The adoption of agile management practices in a traditional project environment: An IT/IS Case Study

Hany Wells, Darren Dalcher & Hedley Smyth

Abstract

Despite the growing interest in the usage and application of Agile Project Management Methodologies (PMMs), there is only scant research examining how and why organisations select agile approaches for managing and delivering Information Technology /Information Systems (IT/IS) projects. This paper reports on the findings of such research conducted within the context of a large technology-focused case organisation. The findings identify significant variance between business lines, specifically between product development and software development functions and their ability to follow agile guidelines. Generally across the organisation there was limited evidence of tailoring to context, an important organisational success factor, yet there was a more significant level of tailoring and responsiveness to client needs and wishes. Overall, there was a lack of clarity about the location of the decoupling points following the scoping of the project. Recommendations therefore require further attention and understanding of the implications of new practices employed by organisations, not least by senior management and for additional research underpinning such discovery.

1. Introduction

The *aim* of this paper is to explore agile as a "project management methodology", or more precisely as a method for executing project management in practice. The first objective is to evaluate how agile project management methodologies (agile PMMs) are applied, specifically tailored to project context, client needs and how this is managed in relation to the decoupling point between traditional approaches and agility. The second objective is to evaluate the degree of success and the extent to which barriers exist in adopting agile PMMs. The empirical exploration is conducted in a large international IT/IS case company using an interpretative methodology based upon qualitative evidence.

The paper commences with the literature review covering, specifically in the IT/IS context. It then addresses the methodological approach and methods employed to investigate agile PMMs on an in-depth case-based approach. The findings and analysis are then reported. The paper concludes with an overview of the main points arising from the research questions and several other issues that emerge from the analysis. The limitations and original contribution to knowledge are then addressed and the recommendations for research and practice complete the paper.

2. Theoretical Background

Agile production and service provision stand as a concept that exists in its own right. In recent years agile methodologies have been extensively adopted for the delivery of IT/IS projects. According to Forrester Research [1] agile software development processes were in use at 14% of North American and European enterprises, and another 19% of enterprises were interested in their adoption. Recent research highlights the rationale for agile adoption as: Increasing productivity (66%), accelerating time to market (66%), reducing costs (48%), and improving quality (43%). While these reflect "traditional project criteria, they offer organisations a lighter, delivery-focus based on the principles of the Agile Manifesto" [2].

Agility advocates greater responsiveness to the customer and their needs, both in general and through customisation. Agile projects thus offer a greater customer focus [3]. Being responsive to context and to customer demands requires management of the response so that it is built into the system in an organised fashion. Agility addresses many of the detrimental effects of uncertainties induced by system effects [4], including the so-called "bullwhip effect" of worsening behaviour induced by upstream disturbances [5]. This is particularly the case for projects where the uncertainties comprise both known unknowns and

unknown unknowns [6]. Therefore, agility provides a semi-structured approach to respond to:

- Requirements that have not been articulated through business development;
- Emergent requirements over the project lifecycle, particularly in the earlier stages when less of the content is fixed or frozen;
- Change orders arising from change in the client organisation; and,
- Change orders arising from reflection on the project and its content through close supplier communication and relationship development.

Agile project management methodologies (PMMs) were introduced into IT/IS working, especially for software development [7]. They offered a good fit as IT/IS projects are often developed iteratively through multi-loop, multi-level, multi-agent and frequently multi-organisational feedback systems [8] [9] [10]. Quality and risk management have proved important to achieving agile objectives [11] in such environments.

Agile approaches provide valuable capacity for responding to emergent client requirements [12] and for adding service value. This is important in a project context too, as projects have historically been conducted with a task rather than customer focus [13]. As the customer focus has yet to develop from a goods- into a service-dominant logic in project sectors, agile provides a method for addressing the contextual effectiveness of project delivery. Indeed, [14] credits 'embracing customer need' with the boldness of the promises of delivering success made by agile approaches.

A prime criticism of the agility concept is that its flexibility leads to an unstructured approach (e.g. [15]). This may be a reflection upon implementation, but conceptually it is a highly structured, albeit responsive approach, especially in the context of uncertain situations. It is argued the values behind agile simply give project management team members scope to do what they want and justify it as agile methodology [16]. It paradoxically allows them to become more focused upon expert tasks rather than benefits delivery, hence resulting misperceptions that agile PMMs are unstructured. Agile PMMs are unsuited for managing projects where criticality, reliability and safety form a major concern [17]. In examining how organisations select a particular type of PMM for delivery and management of projects, [18] suggest "that the selection and implementation of PMMs is usually mandated via strategic organizational directives, and that as a result of top-down approach PMMs are selected and applied in a type agnostic and context free manner".

