovation in SMEs: The role of

absorptive capacity and CEO's engagement in the strategy process', in *76th Annual Meeting of the Academy of Management, AOM 2016*. Academy of Management, pp. 1055–1060. doi: 10.5465/AMBPP.2016.201.

CenterCompet (2020) *EFQM Innovation Lens, Center for Competitiveness*. Available at: <http://www.cforc.org/what-we-do/innovation/efqm-innovation-lens> (Accessed: 1 August 2020).

Dancer, M. (2017) *Channelvation Innovation Framework*. Available at: <http://www.channelvation.com/channelvation-innovation-framework-2/> (Accessed: 22 December 2018).

Decision Driven (2008) *Multi-decision innovation framework | Decision Driven® Solutions Blog*. Available at: <https://decisiondriven.wordpress.com/2008/06/25/multi-decision-innovation-framework/> (Accessed: 4 May 2020).

Dutta, M. (2019) *Portfolio Management*. Available at: https://www.academia.edu/23654572/Portfolio_Management (Accessed: 2 May 2020).

Frankenberger, K. *et al.* (2013) 'The 4I-framework of business model innovation: A structured view on process phases and challenges', *International Journal of Product Development*, 18(3–4), pp. 249–273. doi: 10.1504/IJPD.2013.055012.

GasLabs (2017) *FROST Innovation Framework for Practical Innovation*. Available at: <https://gaslabs.org/frost-innovation-framework-practical-innovation/> (Accessed: 4 May 2020).

Georgia Tech Strategic Consulting (2018) *Enterprise project and portfolio management*. Available at: <http://consulting.gatech.edu/enterprise-project-and-portfolio-management> (Accessed: 14 January 2019).

McAdam, R. *et al.* (2007) 'Implementing innovation management in manufacturing SMEs: A longitudinal study', *Journal of Small Business and Enterprise Development*. Emerald Group Publishing Limited, 14(3), pp. 385–403. doi: 10.1108/14626000710773501.

Mishly, M. A. (2019) *Project and Portfolio Management: A Multilayer Framework to Support Innovation-Driven SMEs in the Industry of Construction and Building Materials - case of Canada*. PhD Thesis. Doctoral Program in Industrial and Systems Engineering, University of Minho, Portugal.

Mishly, M. A. and Tereso, A. (2016) 'Primary roadmap towards a project and portfolio management framework to support innovation-driven SMEs', in *Proceedings of the 28th International Business Information Management Association Conference - Vision 2020: Innovation Management, Development Sustainability, and Competitive Economic Growth*.

Oltmann, J. (2008) 'Project portfolio management: how to do the right projects at the right time', in *PMI® Global Congress 2008—North America*. Denver, CO: Newtown Square, PA: Project Management Institute. Available at: <https://www.pmi.org/learning/library/project-portfolio-management-limited-resources-6948> (Accessed: 4 May 2020).

Ozcan, P. and Eisenhardt, K. (2009) 'Origin of alliance portfolios: Entrepreneurs, network strategies, and firm performance', *Academy of Management Journal*. Academy of Management, 52(2), pp. 246–279. doi: 10.5465/AMJ.2009.37308021.

PMI (2017) *What is Project Management?* Available at: <https://www.pmi.org/about/learn-about-pmi/what-is-project-management> (Accessed: 2 May 2020).

Portman, H. (2016) *Agile Portfolio Management Framework*. Available at: <https://hennyportman.wordpress.com/2016/10/02/agile-portfolio-management-framework/> (Accessed: 12 January 2019).

PWC (2018) *IT Portfolio Management Framework, PricewaterhouseCoopers Hungary Ltd.* Available at: https://www.pwc.com/hu/hu/szolgalatasok/technologiai_tanacsadas/kiadvanyok/portfolio_management_framework.pdf (Accessed: 1 August 2020).

Shenhar, A. J. and Dvir, D. (2007) *Reinventing Project Management: the diamond approach to successful growth and innovation*. Harvard Business Press. Available at: www.hbsp.com. (Accessed: 4 May 2020).

Sparrow, J. (1999) 'Using qualitative research to establish SME support needs', *Qualitative Market Research: An International Journal*. MCB UP Ltd, 2(2), pp. 121–134. doi: 10.1108/13522759910270034.

TenStep Inc. (2007) *PortfolioStep Portfolio Management Framework Overview, Kennesaw, GA*. Available at: <https://www.portfoliostep.com/PortfolioStepOverview.pdf>.

Vasudeva, G. (2010) 'Capability Evolution and Governance in Alliance Portfolios: evidence from an emergent industry', *Academy of Management Proceedings*. Academy of Management Briarcliff Manor, NY 10510, 2010(1), pp. 1–6. doi: 10.5465/ambpp.2010.54495020.

Williams, P. (2011) 'Is Stage Gate the Right Tool for the Job: a fresh look at innovation portfolio management'. Available at: <https://www.coursehero.com/file/43803127/Article-Reviewdocx/>.