The factors influencing the success of on-going agile software development projects

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Abstract

We propose a model consisting of five people-factors that influence the success of on-going agile software development projects, success being measured in terms of cost, time, and customer satisfaction. After surveying 216 agile practitioners, the results obtained using SEM-PLS suggest that "team capability" and "customer involvement" are the main factors contributing to the success of on-going agile software development projects. These results were triangulated with the mixed-methods approach of a focus group, which supported the findings. By knowing which factors are truly important to achieve success, managers and teams will be able to establish priorities, thereby improving project outcomes. We address this matter, along with research limitations and future work.

Keywords: Agile methodologies; Software development; People factors; Success; mixed-methods.

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1. Introduction

Success in software development projects comes with great difficulty. In fact, one of the greatest challenges in these types of projects is to realise how software development can be enhanced in order to avoid its failure (Chow & Cao, 2008). According to Henriksen and Pedersen (2017), publishing the agile manifesto has increased the success rates of agile software development projects, although there is still a need for improvements and to soften its organisational use. As stated by Persson, Mathiassen, and Aaen (2012), agile practices are gaining space in the business world at an increasing rate, allowing high-tech companies and Information Technology (IT) software development teams to achieve faster results in a wiser way (Henriksen & Pedersen, 2017). Considering that agile methodologies are able to provide innovation and competitiveness, further research is encouraged in order to find new ways to reduce failure rates (Conforto, Amaral, Silva, Di Felippo, & Kamikawachi, 2016).

Several authors such as Misra, Kumar, and Kumar (2009) and Stankovic, Nikolic, Djordjevic, and Cao (2013) have helped to mitigate agile software development project failure by unveiling different success factors in distinct dimensions. “People” is one of those dimensions, and it represents a fundamental aspect of the agile movement, requiring motivated and flexible individuals in a support-based environment (Boehm & Turner, 2005). Regarding the reasons why software projects were failing, Ahimbisibwe, Cavana, and Daellenbach (2015) argued that technical issues were rarely the cause, and that problems may arise from people, and that this can be counteracted with proper people management.

This research seeks to maximise the success probability of future agile software development projects. We have selected and characterised five people-factors from two previous studies by Chow and Cao (2008), and Misra et al. (2009) that proved to be significantly related to agile software development project success. The factors “personal characteristics”, “training and learning”, “societal culture”, “team capability”, and “customer involvement” were combined into a conceptual model and its validity was tested. The analysis addresses the following question:

What are the people factors influencing the success of agile software development projects?

Our contribution to the body of literature is fivefold. First, to the best of our knowledge, this is the first time that the relevant people-factors found by Chow and Cao (2008), and Misra et al. (2009) are combined to explain the success in agile software development projects. By using the important people-factors from these studies, we had the opportunity to confirm the factors' validity, unveiling the ones that are truly significant for success. Second, we have built a comprehensive and scalable model that offers a consistent characterisation of the People dimension, which can be used by agile researchers in the future. Third, we investigate the training and learning dimension that moderates the success in agile software development projects. Studying the training and learning relationship with success in agile software development may explain people's beliefs and behaviours. Four, no study has conducted a holistic evaluation of personal characteristics and societal culture to understand the full effect (direct and indirect effects) on team capability and customer involvement and their impact on the success in agile software development projects. Our research also contributes to the literature by studying the impacts of mediation effects in the agile context. By connecting these two dimensions (team capability and customer involvement), it assesses the full effect of personal characteristics and societal culture and their direct and indirect effect on project success. Finally, we draw on a focus group discussion aiming to triangulate our empirical results and support the findings. By offering mixed methods, research is potentially superior and provides stronger inferences to a single method approach (Collins, Onwuegbuzie, & Jiao, 2006; Venkatesh, Brown, & Sullivan, 2016). Each method has strengths and weakness, and the combination of quantitative and qualitative method complements each other and offers a more robust analysis.

We have structured this work as follows. First, we introduce the concept of project success, and agile software development related topics based on the literature. Then, we present the research model and hypotheses, followed by the methods used. Lastly, we discuss the results obtained, mentioning theoretical and managerial implications along with research limitations and future work.

2. Background

2.1. Project success

The ways of measuring project success and how to achieve it have gradually evolved throughout the years. At first, the literature used the iron triangle for project assessment, then critical success factors

(CSF) lists were developed, followed by the introduction of the first success frameworks. These frameworks started to emphasise customer focus, something that has continued into the 21st century.

Considering the success factors in agile software projects, Chow and Cao (2008) conducted a study to identify the most imperative factors that would contribute to a successful agile software development project. Their research has managed to collect many success factors that were cited in previous agile literature.

