

Business Agility in Technology Companies

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Abstract: Agile approaches have been used in the software business for many years. However, the agile approaches can bring a lot of velocity to many other business areas. Many authors have reported that using agile business approaches instead of conventional business approaches has addressed the needs of productivity in the current era. For successful implementation of the agile business concept in a company, the maturity for using this approach should be evaluated. This paper presents the results of a survey which was carried out regarding agile business issues in the light of maturity. Specifically, the ability of companies to adopt agile approaches was assessed based on the five-level maturity model of which level 5 shows the highest maturity. The results show that most companies are mainly at level three regarding open innovation and business agility. It is recommended that companies should also focus on the actions required at levels four and five. Because of the content of levels four and five, we suggest that company strategies should be aligned with agile strategies based on the agile business concept. We also argue that corporate change management skills are needed to realize levels four and/or five.

Keywords: Agile approach, Maturity, Technology companies

1. Introduction

Technological advances, new consumer demands, and the market globalization have brought out about new opportunities and challenges for companies which try to adopt different approaches to stay ahead of competition. Agile software development is a popular approach which several companies adopt to transform their processes (Denning, 2018; Van Waardenburg et al., 2013) as it can improve their productivity, resilience, and product quality even when applied at a large scale (Ismail et al., 2011; Rigby et al., 2018). Several of the agile principles and strategies focus on software development companies- however, agile approaches can be integrated into several business and domains and positively transform them (Lindvall et al., 2004; Steindl, 2005).

Nonetheless, the way agile methods affect each company is unique (Fraser et al., 2006) and their successful integration is also influenced by numerous factors (Shahane et al., 2014). The profile of a company (Bottani, 2010), its culture (Tolfo et al., 2011), and the practices used to adopt agile methods (Gerster et al., 2019) are some of the factors that impact the degree at which agile approaches can effectively be integrated and which transform the existing practices and processes of a company. Due to the variety in which agile approaches influences companies, it is important to measure to what degree they have been adopted and integrated within companies (Choraś et al., 2020; Kanakaris et al., 2019). By doing so, companies would be able to develop a notion of business agility (Setiawati et al., 2022).

The aims of this paper are to reveal the status of the business agility maturity in companies especially in Finland. In the following sections we clarify the differences between agile methods in software development, business agility, and the maturity model used to assess the agility in an organization. Thereafter, the methodology used and the data analysis are presented. Finally, the results of this study are further discussed and conclusive remarks are provided.

2. Agile Methods in Software Development

An agile way of work starts with understanding agile software development. Agile software development was created as a response to the heavy plan-driven software process improvement approach (Siakas et al., 2005; 2006) at the end of the 1990s. The Agile manifesto (Beck et al., 2001) explained agile software and system development as light way business-centric, communicative, and fast developing of new software and systems. In agile software development continuous adaption is used in an iterative process for fast delivery of working software embracing changes in the requirements (often caused by a turbulent external business environment),

end-user participation (customers on board for understanding customer needs), and creative software developers (empowerment of software engineers, collective ownership, and team rotation) (Georgiadou et al., 2019; Siakas et al., 2005; 2006).

Agile methods have increasingly been used in software development since the creation of the agile manifesto in 2001 and focus on an iterative and collaborative process (Siakas et al., 2005, Berki et al., 2007; Siakas and Siakas, 2007, Baskerville, 2011), while business agility refers to a broader capacity of an organization facing a volatile, uncertain, complex, and ambiguous business environment to swiftly respond by adapting to changing circumstances, emphasizing overall adaptability and responsiveness (Girod et al., 2023, Ronzon et al., 2019). For distributed software development, which today is a norm, there are different challenges related to differences in time, location, and culture (Siakas & Siakas, 2006; Struciński et al., 2014; Lampropoulos et al., 2018).

Agile methods, as adopted in ICT companies, include certain features, such as (Beck et al., 2001):

- highest customer satisfaction based on continuous delivery of software:
- changes to software features are possible at any time of the development process,
- frequent delivery of software in the timescale from a couple of weeks to some months,
- nonstop interaction between users and developers in projects,
- good working environment for project work is needed,
- emphasis on face-to-face communication when running a project,
- working software as major measure regarding level of project success,
- promotion of sustainable development through agile processes,
- nonstop quality control that enhances agility,
- avoidance of complexity - simple ways of working,
- self-organizing teams enabling best results in different ICT throughputs, and
- intervals in design which, in turn, enable good effectiveness and behavior.