Indeed, [19] state that the conventional PMMs are: "traditionally associated with organisations that operate in software 'engineering centric' business domains. These view software activities as an engineering process, rather than a creative process based on the skill of individuals or small teams". Moreover, creativity and problem solving can be easily structured through the agile approach to PMMs, offering a counter-balance to the focus on structure embedded in more traditional approaches. A summary of the fundamental differences between traditional and agile methodologies is presented in Table 1.

Table 1: Traditional Methodologies versus Agile Methodologies

Traditional Methodologies	**Agile Methodologies**
Plan-driven prediction	Adaptive response to emergent change
Focus on planning the future in detail	Emphasis on adapting quickly to changing realities
Teams report on an exact planned set of actions	Teams change direction when the project changes
Inflexible division of projects into separate stages	Each stage's tasks emerge from the outcome of the previous
Demand early detailed definition and commitments	Focus on workable functionality required to deliver business benefit
Depend on structure	Embrace creativity
Resist change	Welcome change
Slow to respond to requirement changes	Responding immediately to requirement changes

As more organisations endeavour to adopt agile PMMs an increased recognition of the implications is needed. Yet, very little is covered in the literature. It is pointed out that the adoption of agile approaches as a "bolt-on" to existing systems requires awareness of the following factors [20]:

- Organisations must live with development team decisions.
- Organisational culture supports negotiations.
- Fewer and more competent people are needed (see also [21], [22] and [23]).
- People must be trustworthy.

- Rapid communication between team members is necessary, often facilitated through co-located teams.

Similar factors can be identified in using traditional PMMs [24], [25]; however, there is an absence of any reliable base data or in-depth empirical evidence, positive or negative underpinning such knowledge. To begin to address this absence, an evaluation of the experience of a single organisation engaged in adopting agile PMMs is presented as an extended case study.

The research questions examined the issues concerning the scope of agility found in PMM application addressing problems with applying agile PMMs for the case organisation:

- What were the barriers to adopting an agile PMM? Focusing on systems, procedural and attitudinal barriers.
- To what extent was there evidence of tailoring to context?
- To what extent was there specific tailoring to emergent client needs?

3. Research Methodology

Selecting an appropriate and suitable research perspective concerns beliefs about the physical and social reality of the research, alongside criteria for constructing knowledge and the methods. There is no unified theory of the management of projects [26], therefore an examination of agile PMM without a theoretical underpinning and within the complex business context [27], [28] requires a reasonably open-ended rather than a project-bounded approach.

Whilst positivism remains the most dominant methodological approach, its claims for independence pose problems when addressing socially constructed realities. Interpretivism allows for understanding of social processes and involves getting inside the world of those generating it [29]. From the different approaches of symbolic phenomenological, realist and hermeneutical interpretivism, the phenomenological approach [30], [31] is selected as suited to the interactive and reflexive socially constructed complex corporate management and PMMs (cf. [32], [33]).

It is explained that prior specification of a construct can shape the initial research design, yet employment of inductive research methods for evidence collection and analysis can be used to build and develop theory [34]. Although the literature shows an association between PMMs and project performance, there is scant research examining the contribution of PMMs to performance [35]. Therefore, the initial point of this research was exploration of the role of PMM in practice through the use of a substantive case study (see [36], [37], [38],[39] and cf. [40]). Archive searching, company documents, interviews and some observation were sourced and a total of 13 interviews of key decision-makers were conducted. The interviews lasted just over 90 minutes and the roles of the interviewees included: Head of tools and methodologies (1) Tools and Techniques team (1) Senior Agile Advocate (2) Senior IT project manager (3), Product Manger (3), Project Manager (3). The interviews provided the primary source of evidence as the perceptions of those interviewed informed the actions taken in the implementation of agile PMMs.

The inductive analysis of the qualitative evidence involved breaking it down into small units of characteristic elements and structure [41], [31] through iterative examination in order to identify generalities whilst acknowledging context, a process akin to pattern coding [31]. A general inductive approach was employed for organising and analysing content of the qualitative data [42].

4. Findings and analysis

The case organisation is a large telecommunications company, with a strong history of using traditional PMMs resembling the “Copper” stage-gate model approach to product delivery. In restructuring the organisation, it was endeavoured to expand the usage of agile approaches from the IT/IS department to other business units such as product development. In this company software systems were the core to the business and the majority of business functions were reliant upon them for operational support. Due to its size each line of business followed a slightly different governance and methodology for its project and product management. For this technology-intensive company the challenge of being able to compete on speed to market was achieved through the creation of a culture and mind-set ready to respond rapidly to change, external needs and technological developments. In understanding the issues faced by managers in using the stage-gate approach to project and product delivery three main limitations were highlighted: 1) weak customer engagement resulting in poor customer experience, 2) increased bureaucratic burdens, 3) too much emphasis on up-front estimation.