Their study defined success using four attributes: Quality (delivering good product or project outcome), Scope (meeting all requirements and objectives), Time (delivering on time), and Cost (delivering within estimated cost and effort) (Chow & Cao, 2008).

After a reliability and factor analysis that provided 12 possible success factors, was systematised into Organisational, People, Process, Technical, and Project dimensions. The multiple regression analysis of results demonstrated that a correct delivery strategy, proper use of agile software techniques, and a high calibre team were critical factors for agile software project success. However, some other factors like a team environment, project management process, and customer involvement can also be considered as critical to a certain extent (Chow & Cao, 2008). Of the five factor categories proposed, both People and Technical were considered as the most important dimensions for on-going agile software development project success. However, the study failed to prove that some popular factors such as strong executive support, strong sponsor commitment, the availability of a physical agile facility, or agile-appropriate project types were indeed prerequisites for a successful project.

Years later, Stankovic et al. (2013) extended Chow and Cao's (2008) work. The same 12 possible CSFs were utilised to study the former Yugoslavian perspective about agile software development project success. The investigation revealed that project nature can be considered as a critical factor attending to time and cost attributes, in which project type and project definition process can also be regarded as critical, but solely in terms of cost. It is noteworthy that their research did not manage to prove that the CSFs identified by Chow and Cao (2008) were indeed critical for a successful agile software development project.

2.1.1. The iron triangle and critical success factors listings

Time, cost, and quality, known as the iron triangle of project management (Atkinson, 1999) are metrics used to assess project success. Atkinson added that time and cost were seen as estimates, calculating both when the project planning phase lacked information, while quality depended on people’s beliefs and perceptions, which could be altered throughout the project. According to Lim and Mohamed

(1999), and considering the project life-cycle, these metrics were used as success measures of the project implementation phase. However, there was a lack of project assessment after delivery, which could allow a wider perspective in terms of success analysis (Atkinson, 1999). As stated by Jugdev and Müller (2005), measuring success after delivery allows team members to make a project effectiveness analysis in which they assume the stakeholder's perspective about the benefits provided.

Rockart (1979) first presented the CSF concept with the purpose of identifying crucial information for managers to work with (Stankovic et al., 2013). In addition, Kerzner (1987) defined CSFs as the project elements that could not fail, and at this point, due to the increasing market competitiveness, the literature was turning attention to stakeholder satisfaction as a metric for project success (Jugdev & Müller, 2005). As stated by Munns and Bjeirmi (1996), to assure quality, there is a need to satisfy end-users' necessities. For Clarke (1999) the critical factors influencing project success were based on communication and its effectiveness, clear objectives, and scope, splitting the project into manageable blocks, and the use of project plans as living documents. The period comprising the 1980s and '90s witnessed the identification and description of several useful CSFs, including the production of the ten success factors list by Pinto and Slevin (1987).

After the year 2000, CSF lists were still being created by leading authors such as Cooke-Davies (2002), Jugdev and Müller (2005), and Ika, Diallo, and Thuillier (2012). The Standish Group has also published reports studying project successes and failures, especially in the IT area, since 1994. Their 2013 publication revealed that only 39% were considered to be successfully concluded projects. The main success factors for IT projects were also reported: executive management support, user involvement, optimisation, skilled resources, project management expertise, agile process, clear business objectives, emotional maturity, execution, and tools and infrastructure (The Standish Group International, 2013). Despite all the lists created, no standard one can be applied to all projects (Todorović, Petrović, Mihić, Obradović, & Bushuyev, 2015).

According to Badewi (2016), time and cost are still being used as attributes to assess project performance. Both of these attributes have been applied within different business areas, such as engineering and construction as indicated by Lim and Mohamed (1999), or agile software development, as reported by Stankovic et al. (2013). The time attribute refers to on-time delivery, while cost emphasises the compliance with the estimated budget (Toor & Ogunlana, 2010). As reported by Badewi (2016), in addition to finishing on time and within budget, project stakeholders also need to extract benefits from the project's output to justify their investment, which leads to customer satisfaction. Customer satisfaction relates to how the customer perceives the performance of

the final product which involves its adherence to a pre-defined set of goals; if expectations were lower than the actual performance, then customer satisfaction would be reached (Haverila & Fehr, 2016). For Alvertis et al. (2016), success is highly dependent on how the software solution fulfils the expectations of the users addressed. In this research, we use the term "customer" as a reference to the end-user.

Considering the previous statements and this research dependent variable "agile software development project success", we have delineated our success definition based on time, cost, and customer satisfaction.