3. Business Agility

The concept of business agility has its roots in agile software development, but has mainly been discussed in other areas than ICTs. Two main approaches build on agile principles, the agile method used in software development and the use of agile principles to create an organization-wide (digital) transformation by accelerating the principles and facilitating digital change (Beretta & Smith, 2023). Beretta and Smith (2023) argued that “agile has become an organization-wide movement where firms are striving for excellence in business agility as they seek to adapt to the fast-changing business environment”. However, to satisfactorily adopt, promote, and integrate business agility approaches, there are several challenges and issues that must be addressed (Goodhue et al., 2009) When implementing agile approaches within an entire organization, significant cultural changes occur and focus is put on aspects such as leadership behaviors suitable for business agility, digital mindset, customer-centric thinking, alignment between business and IT strategy, as well as dynamic and innovative capabilities (Mkoba & Marnewick, 2022; Sidhu, 2023). Hence, the adoption and implementation of agile approaches require significant cultural changes (Iivari & Iivari, 2011).

According to Uimonen (2024), business agility should be implemented by companies to acquire good level of strategic risk management and dynamic capabilities. Dynamic capabilities involve agility and resilience, which are related concepts. With these concepts, it is easier to approach increasing uncertainty in companies’ environment. Shams et al. (2021) claimed that business agility is particularly crucial in multinational enterprises (MNEs) operating in culturally different host countries. They identified factors dealing with continuous change and uncertainty that affect agile route-to-market (RTM) decisions at micro-market levels for enabling strategic renewal and sustainability in socio-economic contexts. They created a conceptual framework that aligns strategic business agility with the integration of different operational areas, such as supply change, ICTs and production. Lakshman and Gonzales (2023) argued that multiculturalism in top management teams influences cultural intelligence on team-level. In MNEs, this endorses business model innovation and enhances organizational dynamic capability and strategic business agility. The results of a study conducted by Troise et al. (2023) regarding the performance of young innovative companies showed a strong relationship between entrepreneurial alertness and digital platform capability, organizational agility, and business model innovation.

The current turbulent business era with new tools, such as generative artificial intelligence tools, have brought more velocity to the business life (Kanbach et al., 2024). Hence, it is important to understand business agility and other related concepts in management theory, such as dynamic capabilities, strategic flexibility, market orientation, and absorptive capacity (Overby et al., 2006). Wang et al. (2022) suggested that innovative use of

chatbots are drivers for creating business agility and business sustainability. To obtain the benefits of business agility, companies should create and adopt flexible business models and processes and encourage all the involved stakeholders to pursue an agile way of working.