The following quotes are examples of responses from different interviewees reflecting cultural and organisational assumptions.

> *"We never thought about the customer experience of the new products, we just assumed that if you were launching a new product and produced thick manuals to support the customer, then this should suffice and never used to consider the real user experience." (Product Manager)*

> *"You are asked to estimate an unknown, which is not necessarily the fault of the method but the nature of software development [and] does not lend itself well enough for this. As part of the business culture or the method employed you are expected to stick to those regardless. If you find that the solution would be harder or it is more complex than originally estimated, then it is almost seen as a failure." (Project Manager)*

> *"Being a traditional company, the Waterfall method was the main method of use. For this reason our company would spend a lot of time capturing requirements in terms of upfront work and over-architect rather than doing the job." (Project Manager)*

> *"There are very definite stages, almost monolithic - you have a big design section, big development section, which leads to inefficiencies. Where you find a development problem becomes a design problem that you have to go back all the way to those different groups...The requirements capture is proved to be inadequate in traditional methods." (Product Manager)*

4.1. Barriers to adopt agile PMM

The introduction of an agile approach to management and delivery of projects brought about a cultural change as well as a number of questions that needed to be answered. Many managers, in particular product managers, were not comfortable with the idea that IT projects could produce a result in three months. The introduction of agile was tentative and problematic across all project business activities. As a result of this the senior managers chose to investigate whether agile methods could be incorporated into the stage-phased method.

> *"Selecting and promoting agile is not a direct reason to be more innovative but it is a response to shortcomings of traditional methods." (Head of Tools and Methodology)*

Transformation from more traditional approaches to agile can prove to be a difficult journey in practice. There was significant variance between the different business lines. Despite the strategic intention to invest in agile, product development continued to adhere closely to traditional PMMs while the IT/IS business lines, covering software development and IT/IS projects for internal and external clients, were generally more diligent in trying to implement the agile PMMs.

> *"One of the biggest problems with our development team is that after having the [Product Requirements], which say 'these are all the things that we will deliver', we are going to design and implement, and three quarters of the way through the designer will come back and says that they can't deliver. Actually can't deliver in the time specified, so can you prioritise the features that are more of importance and we will try to deliver those important features." (Product Manager)*

> *"For instance initially after the changeover from Waterfall to agile, it became apparent that 80% of the work we were doing wasn't going to add any value to the user. It had been defined by a manager who was not actually a user." (Project Manager)*

In effect one might say that while IT proved amenable and supportive to the agile concept, product delivery struggled with the implementation of agile ideas and would require a more fundamental perspective to re-align the asset life with agile delivery and management perspective. This might also reflect the on-going tension between creativity and structure as they apply through project management methodologies and philosophies [25]. The value of agile was questioned predominantly by product mangers, as they explained that the organisation's structure and the way in which products were designed and developed was a major stumbling block for the full implementation of agile methodologies.

> *"Agile is fine for software development, as opposed to product development where it doesn't work as well. On a physical level, changing physical aspects of a product, that kind of development doesn't lend itself to agile." (Product Manager)*

> *"For agile to work effectively there is a need for working together, which is more difficult with off-shore teams and third party involvement. Sometimes customers don't buy into using agile and they don't get involved as much as they need to." (Project Manager)*

The comments also imply that the value and benefit offered by PMMS in increasing effectiveness is questioned at project level as opposed to the strategic level [35].

The task focus observed amongst the project managers, coupled with the attitudes of resistance show the problems companies face in shifting to a customer

focus using agile and contributing towards the increasingly prevalent service-dominant logic [43]. It also identifies fundamental differences in approaches between different parts of the organisation, as shown by the following quotes:

> *"The project delivery is more difficult using [agile approaches], with the external customer to push contracts and get the fixed price. For this to work there is a need for trust between suppliers and customer." (Senior Project Manager)*

> *"There is an issue with regards to managing projects with external clients such as government with PRINCE2 as a methodology, how does PRINCE2 work with agile? This can happen by bringing the customer to understand the agile method." (Project Manager)*

There clearly were substantial barriers to implementation across the company despite the fertile conditions provided by the overall agile strategy for the business.