2.1.2. Project success frameworks

The project success elements were Morris and Hough's (1987) pioneer framework, in which the authors analysed project success in terms of functionality, management, contractors' commercial performance, and termination. Project functionality evaluates if the financial and technical requirements are met, while project management assesses if the project meets the schedule, budget, and specifications. Contractors' commercial performance understands if the contractors have reached a commercial benefit with the project or not. Finally, project performance concerns an efficient and reasonable decision in case of possible project cancellation. However, the authors' work did not have much initial impact within the research community, since CSF lists were still being created and the newly proposed frameworks were not built upon following Morris and Hough's publication (Jugdev & Müller, 2005).

A framework for implementation success was developed by Pinto and Slevin (1988) consisting of three success elements: technical validity, organisational validity, and organisational effectiveness. Technical validity establishes an assessment with the purpose to understand if the project is working as desired. Organisational validity considers if the clients' requirements and needs will be satisfied with the project and if they will use it. Lastly, organisational effectiveness regards the positive contributions offered by the project when delivered to the organisation. Both organisational validity and organisational effectiveness are equally significant to the project organisation and the client. This schema means that project success should be assessed internally, which was the focus of the early literature, and externally, in which the client is central to project success (Pinto & Slevin, 1988). For Munns and Bjeirmi (1996) project success requires progress throughout the implementation phase, end-users' perception about the product, and customer satisfaction. The project team should also be present at the project's utilisation phase, allowing the confirmation of end-users' requirements (Munns & Bjeirmi, 1996).

Belassi and Tukel (1996) created a holistic framework of industry and firm-related factors. The authors noticed that there was a need for a success factor classification, allowing to associate each factor with a specific category. The classification would also permit an analysis of the established relationships between success factors. Four categories were proposed to perform that classification: factors related to the project, project manager and team, organisation, and external environment (Belassi & Tukel, 1996). The authors' work has also shown that success factors can vary according to the industry type and that top management support is crucial.

A year later, Shenhar, Levy, and Dvir (1997) conducted a study that resulted in a proposition of a multidimensional framework to assess project success. Project efficiency, impact on the customer, business success, and preparing for the future were the four dimensions proposed (Shenhar et al., 1997). The authors also managed to identify three success clusters: meeting design goals (time, budget, and performance), customer impact, and benefits to the organisation. It was also verified that time and budget are resource-related while meeting the performance is associated with customer satisfaction. They concluded that customer satisfaction was the main factor to achieve project success, followed by the elements of the Iron Triangle. Project success includes consequences over a shorter and longer period, and some of those consequences are the efficiency of the project, success within the business, and preparation for future events (Shenhar et al., 1997).

A technically well-accomplished project is no longer enough of a criterion to be classified as successful. Pinto and Slevin (1988) affirmed that greater importance was being given to how the client accepted projects and Lester (1998) stated that success was dependent on the project stakeholders, involving constant interaction between organisations. Herein we consider it valuable to deepen this theme, as substantiated in the next section.

2.1.3. Stakeholders involvement

In the early 21st-century, project success started to be seen as something that both project and client organisation should be reaching together (Turner & Müller, 2003). According to Davis (2014), the involvement of major project stakeholders such as the project owner and sponsor has become important for success achievement.

Turner (2004, p. 350) highlighted four success conditions that encompass the project owner's importance:

1) Success criteria should be agreed on with the stakeholders before the start of the project, and repeatedly at configuration review points throughout the project.

2) A collaborative working relationship should be maintained between the project owner and project manager, with both viewing the project as a partnership.
3) The project manager should be empowered with the owner giving guidance as to how they think the project should be achieved but allowing the project manager flexibility to deal with unforeseen circumstances as they see best.
4) The owner should take an interest in the performance of the project.

These four conditions must all be achieved for a successful project, but they cannot guarantee it (Turner, 2004). Stakeholder involvement can also help to decrease project risk since the process of managing their needs is facilitated, which impacts project success (Atkin & Skitmore, 2008). Vrhovec et al. (2015) identified stakeholder resistance as a serious organisational risk for project success.

2.2. Agile software development

In February 2001, a group of 17 leading software process methodologists participated in a summit to uncover better ways to develop software (Chow & Cao, 2008). The participants' efforts resulted in the agile manifesto for software development, which addresses the inflexibility inherent to traditional project methodologies and its negative impact on software project results (Lechler & Yang, 2017). According to Campanelli and Parreiras (2015), the manifesto gathered principles and values from already well established agile methods and approaches, transposing them to the software development business. The main focus of the agile values are "Individuals and interactions, Working software, Customer collaboration, and Responding to change" (Campanelli & Parreiras, 2015, p.86).