Singh et al. (2013) emphasized that the notion of business agility “has received neither a consistent treatment in the literature nor a coherent typology or theory of its meaning (i.e., what it is) and significance (i.e., why it matters) to guide a systematic program of research”. Business agility refers to the ability of a company to adapt to changes in the business environment. Girod et al., (2023) argued that different disciplines have articulated different versions of the term, such as agile software development, marketing agility, supply chain agility, strategic business agility, and international business agility, conveying slightly different meanings. Nevertheless, the common notion of business agility in the different versions refers to complex and ambiguous concepts developed in rapidly changing environments regarding a company’s capability to operate in a flexible way and to take advantage of their resources, such as technology, for efficiently identifying and addressing opportunities and threats (Mathiassen & Pries-Heje, 2006). Shams et al. (2021) stated that (strategic) business agility refers to the ability of an organization to renew itself, to adjust its strategic directions, and to develop novel approaches to create value when facing new developments (Shams et al., 2021). Troise et al. (2022) defined business agility as “a firm’s ability to respond to the challenges posed by the changing and uncertain environment and to renew its business. Overby et al., (2006) divided business agility into two capabilities, namely sensing (the capacity of identifying and foreseeing potential future opportunities) and responding (doing the necessary changes for exploiting new opportunities). Information and Communication Technologies (ICTs) are enablers for quickly sensing environmental changes and as a result, increase the likelihood of responding to change. A competitive advantage is created. By having compelling responding capability companies can provide incentives for identifying emerging opportunities which, in turn, improves the company overall sensing capability. The way ICT capabilities directly affect business agility is twofold, namely through the process integration capability (alignment of processes for capturing data/information pertaining customers, orders, and suppliers) and the knowledge management capability (processing of key information and sharing it with decision-makers). Therefore, decision making based on swift information identifying opportunities and threats in combination with forward-thinking is a strong enabler of business agility. Ilmudeen (2022) proposed that IT-enabled dynamic capabilities impact on the innovative capability of an organization and its business agility. Similarly, Škare and Soriano (2023) prove statistically that there is a strong relationship between the national / industry level of digitalization and agility. Ilmudeen (2022) concluded that operational agility is achieved due to ICT enabled sensing, and subsequent responding by taking advantage of opportunities for innovation and competitive action. The results of a study by Ashrafi et al. (2019) indicated that business analytics strongly impact on business agility because information quality increases (sensing) and as a result, innovative capability also raises (responding). According to Perkin and Abraham (2017), Jeff Bezos, the founder of Amazon, has clarified the business agility in the following way: “In today’s era of volatility, there is no other way but to re-invent. The only sustainable advantage you can have over others is agility, that’s it. Because nothing else is sustainable, everything else you create, somebody else will replicate.”

According to Perkin and Abraham (2017), business agility is needed in general because of four reasons. These are digital transformation (integration of digital technology into all areas of a business), increasing velocity (speed of meeting certain milestones), need for focusing more, and need for flexibility. The digital transformation means responding to the needs of humans through technology. Velocity refers to the faster development of products and services. Focusing means concentrating on the strategy of a company and customers’ needs. Flexibility refers to the skills required to work in different ways based on business needs. Perkin and Abraham (2017) described the steps to agile business including phases, such as “personal”, “principles”, “process”, “practice”, and “pace”.

4. Maturity Model for Business Agility

Maturity assessment is used to investigate the current maturity level of a certain aspect of a company. The aim of such an assessment is to facilitate stakeholders in identifying strengths and weaknesses, and in prioritizing actions for reaching higher maturity levels. A business agility maturity framework has been developed to illustrate the agility expertise and capabilities of an organization, by combining metrics in a number of areas of agility, thus, revealing areas of excellence and also areas for possible enhancement so as to attain the next level of maturity (Cox, 2021). The business agility concept is a strategic option for a company. A road map is essential in order for a company to become more successful. According to our literature review in previous sections, the literature provides what is needed in the adoption of business agility. However, these sources do not provide

road maps for the guidance for improving business agility in companies. Therefore, a maturity model analysis helps companies to improve business agility in their businesses.

Maturity models can offer crucial guidance to companies which in turn can lead to their business becoming more mature to successfully meet challenges and overcome competition. The maturity model examines capabilities in any company (Enkel et al., (2011). The maturity model for the business agility includes the following five levels (Cox, 2021):

Level 1: Siloed operations, command and control management, no business architecture, no or few documented processes, success based on individual performance, no measurements, initiatives poorly managed, mistakes are penalized, and using a keeping people busy policy.

Level 2: Work can be quantified, value is used for more productive work, the transparency and shared understanding of work, and evaluation some metrics are in use.

Level 3: Agile principles are adopted at the business level, strategic goals have incremental checkpoints to ensure that all work aligns with organizational goals, management is moving to servant leadership.

Level 4: All business results have relative targets and regular measures (including non-financial measures). Specifically, work, projects, and/or products should be able to start, pivoted (changed) and stop easily.

Level 5: Adaptive funding models have been used to allocate funds against value streams. Governance is aligned with value delivery. System thinking approach to business has been accepted. Work, systems, and value streams have been visualized in a way that renders their management more feasible.