4.2. Tailoring to Context

In response to the specific research questions it was found that there was: (i) limited tailoring to the general context, (ii) a greater level of specific tailoring and responsiveness to client needs, and (iii) a lack of clarity and therefore, ability to identify where the decoupling points were located or could be located to improve customer responsiveness.

Comprehensive documentation and guidelines for plan-driven methods are normally prepared by experts. The comprehensive design is typically done with the intention that the method be *tailorable-down* for less complex situations. It is suggested that: "experts understand tailoring but unfortunately; less expert and less self-confident developers, customers and managers tend to see the full-up set of plans, specifications and standards as a security blanket" [17]. This does lead to the creation of inappropriate tailoring and the generation of high volumes of documentation, as observed by the interviewees:

> *"A pointer towards one size does not fit all would be good. Recently everyone is encouraged to use PRINCE2 and project management communities tend to go down this route of 'we will define a methodology and all projects will have to be managed using this method'. If you take PRINCE2 at its intent which you use as much or as little as you see fit then it would not be so bad, but in reality the tendency in this document is that most managers comply with all the documents for even the smallest known quantity project which does not necessary need it." (Product Manager)*

> *"This company is changing from waterfall to agile, we are gradually starting to introduce agile, part of the difficulty was getting the agreement with users." (Senior IT Project Manager)*

Three points are worth noting here. Firstly, managers relate some aspect of problematic project delivery with the misalignment between the project type and the PMM selected. Managers in this company either in product development or in IT argued for selection of an appropriate PMM based on project needs and characteristics. Secondly, the company was encouraging agile as a way forward with the aim to replace traditional legacy PMMs. Hence certain tailoring was in place as mentioned in the introduction in order to embed agile principles into their phase-gate method. Thirdly, at operational level, it was seen that this transition was left to the discretion of the product or project manager. One product manager interviewed showed his presentation made to senior managers, demonstrating how he embedded agile principles into his product development PMM. Some of the comments below reflect the issues:

> *"I am responsible for implementing change and promoting agile throughout our organisation, this is not an easy task. There is no reward for being an expert agile developer and there is no reward for being an agile practitioner, whereas as a PRINCE2 practitioner there are recognised incentives." (Head of Tools and Methodologies)*

> *"Selecting agile is not a direct reason to be more innovative but it is a response to shortcomings of traditional methods." (Head of Tools and Methodologies)*

> *"The reaction on modifying and tailoring gate-phased method was 'over our dead body', so ultimately we had to backtrack; we had to stick with a six stage process and incorporate [agile] in the six phase process." (Product Manager)*

4.3 Tailoring to Emergent Client Needs

Tailoring to the emergent customer or client needs is at the heart of agile thinking and a key component of agile PMMs. Tailoring projects to client product needs resulted in the putting in place several services: an ordering process Lead-to-Cash (L2C) to introduce a proposed product to the customer base; and, concept to market (C2M) which initiates production and Trouble-to-Resolve (T2R) thus inducing problem-solving as an iterative aspect. However, there is nothing intrinsic to

these to force decision-makers to be customer focused in addressing ordering, entering production and refining solutions. An agile focus on the customer was overridden by assessing how well the customer has experienced L2C and T2R by measuring the right-first-time rate, which cuts across the iterative development of project services. In addition the focus was on the product and not the organisation of the agile PMM.

Whilst product development arguably carries less inherent uncertainty compared to the requirements capture for IT/IS projects, guidance to follow the agile business strategy and employment of agile PMMs was largely ignored amongst the Product Managers and in the product development business line.

4.4 Locating the Decoupling Points

In the IT/IS project line the decoupling point is guided by SCRUM and XP for IT/IS projects and software development respectively. This is guided under the project stages and Sprint-like activities. There will tend to be a decoupling point following scoping the project at the front-end, then minor decoupling points for elements within each stage and Sprint activity.

In the product development business line, the ability to locate decoupling points was considerably constrained by the processes adopted. This applies as much to the analysis as for practitioners on the ground. When the company developed new products one initiative was agile hot-housing, aimed at introducing agile elements to the traditional PMM approach. Agile hot-housing was set up where two competitive teams continually worked in parallel for three days in order to create a feasible solution and the team with the best solution won the project. This occurred once the scope was established, hence after the decoupling point. It substituted some degree of iteration previously applied for parallel working. It has the advantage of accelerating work and echoes traditional PMM procedures of keeping plan-driven linear development. It follows agile intent if the teams are working to a detailed understanding of the customer base and end-users, which was not necessarily the case, as the subsequent analysis demonstrates. Hot-housing has the effect of freezing or reducing the ability to subsequently respond to better team understanding of emergent customer needs. The commencement of hot-housing tended to become the decoupling point and rigidities were formed by its end.