The Agile Alliance (2001) also published 12 Agile principles, namely, "Valuable software delivery on an early and continuous basis, Requirements changes are welcome, Deliver software frequently, Constant interaction between business people and developers, Motivated working people, Prioritise face-to-face communication, Working software is progress, Keep a constant working pace, Good design allied to technical excellence, Work simplicity, Self-organising teams, and Improve continuously".

As evidenced by Fernandez and Fernandez (2008), agile and traditional (plan-driven) methodologies are substantially different. Defined as an incremental and iterative approach, agile avoids some of the plan-driven characteristics, such as low customer collaboration and projects with fixed scopes; these are described in the literature as symptoms of unsuccessful projects (Serrador & Pinto, 2015). It is unanimously accepted that agile methods allow for better handling of unstable requirements when compared to the traditional approaches, delivering high-quality software in a short period and under

budget (Campanelli & Parreiras, 2015). Agile methods are also able to improve productivity, flexibility, and business alignment (Henderson-Sellers & Ralyté, 2010). Table 1 summarises some differences between traditional and agile approaches.

Table 1 Traditional development versus Agile development

Traditional development	**Agile development**
1. Follows a top-down approach, and making changes is not easy	**1.** Team conducts experiments on various techniques and gradually arrives at the best possible solution
2. It has a leadership style of working	**2.** In agile, there is a free flow of communication; anyone can present their ideas within the team
3. Pre-planning is done to carry out the various phases	**3.** Is more flexible as compared to the traditional model, as it can change its workflow based on any new request for modifications
4. Customer is involved only in the initial phases of requirements gathering	**4.** Customer involvement is crucial for this model to prove its mettle
5. The project plan is prepared before commencing the process of system development	**5.** Project work is delivered to the client in increments, that is, as, and when one module is prepared, a demonstration is given to the client, to confirm the work progress in the right direction
6. The ownership lies in the project manager	**6.** It has the concept of shared ownership, i.e., every team member is equally responsible for their individual contribution
7. There is a one-time delivery of the product	**7.** Relies on incremental delivery of the product
8. The organisational structure is mechanical (bureaucratic, high formalisation), targeting large organisations	**8.** The structure is organic (flexible and participative, encourages social cooperation), targeting small and medium organisations

Currently, the most popular agile methods for software development are Extreme Programming (XP), SCRUM, Kanban, Feature Driven Development (FDD), Dynamic System Development Method (DSDM), Adaptive Software Development (ASD), Crystal (Campanelli & Parreiras, 2015). It is important to note that these methods were conceived to use minimal amounts of documentation, thereby increasing flexibility and responsiveness to changing requirements, which contrasts with the plan-driven methodologies (Serrador & Pinto, 2015).

Despite all the benefits provided by agile methods, their adoption is still complex due to within-firm features like change resistance, organisational culture, and lack of management support and involvement (Chow & Cao, 2008; Dyba & Dingsoyr, 2009). Even so, agile methods are a viable option to face the challenges proposed by the software development industry since they prioritise certain features such as quality, budget, time, and business strategy (Santos, Bermejo, Oliveira, & Tonelli, 2011).

3. Research framework and hypotheses

The present research addresses people and people-factors in a way that allows the establishment of priorities in agile software development projects and maximises their chances of success. We have built a research model, as shown in Figure 1, composed of six theoretically well-grounded variables. Agile software development project success, which is this study's dependent variable, is defined in terms of time (i.e. on-time delivery), cost (i.e. on or under budget), and customer satisfaction (i.e. overcoming customer's expectations regarding product performance). As independent variables, five people-factors that are proven to be related to agile software development project success were selected. The factors are personal characteristics, training and learning, societal culture by Misra et al. (2009), team capability, and customer involvement by Chow and Cao (2008). Each model has strengths and weaknesses, and these are offset and complemented by combining the various models. The Misra et al. (2009) and Chow and Cao (2008) models complement each other, meaning that their combination is useful for understanding the impact of project success. Moreover, weaknesses in the two models can be compensated for by connecting them with each other.

By assembling these five factors in our research model, we believe that together they can offer a more consistent characterisation of the people dimension. In summation, we postulate that the previously mentioned people-factors, together, are important contributors to agile software development project success.

