

A Review of the Use of an Agile Project Management and Stage-Gate Model

[A hybrid Innovation framework for technology]

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Abstract:- This paper looks at one of the main objectives of innovation in project management and tool provision using methodologies that ensure project flow and faster delivery rather than a step-by-step approach. In this study, two papers are reviewed concerning the framework utilized for agile project management and the stage-gate model. The first paper, (Conforto & Amaral, 2016), looks at the use of this technique in the context of agile project management (APM). The second paper, (Brandl et al., 2018), looks at the framework for a hybrid of innovation management. A case study is then presented by the author explaining the context in which the targeted framework was used, how it was used, what results were achieved, and some reflections on the process.

Keywords:- Innovation Management, Project Management, Technique, Innovation, Agile, Framework, Hybrid.

I. INTRODUCTION

THIS paper looks at the experimental analysis of a hybrid management framework. It is shown that the complexity of products and innovative solutions can affect the use of new product development (NPD) terms in this practice. As Conforto & Amaral (2016) have pointed out, the complexity of the NPD process can arise from many sources, such as susceptibility to innovation, number of components, structures and subsystems, and number of associations involved. These difficulties make the choice of NPD as a pure methodology uncertain compared to traditional step-by-step NPD models, which heavily hinder the basic organizational steps of delineating and detailing product details and requirements.

The stated technique has a particularly useful and thus positive impact on projects and development of products, when combining the two approaches detailed in this paper to achieve budgeting and flexibility in project management for innovation-based companies.

II. OTHER RESEARCHERS' USE OF THE TECHNIQUE

In this section, two papers of researchers who have used the indicated technique in their work are reviewed and analysed. The papers are entitled "Agile project management and stage-gate model—A hybrid framework for technology-based companies" by, Conforto & Amaral in 2016, and "A Hybrid Innovation Management Framework for Manufacturing—Enablers for more Agility in Plants" by Brandl et al. in 2018.

A. First Paper

In the first paper, Conforto & Amaral, (2016) look at the use of the target technique in the context of the NPD theory which has changed widely since 1990 although the methods, practices, management frameworks and tools remain unchallenged. More recently, with the emergence of industries such as rapid prototyping, 3D printing, collaborative creativity, digital creativity, and increased interest in core competencies in development, the climate of challenges and new developments has tested NPD theory and practice. Progress and challenges in these sectors need NPD processes and frameworks that combine unprecedented simplicity, speed, and adaptability. For this reason, the search for NPD models and methods has become a new growth area for researchers and professionals.

In 2016, Conforto & Amaral suggested a management framework called the "Iterative and Visual Project Management Method (IVPM2)", which combines APM methods and practices with the idea of moving to a hybrid management model. The model, called stage-gate, provides overview and convergence, which enable communication with other members of the team. When combined with APM practices, for example, it underpins the use of agile models, encouraging group self-regulation and interactive adaptability to enable experimental and iterative development at different levels of organisation and governance.

A combination of research methods e.g., questionnaires, observation, and interviews, and top-down contextual research methods have been used to conduct this study. Additionally, the active research itself has involved a number of collaborators.

A study by the researchers (Conforto & Amaral, 2016) of NPD practices in two start-up businesses found that these organisations struggled to make use of all the disparate NPD practices, particularly the highly structured point cycle and method phases, as well as phase assessments conducted using direct development techniques ('waterfall'). It is often seen that lack of resources, human and financial, restricts the use of this practice, which is usually undertaken by large associations.

This focused study is considered a feasible review scheme, primarily because APM is still considered a management technique for organisations who habitually work on software development. It also has incredible potential for adaptation to different sectors and projects. In addition, ongoing research has demonstrated the importance of adapting and combining APM practices with more general

NPD measures (e.g., stage-gates). This increased adaptability improves responsiveness to changing needs and dynamic project environments. Similarly, recent research has highlighted the potential impact of flexible practices on project delivery, as noted by Conforto & Amaral, (2016) in a study of more than 1000 respondents working in a range of sectors. The implementation framework for this project (IVPM2) that provides an iterative cycle of seven phases and five measures is presented as follows.

Additionally, Schumpeter, (1934) recognized five types of innovative projects such as product, production methods/process, market, sources of supply, and organizational innovation. In this study, the previously suggested hybrid management structure determines the significance of the stage-gate model combined with agile invention project management practices as a possible solution for organisations based on a small number of innovations. As such, project teams working in more favourable product development environments can benefit from the ideas and recommendations in this review. Project teams interested in adopting this hybrid methodology should systematically adopt some of the essential components of IPMV in stages, such as the public support component (PPDM) to start with. They should then move on to visualisation boards (WAPW and PPCW), cycle development methods, and, lastly, to project product management and executive tagging systems. It is important to keep in mind that a PPDM can be specific to each type of project or organisation as it should reflect the product development steps, templates, key deliverables, goal evaluation criteria and milestones.