5. Methodology

Using the maturity model as a basis for examining the business agility levels, a survey was conducted over the time period of spring 2023. The aim of the survey was to reveal the status of the business agility maturity in the companies especially in Finland based on employees' perspectives. The participants who were master students received a set of questions in the business agility context which focuses on maturity levels two to five. Three to four business related questions were included for each maturity level. The questions included in the survey for each maturity level are presented below:

- "How well the work has been quantified/measured as the activity which creates more value at your workplace?" (Level 2)
- "How well do you believe that added value has been understood as the source of better work?" (Level 2)
- "How well do you believe that there is transparency in the work activities at your workplace?" (Level 2)
- "How much you believe that there are metrics available for measuring the work success?" (Level 2)
- "How much you believe that agile principles and values have been accepted at your workplace?" (Level 3)
- How much you believe that strategic goals are connected to the real work at your workplace?" (Level 3)
- "How much you believe that your managers have attitude to serve (especially your customers/clients) in your workplace?" (Level 3)
- "How much you believe that all business results have targets and regular measures including non-financial measures in your workplace?" (Level 4)
- "How much you believe that how easily the new work can be started in your workplace?" (Level 4)
- "How much you believe that how easily old work can be changed or can be stopped in your workplace?" (Level 4)
- "How much you believe that funding for the most valuable things in your workplace can be possible?" (Level 5)
- "How much you believe that your administration is connected to the creation of value through the business at your workplace?" (Level 5)
- "How much you believe that system thinking has been adopted in the business at your workplace?" (Level 5)
- "How much you believe that work, systems and value streams are visualized and managed?" (Level 5)

After being given the above-mentioned claims, the participants were able to provide their comments on promoting open innovation. Particularly, the focus was on which aspects and elements promote open innovation and which ones hinder it.

In total, 61 master students, 32 females and 29 males, whose mean age was 34 years (range 20-55 years), participated in this survey. Particularly, 39 of the students, who participated were from three different higher education institutes in Finland while the other 9 were from a higher education institute in Germany and the other 13 from a university in Morocco. The respondents were full-time engineering professionals who participated in the technology organizations' leadership courses in their universities. They had mean working experience of 12 years (range 1-30 years). 16 respondents worked in operational level positions, 30 in mid-level positions (as an expert with responsibility), and 12 in executive positions (management). 28 respondents worked in ICT companies and other respondents worked in other technology areas including construction, chemical engineering, steel and zinc production. The respondents worked mostly in technology expert positions.

The survey for this study was voluntary and anonymous. The data collection process involved the use of an online questionnaire which was uploaded on the Webropol platform as well as the use of a paper-based one. The participants rated each item (variable) of attributes on a Likert scale of 1 to 5 where 1 meant "Done extremely badly" (Extremely low) and 5 meant "Extremely high" (extremely well). Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). The analysis followed a quantitative approach and focused on the average of the participants' responses and on the outcomes of T-tests.

6. Data analysis

To examine the participants' responses, their answers to each question of each particular maturity level were analyzed. Specifically, the average score for each question as well as the mean score of their responses to the questions related to a specific maturity level were examined. Of the total 5 maturity levels, levels 2 to 5 were included in this analysis. Since maturity level 1 does not showcase any significant proof regarding company business agility, it was not included in this study. In particular, Table 1 presents the questions and the average scores of responses of maturity level 2 and Table 2 presents the related information about maturity level 3. Table 3 represents the questions and responses relevant to maturity level 4. Finally, Table 4 showcases the participants' average scores and the questions related to maturity level 5.

Tables 1-4 (see next page) depict participants' average score for each question based on the 5-points Likert scale as well as the statistical significance (p) of each claim.

Table 1: Maturity level 2 questions and average score of responses

Question	Average
"How well the work has been quantified/measured as the activity which creates more value at your workplace?"	3.59
"How well do you believe that added value has been understood as the source of better work?"	3.49
"How well do you believe that there is transparency in the work activities at your workplace?"	3.48
"How much you believe that there are metrics available for measuring the work success?"	3.41
Mean of responses at level 2	3.49

Table 2: Maturity level 3 questions and average score of responses

Question	Average
"How much you believe that agile principles and values have been accepted at your workplace?"	3.16
"How much you believe that strategic goals are connected to the real work at your workplace?"	3.58
"How much you believe that your managers have attitude to serve (especially your customers/clients) in your workplace?"	3.62
Mean of responses at level 3	3.45