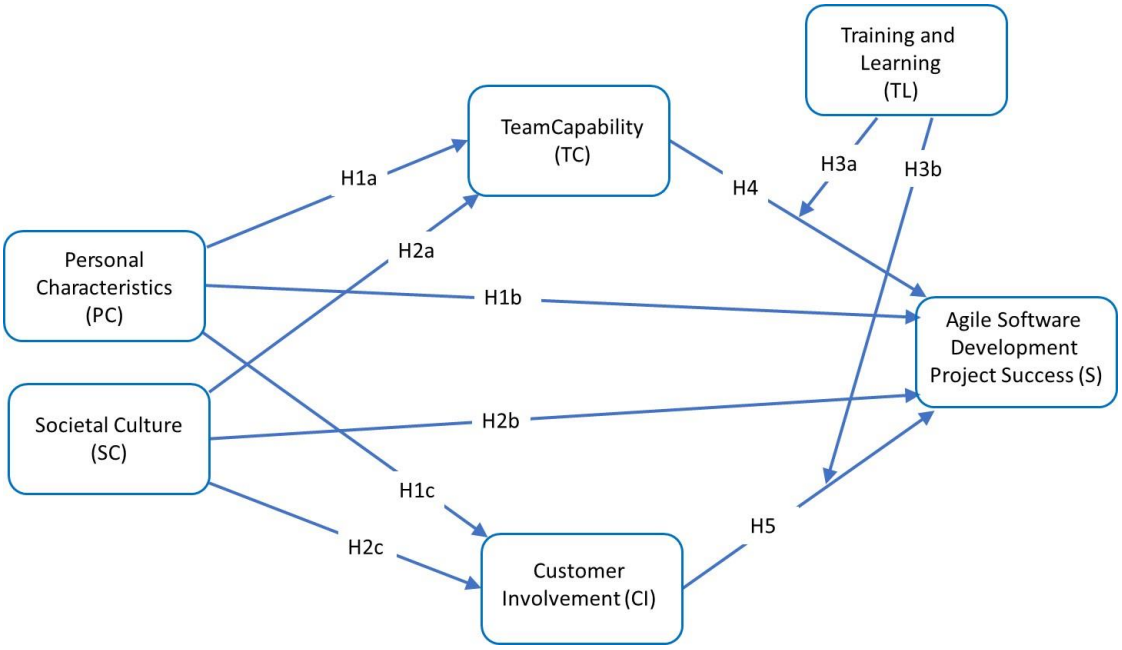

Figure 1. Research Model

3.1. Personal characteristics

As stated by Shipper et al. (2017), personal characteristics accent certain qualities that are not cognitive, such as communication skills, empathy, and resiliency. In this study, we characterise and measure this factor according to the attributes used by Misra et al. (2009), which apart from communication and interpersonal skills, also emphasise honesty, motivation, collaborative attitude, a sense of responsibility, and readiness to learn. In terms of projects, the communication and interpersonal skills, honesty, collaborative attitude, and working with others are part of the necessary set of personal and interpersonal competences for an individual to achieve good performance in a project, programme or portfolio, leading to its success (International Project Management Association, 2015). Considering the above statements and the context of our research, we state the following hypothesis:

H1a: Personal characteristics have a positive influence on team capability.
H1b: Personal characteristics positively influence an agile software development project's success.
H1c: Personal characteristics have a positive influence on customer involvement.

3.2. Societal culture

Similar to any other activity undertaken by humans, inherent regional culture can greatly influence software development, which becomes a relevant factor for on-going agile software development project success (Misra et al., 2009). Societal culture is a system composed of the shared values, beliefs, and norms that are learned and perpetuated over the generations and reflected in the society's laws, policies, and actions (Aycan et al., 2000; Thomas et al., 2010). There is a risk of cultural friction when employees have different societal cultures since the established relationships are composed by a mixture of different perspectives (Thomas, Au, & Ravlin, 2003; Thomas et al., 2010). According to Misra et al. (2009), societal culture affects the degree to which individuals, in general, are more or less communicative, dynamic, and progressive. Regarding the above statements and the context of our research, we state the following hypothesis:

H2a: Societal culture has a positive influence on team capability.
H2b: Societal culture positively influences an agile software development project's success.
H2c: Societal culture has a positive influence on customer involvement.

3.3. Training and learning

According to Misra et al. (2009), training and learning refer to information sharing and continuous learning capabilities that increase the success probability of agile software development practices. Training is an important success factor for large-scale agile transformations, and teams that are not properly trained often struggle to implement a correct application of agile practices (Dikert, Paasivaara, & Lassenius, 2016). However, these practices do not rely on formal training for knowledge sharing. Instead, there is a focus on mentoring and professionally guided discussions, which provides better results (Misra et al., 2009). Since agile practices and techniques do not follow a strict "how-to" guide, the learning process is done through continuous experimentation (Dikert et al., 2016). Considering the above statements and the context of our research, we state the following hypothesis:

H3a: Training and learning positively moderate the impact of team capability on agile software development projects success.
H3b: Training and learning positively moderate the impact of customer involvement on agile software development projects success.