This review has shown that there can be some difficulties with the use of visual maps, so when using these maps, the motivation behind visual management should be clearly understood by team members. To increase the usefulness of using these tools, an important action is to involve all colleagues in the use and adaptation of these components so that they can make suggestions and ideas and critique the normal usefulness of each component of IVPM2.

The outcomes of this evaluation have shown that the hybrid system complements some aspects of product and project development, namely authority, data accuracy and accountability. It is suggested that comparable design environments and contexts can be improved through a combination of step-by-step models and related adjustments combined with agile practices. However, despite the positive results achieved in earlier product design and implementation in general, some fundamental concerns have been raised. For example, what are the underlying characteristics/factors of the selected groups, project climate and associations that support the use of APM practices, tools, and methods? Some of these underlying factors may include group competence, individual characteristics, hierarchical constructs, culture, market characteristics, available assets, and receptiveness to innovation.

B. Second Paper

The second paper, by Brandl et al., (2018) looks at another use of the technique being discussed, in the context of the dynamism of an evolving business sector which provides a dynamic and customised market for innovative products and processes tailored to customer needs. Balancing the pace of innovation with risk mitigation is key and, keeping this in mind, in an ever-changing environment, today's manufacturers must be pioneering innovators.

Recently, large manufacturing companies have sought to adjust their project management strategies in the hope of increasing the pace of innovation while mitigating risk and maintaining control. This indicates a promising new path for hybrid coordination, which, in turn, signifies integration of the strengths of APM and stepping gates.

Furthermore, as early stages of specialised innovation science have shown, the innovation process involves three key aspects: (1) it motivates (e.g., needs satisfaction or growth), (2) it absorbs assets (creative/financial/specialised) and, (3) it entails specialised and hierarchical change.

Since “the ability to change and adapt is a prerequisite for the sustainability of any association”, innovation management pursues the goal of “orderly benefit”, which is to organise an association of innovation processes and to demonstrate ideal asset management for ongoing innovation projects. It is understood that agile project management signifies a duplicate approach to project management. The initial role of APM is to break down large tasks into smaller more manageable parts. The aim is to then implement them in a short period of time, while maintaining focus on the project in its entirety. To clarify, teams that utilise agile methods can complete the job more rapidly, climatise to differing project requirements and enable an enhanced workflow.

Probably the most widely used APM method is Scrum, first proposed by Brandl et al., (2018). It is based on iterative circles of critical thinking, the so-called 'Deming loops', which play an important role in Toyota's production system. The method offers three redundant input circles, namely Daily Scrum as the inner circle, Targeted Sprint as the middle circle and the outer circle, which includes the entire adjacency and review phase. The exemplary Critical Circle promotes the consistent alignment and continuous review of the key development axes.

The next critical phase of exploration may involve the development of a comprehensive and detailed framework for the application of hybrid project management within the Manufacturing Innovation Management (MIM) programme, followed by a phased and incremental approach to the representation of the production system. The expansion of new applications for multi-layer innovations such as winding processes, the shortening of lead times for complex specialised changes, and adaptation to changing requirements, may be suitable production features of the staged and process-oriented innovation process models common in MIM.

To meet requirements, the successful installation of a hybrid process structure in an MIM environment requires a set of influences called a “hybrid structure.” Similar to a comparable matching model, its components should form nodes whose relationships are represented as edges. In addition, the framework should unify the system representation of the hybrid process to provide clear guidance to experts on how the hybrid design process fits into the MIM space and how this process can be clearly updated and coordinated after the design phase. While some pilot projects may currently benefit from the seamless implementation of a hybrid process design, a more rigid view of the overall model will largely inhibit the full functionality of this methodology.

The Agile Evaluation System allows an assessment of whether a future development project should be managed using a traditional stage and gateway-based methodology, or whether a more explicit agile methodology is worth considering.

The Hybrid Innovation System is based on the organisation of seven interdependent systems that include hybrid technology systems as core components, covered by auxiliary systems as supporting bodies. With increasing product and production complexity, respect promotes the rapid development of renowned manufacturers during operations and serves a deeply dynamic and individualised market with innovative products and processes organised according to customer requirements. The balance between innovation and risk reduction contains a critical success factor: today's manufacturers must be pioneers for change and constantly show signs of their ability to change. Therefore, a framework has been developed to gradually update the innovation process model by coordinating agile project management (APM) methodologies to set the goals of this document. The extension defines the general idea of “Manufacturing Innovation Management (MIM)”, establishes an overview of innovation management in the manufacturing environment, and provides an in-depth examination of traditional innovation process models, hybrid frameworks and continuous writing of hybrid progress. It also adds a semi-organised keynote lecture to the Hybrid Innovation Management framework describing the enablers for effective Scrum association to improve manufacturing departments and agile production in factories (Brandl et al., 2018).