In addition, the L2C and T2R protocols were not structured to adhere to any decoupling points or, when a project element finally needed to be fixed, to place orders. L2C could also be used to freeze content to instigate orders.

In principle, product managers could have re-introduced iterative development subsequently. The agile PMM was perceived as difficult to govern by most product managers. Product managers adhered rigidly to stage-gate decision-making, restricting iterative development between stage-gates regardless of emergent customer needs at later stages. Five core practices were introduced to fit customer requirements whilst retaining the stage-gates. These were claimed to be customer involvement, user stories, iterative development, automated testing and continuous integration. User stories were used to engage customers through a round table practice at the Concept stage, where marketing, customer, product manager and designer explore the customer requirements and tease out latent and tacit expectations through the language of user stories – these follow a specific format with the sole objective of capturing and prioritising requirements. The round table and user stories accelerated requirements capture, but could be used to fix content subsequently.

Whilst agile processes, following the five core practices remained possible, activities tended to fix, or freeze, content at the first opportunity. Hot-housing could reduce the scope for agile practice, framing or reducing opportunity for responsiveness between each subsequent stage-gate, which further reduced agility within any Sprint and for key elements of content. This renders analysis of decoupling points difficult. Overall, the commencement of hot-housing represents the primary decoupling point with its end inducing fixity. Each stage and Sprint has its own decoupling point on a reduced basis.

5. Conclusions and Recommendations

The research considered the agile PMM in one large case organisation. In response to the specific research questions addressed it was found that there was: (i) limited tailoring to the general context, (ii) a greater level of specific tailoring and responsiveness to client needs, (iii) a lack of clarity and therefore ability to identify where the decoupling points were located or could be located to improve customer responsiveness. There was significant variance between business lines. Product development adhered closely to traditional PMMs, while the IT/IS business lines covering software development and IT/IS projects for internal and external clients were generally more diligent in trying to implement the agile PMMs, SCRUM and XP.

There were barriers to implementation across the company despite the fertile conditions provided by the overall agile strategy for the business. Systems and procedures were unaligned, sometimes in order to retain the plan-driven linear approach of traditional PMMs, particularly a Waterfall PMM; while, sometimes the misalignment seemed arbitrary, especially for procedures. Attitudes of product managers and project managers posed resistance, particularly amongst the product managers.

The findings posed a range of analytical issues. Some of those cited or implied are as follows. Inconsistent implementation of PMM in the case company had sufficient awareness and committed adequate resources to implementation. It may have been anticipated that the shortfalls in investment may have yielded problems and posed barriers, but the management assessed the net gains to be beneficial. Further investigation is necessary.

The task focus observed amongst the project managers, coupled with the attitudes of resistance confirm the problems companies face in shifting to a customer focus using agile and contributing towards the increasingly prevalent service-dominant logic [43]. However, exploration of this dimension is beyond the scope of this paper.

The weak systems and procedures applied between the corporate centre and individual projects are endemic problem in temporary organisations linked to both the previous points on investment and service. They give rise to the autonomy of the project manager, empowering them to flout the strategies and policies for implementation, which at worst is for their personal comfort rather than the benefit of their employer, client and other stakeholders (cf.[13]). Further investigation on the power of such attitudes is beyond the scope of this paper.

Apart from the limits described above, the primary limitation of paper is the single case study organisation. Whilst this provides opportunities for in-depth exploration and interpretation, generalities for other agile PMM contexts and companies cannot be made and there is scant literature covering this specific focus. This provides a weakness, but also highlights the original contribution to research this paper is making. The implementation of PMMs has been neglected, especially in relation to how project execution is conducted on the ground specifically to deliver customer benefits. The contribution shows successful execution is frequently judged by practitioners according to internal efficiency and effective fit with prevailing attitudes, rather than customer and stakeholder needs.

Recommendations for practice are that companies adopting new management ideas should thoroughly investigate the investment and maintenance costs of implementing new ideas such as agile concept, agile PMM and indeed other capabilities and competencies. Aligning the customer base to competencies and capabilities is important as new services need to be valued by clients in target markets. This requires careful consideration prior to introducing a new capability and set of competencies. Developing capabilities and competencies needs vigorous attention by senior management and it is recommended that the investments in social capital should be taken more seriously (cf. [44]).

The primary recommendations for research are to explore and examine agile PMMs in comparison to other PMM applications in organisations; compare agile PMM implementation across different companies, and finally to explore PMM application in relation to investment, service delivery and decision-maker attitudes to enhance the emerging body of evidence.

6. References

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