3.4. Team capability

This factor refers to the utilisation of knowledge, along with the conditions that allow teams to accomplish their tasks successfully (Haas, 2006). According to Misra et al. (2009), a highly capable team allows fast deliveries of working software that attends to the customer's requirements. Besides technical competence and expertise, some other attributes were used by Chow and Cao (2008), such as team members' motivation and commitment, agile knowledgeable managers with an adaptive management style, and proper provision of technical training to the project team. Aspects such as commitment and technical expertise are, according to Ahimbisibwe et al. (2015), drivers that allow teams to deal with risks better, thus improving the likelihood of project success. Considering the above statements and the context of our research, we state the following hypothesis:

H4: Team capability is a factor that contributes to an agile software development project's success.

3.5. Customer involvement

As stated by Carbonell, Rodríguez-Escudero, and Pujari (2009), customer involvement reflects the interactions between customer representatives and the company throughout the project duration. An investigation undertaken by Ahimbisibwe et al. (2015) reported that the degree of customer

participation is closely related to the success of a software development project, so projects tend to be more successful with higher levels of customer involvement. According to Bendapudi and Leone (2003), involving customers can also benefit the project in terms of customer satisfaction, and their satisfaction is highly advocated by the first principle of the agile manifesto (Agile Alliance, 2001). This factor will be characterised by customer commitment, authority in the project, and a good relationship with the project organisation (Chow & Cao, 2008). Considering the above statements and the context of our research, we state the following hypothesis:

H5: Customer involvement is a factor that contributes to an agile software development project's success.

3.6. Mediating role of team capability and customer involvement

The success of project management has frequently been associated with the closing outcome of the project. Project management shows us that team capability and customer involvement can establish a link between personal characteristics and societal culture to project success (Geoghegan & Dulewicz, 2008). Team capability and customer involvement could be seen as mediator. For Ahimbisibwe et al. (2015), the influence of personal characteristics and societal culture through team capability and customer involvement are closely related to a project's success. We therefore hypothesise:

H6a: Team capability positively mediates the relationship between personal characteristics and agile software development projects success.

H6b: Team capability positively mediates the relationship between societal culture and agile software development projects success.

H6c: Customer involvement positively mediates the relationship between personal characteristics and agile software development projects success.

H6d: Customer involvement positively mediates the relationship between societal culture and agile software development projects success.

4. Methods

4.1. Measurement

The measurement items used in the present research are based on relevant agile literature. Personal characteristics (PC), training and learning (TL), and societal culture (SC) were adapted from Misra et

al. (2009); team capability (TC), customer involvement (CI), and agile software development project success (S) came from Stankovic et al. (2013). We include all the items in Appendix Table A1.

The target population consisted of individuals who were involved in at least one agile software development project, either as a team member or stakeholder (this was the sole participation requirement). Portugal was the country selected to conduct the investigation.

4.2. Data

This research used an online survey to collect the necessary data. The questionnaire was developed in English, and we did not restrict it to professionals from a specific industry or region in Portugal. To find respondents, we used the professional social network LinkedIn, searching for keywords such as "Agile methodologies" and "Agile Project Management". The survey was also included in the Portuguese Project Management Association's (APOGEP) April newsletter.

The 7-point Likert Scale, ranging from totally disagree (1) to totally agree (7), was used to understand the respondents' agreement level toward each item, except on the perceived level of project success, where the scale ranged from very unsuccessful (1) to very successful (7).

Before sending the final survey, we made a quality and validity pre-test. The quality pre-test was conducted among five agile-knowledgeable individuals who were asked to provide feedback in terms of clear and objective language, making the survey easier to understand. The feedback provided was incorporated before the validity pre-test, which was applied to a group of 30 agile professionals. The validity pre-test group had the exact same answering conditions as in the final survey population since no additional recommendations were made. The data from the validity pre-test were not included in the final analysis.

A total of 600 invitations were sent on 20 March 2018. The final survey was online from 20 March 2018 to 29 April 2018. Two hundred and forty-two responses were received, which corresponds to a 40.3 per cent response rate. Twenty-six responses were removed due to incompleteness, leaving a total of 216 valid answers. A common method bias test was performed using the marker variable technique (Lindell & Whitney, 2001; Malhotra, Kim, & Patil, 2006) to ensure that no systematic bias was influencing the data. The results suggested the absence of significant common method bias in our data.