Furthermore, various elements are also required to assess improvisation in manufacturing departments and agile production units. The nodes and modular segmentation have been carried as ‘edges’. The control of the Hybrid Process System can only be further refined as per the leading description. This is due to the efficient induction of the concrete form of information, and structured pre-sets. Different levels of the Hybrid Process System can enable the Hybrid Innovation Management System in a productive column. The establishment of such APM and MIM requires both hybrid and agile process structures in the development of technological and innovation framework. Requisition of continual processes should be organised and implemented to bring technology and innovation to manufacturing companies. Execution of pilot projects should be triggered to

conduct execution of the hybrid process. The main theme of Brandl's paper is to apply the set of these processes based on one effective approach. The implementation may also involve the Agility Assessment System (AAS) on a strengthening note, which evaluates the source of developmental projects in connection with the *Stage-Gate* model. It would be worth considerably more and offer efficient processes to manufacturing and production companies.

III. CASE STUDY

The study in focus has applied a contextual analysis approach, the main objectives of which are to obtain information on the use and usefulness of the IVP M2 framework in product and project development activities, and to obtain partial adherence to the key principles of APM as they are written.

A general contextual enquiry was that technological organisations were seen to consider a mix of input and stage-gate models in their product development environments. This has many attributes that combine the normal product development cycle to meet all the requirements of APM implementation and to find the right harmony between formalisation and adaptability. Technology organisations are a real example of corporations with limited structures and resources that are at a disadvantage in creating innovative products and new developments (Ćirić et al., 2016).

Much depends on an organisation's salient characteristics, such as (i) the nature of a research project involving hardware and software development considered innovative and challenging for the project team, and (ii) the adoption of new management methods which can be very risky in terms of product development, peer resistance and the dreaded demo iii) willingness to develop.

The aim of the product development project investigated in this study was to create a robot to support the research and demonstration exercises, both pedagogically and for enjoyment. The project was carried out over two years and the team involved in the research consisted of a project manager and five colleagues, including software, mechanical, electrical, and electronic engineers. The project was seen by the participants to be innovative but challenging. Additionally, it was considered unique as there had been no similar products on the market prior to this one.

Analysts highlighted several key challenges to working on the project, which the company's CEO summarized. The project team also cited specific challenges in the organisation and management of the project, such as deficiencies in technology, systems and product subsystems, and the lack of a strategy appropriate to the project environment. As a result, it is difficult for teams to manage gaps in regular change and product development efforts. The study indicates the need for groups to develop self-management and self-monitoring capabilities. It also calls for more active contribution to the management cycle, including dynamic day-to-day organisation and control. Finally, it is necessary to understand the characteristics of the project environment that make it

suitable for use of some of the tools and techniques presented in this study. For example, when monitoring, the use of a team or colleagues fully committed to the project can encourage utilisation of visual charts in ongoing meetings.

first step towards further research into identifying companies in need of a solution.

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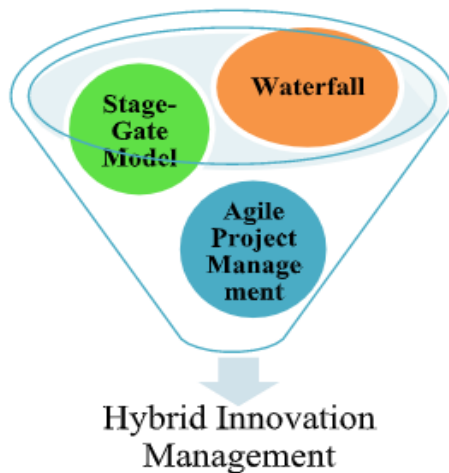


Fig. 1. Hybrid Innovation Management by Author

IV. REFLECTIONS

The goal of this paper was to reflect on the use and approaches of agile project management and stage-gate model, and to explore scenarios where the combined technique can be used effectively. To this end, the technique was first explained, then two papers focusing on the approach were discussed. Following is this researcher's evaluation of the technique.

Key reflections on this technique are as follows:

- In today's world, the idea of development and innovation has become an integral and necessary part of the competition. Innovation is the essence of an effective organisation and is the main driver of development. To explore the innovative potential of an association, it is essential to be clear about what is meant by improvement.
- The main task of the executives/ management of an organisation is to provide a set of tools, devices and procedures that facilitate innovators within the establishment to resolve difficulties and turn ideas into viable developments throughout the development cycle. Development is an attempt to turn board vulnerabilities into identified hazards, and then earnestly set about resolving these issues.
- The continuous innovation process enables organisations to compete long-term in the market. It enables the growing of opportunities. The framework to refurbish the Stage-Gate innovation process is effective for Agile Project Management.
- The agile approach is usually related to the IT sector; therefore, it would be useful to have an empirical study for other types of innovation projects.
- The proposed hybrid MIM framework is an attempt to structure conditions that allow for a more flexible design so that the board of an organisation can adapt to rapidly changing needs. The concept is presented as a phase showing what the real situation is like and requires the