Table 3: Maturity level 4 questions and average score of responses

Question	Average
“How much you believe that all business results have targets and regular measures including non-financial measures in your workplace?”	3.38
“How much you believe that how easily the new work can be started in your workplace?”	3.48
“How much you believe that how easily old work can be changed or can be stopped in your workplace?”	3.03
Mean of responses at level 4	3.30

Table 4: Maturity level 5 questions and average score of responses

Question	Average
“How much you believe that funding for the most valuable things in your workplace can be possible?”	3.49
“How much you believe that your administration is connected to the creation of value through the business at your workplace?”	3.36
“How much you believe that system thinking has been adopted in the business at your workplace?”	3.03
“How much you believe that work, systems and value streams are visualized and managed?”	3.49
Mean of responses at level 5	3.34

Furthermore, to get a better understanding of the participants’ responses, we created a sum variable for each of the maturity levels and compared the sum means using the T-test. According to Kolmogorov test, the responses data agreed with the normal distribution. For that reason, conducting statistical data analysis through T-test was deemed as an appropriate method. The related results are showcased in Table 5.

Table 5: Comparing means

Comparing means using T-Test	
Level 2 responses versus Level 3 responses	p=.751
Level 3 responses versus Level 4 responses	p=.249
Level 4 responses versus Level 5 responses	p=.957

The results show that in most companies, agile business practices are currently at level 2 to 3. However, the differences when proceeding from low levels to upper levels are not significant. The notable thing is that the respondents evaluated some features of agile business less significant in their organizations. These features were “How much you believe that agile principles and values have been accepted at your workplace?”, “How much you believe that how easily old work can be changed or can be stopped in your workplace?”, and “How much you believe that system thinking has been adopted in the business at your workplace?”.

7. Discussion

As technologies become more advanced and complex, their role in companies is becoming more important. Companies have to effectively adopt and integrate ICT tools in their processes to stay ahead of the ever-increasing competitive global market. Agile approaches offer several benefits throughout the product or service development cycle. Although many companies use agile approaches, there is a great variety regarding the degree in which companies are able to fully integrate them. Employees have first-hand experience in many of the processes of a company. Therefore, their perspectives are closely related to the true capabilities of a company to integrate agile approaches.

Therefore, this study focused on the viewpoints of master student who were also working in technology related companies. Emphasis was put on levels 2 to 5 of the company maturity level. Specifically, the participants quoted that system thinking has not been effectively adopted at their workplace, that changing and stopping existing processes and practices that use the old ways is difficult, and that agile values and principles have not yet been accepted at the workplace at the level that they should. Additionally, the participants most agreed that managers have an attitude to serve, that quantifying/measuring their work adds value at their workplace, and that strategic goals are closely connected to the real work environment. From the results, it was revealed that the majority of the companies examined are currently at maturity levels 2 or 3. Hence, companies should focus more on further adopting appropriate practices and methods to improve their ability to effectively integrate agile approaches.

Moreover, our results show that the agile business concept has been moderately accepted in companies. We found that in three issues of our survey, namely i) “adoption of principles and values” ii) “changing work” and iii) “system thinking”, more understanding is needed and this understanding can be achieved through training and changing management activities. These are fundamentals which can help companies to meet the need of velocity which has been argued in section 3 (Uimonen, 2024; Shams et al, 2021).

In the adoption of principles and values, the methods of change management are vital because of the cultural change as argued in section 3 (Goodhue et al., 2004; Mkoba & Marnewick, 2022; Sidhu, 2023; Iivari & Iivari, 2011). This should be introduced by the methods for example suggested by Kotter (1996) – this includes actions such as motivating, introducing short-term benefits, introducing long-term benefits, and rewarding employees. The same can be applied to issue two “changing work”. Individual change is slow. Employees’ attitudes toward change are challenging (Ahmad & Cheng, 2018). The third issue “system thinking” is vital for understanding the whole of the company. This can be organized during a company strategic meeting. Our suggestion to meet these challenges is the adaptation of Joiner’s model of business agility (Joiner, 2019).

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