Considering the characteristics of our sample, most respondents (around 96.8%) attended higher education. The remaining 3.2% are individuals who completed 12th grade or equivalent. Regarding professional status, most individuals (roughly 96.3%) are professionally active, while the remaining

3.7% are either unemployed or students. Considering the respondents' knowledge about agile practices and methods, we verified that most respondents (about 69%) have been agile-knowledgeable for more than three years. In terms of agile experience, the results suggest that around 41.2% have at least five years of usage experience. SCRUM is the method most used by the participants, accounting for 97.7% of the responses.

Regarding the role undertaken by the survey respondents in a specified project, SCRUM Master is the most popular position, obtaining 90 entries which account for roughly 41.7% of all respondents. According to our sample, "Computer-related" is the main industry in which agile software development is being used in Portugal. Additional details are provided in both Tables 2 and 3.

Table 2 Demographic data

Education	**N**	**%**	**Professional Status**	**N**	**%**
Basic education	0	0	Unemployed	6	2.8
12th grade or equivalent	7	3.2	Employee	197	91.2
Bachelor degree	111	51.4	Self-employed	11	5.1
Master degree	98	45.4	Retired	0	0
Doctoral degree	0	0	Student	2	0.9
Agile knowledge	**N**	**%**	**Agile experience**	**N**	**%**
Less than 1 year	8	3.7	Less than 1 year	19	8.8
1 - 2 years	59	27.3	1 - 2 years	64	29.6
3 - 5 years	57	26.4	3 - 5 years	43	19.9
Greater than 5 years	92	42.6	Greater than 5 years	89	41.2
			Not applicable	1	0.5

Table 3 Demographic data

Methods	**N**	**%**	**Role**	**N**	**%**	**Industry**	**N**	**%**
SCRUM	211	97.7	SCRUM Master	90	41.7	Computer-related (Hardware, Software)	74	34.3
Kanban	128	59.3	Developer/Tester	47	21.8	Banking/Insurance	37	17.1
Lean	52	24.3	Product Owner	41	19.0	Consulting	28	13
XP	44	20.4	Agile Coach	13	6.0	Telecommunications	26	12
FDD	19	8.8	Project Manager	6	2.8	Business supplies/services	12	5.6
ASD	4	1.9	SCRUM Master & Developer/Tester	4	1.9	Consumer retail/wholesale	7	3.2
TDD	4	1.9	Delivery Manager	3	1.4	Entertainment	7	3.2
DSDM	2	0.9	Head of Technology	3	1.4	Medical/health care	5	2.3
Others	12	6	Unit Director	2	0.9	Government	4	1.9

Others	7	3.2	Manufacturing/distribution	4	1.9
			Aerospace	3	1.4
			Engineering/construction	2	0.9
			Hospitality	2	0.9
			Education/Research	2	0.9
			Others	3	1.4

5. Results

After gathering the data, we performed the analysis using structural equation modelling (SEM), which is a statistical method to test and estimate causal relationships by using a mixture of statistical data and qualitative causal assumptions. As indicated by Chin, Marcolin, and Newsted (2003), partial least squares (PLS) is a common method used in information systems research, so we used it to test our model hypotheses, ensuring that the outcome of the structural relationships established is obtained from a set of measurement instruments with psychometric attributes. In terms of analytical software to examine the relationships established in our research model, we selected Smart PLS 2.0.M3.

5.1. Measurement model

Composite reliability (CR) was used to test construct reliability. As shown in Table 4, the results suggest that our model has good internal consistency, since all constructs scored above 0.7 (Straub, 1989). An indicator reliability test was also conducted, and according to Churchill (1979) and Henseler, Ringle, and Sinkovics (2009), loadings should be greater than 0.7, and every loading below 0.4 should be removed from the model. Table A2 of the Appendices depicts the PLS loadings and cross-loadings that were extracted from our model. In bold we have represented the loadings, in which the majority scored above 0.7, except for PC1 and PC2. Items PC1 and PC2 scored 0.67 and 0.68 respectively, which are values below 0.7, but still higher than 0.4. Items SC4 and TC1 were excluded for low loading. The convergent validity was tested through the average variance extracted (AVE), which has a minimum reference value of 0.50 indicating that the latent variables explain more than half of the variance of their indicators (Hair, Hult, Ringle, & Sarstedt, 2016; Henseler et al., 2009). The AVE values (Table 4) are above the minimum reference 0.5 for each construct, which ensures convergence. The results obtained a guarantee that the measures utilised in this research are valid and reliable. The Fornell-Larcker criterion and the cross-loadings approach were used to evaluate the discriminant validity of the constructs. The first requires the AVEs' square root value to be higher than the correlations between the construct (Fornell & Larcker, 1981). The diagonal values (AVEs' square

root) in Table 4, are greater than the correlation amongst each pair of constructs (values in off-diagonal). Considering the cross-loadings criterion, it requires the item loading to be greater than all cross-loadings (Chin, 1998; Götz, Liehr-Gobbers, & Krafft, 2010; Grégoire & Fisher, 2006). As seen in Appendix Table A2, the values of the loadings are higher than the cross-loadings, which meets the criterion. Besides a good internal consistency, the results from the measurement model demonstrate that the model also has a favourable indicator reliability, convergent validity, and discriminant validity, allowing the use of all constructs to test the structural model.

Table 4 - Latent variables means, standard deviations (SD), composite reliability (CR), Cronbach's Alpha (CA), and validity (AVE) measures.

Constructs	**Mean**	**SD**	**CR**	**CA**	**PC**	**SC**	**TC**	**CI**	**S**
Personal Characteristics (PC)	5.654	.860	.886	.846	**.752**				
Societal Culture (SC)	5.184	.935	.881	.804	.575	**.845**			
Team Capability (TC)	5.276	1.067	.868	.795	.592	.594	**.790**		
Customer Involvement (CI)	4.864	1.281	.876	.790	.364	.333	.473	**.837**	
Agile Software Development Project Success (S)	5.155	1.135	.884	.806	.430	.422	.621	.529	**.847**

5.2. Structural model

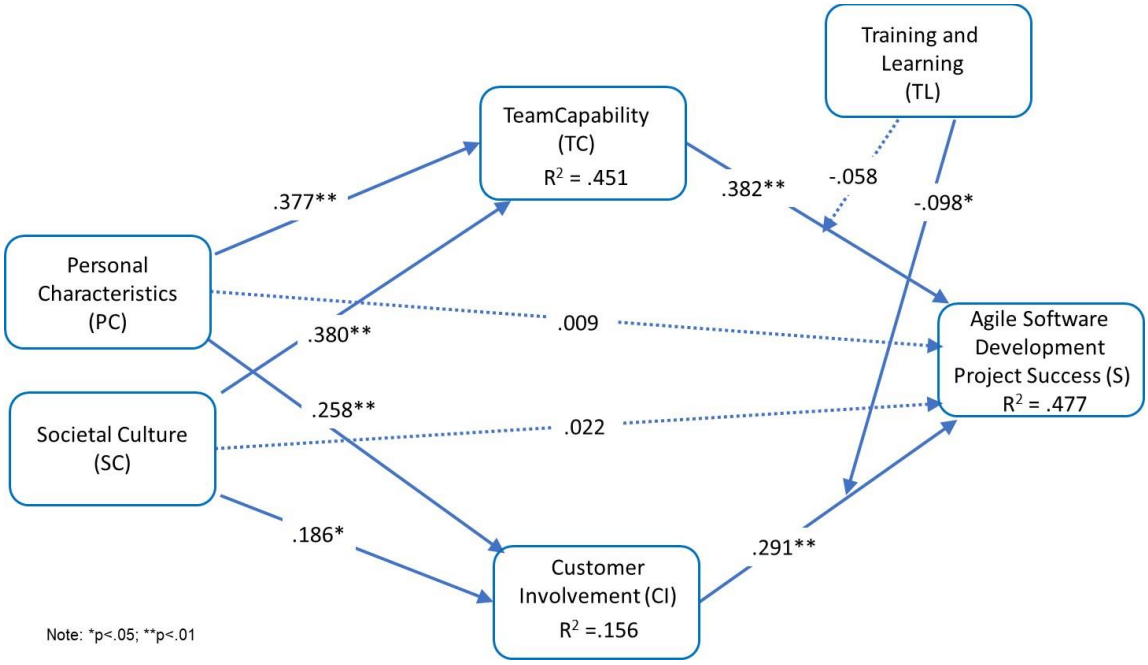

Figure 2. Research Model with results

For the structural model estimation, both R^2 measures and path coefficients level of significance were used. As seen in Figure 2, this study's dependent variable "Agile Software Development Project Success" scored an R^2 of 47.7%. We also assessed the significance of the path coefficients through a bootstrapping procedure with 5,000 resampling iterations (Hair et al., 2016).

The model explains 45.1% of the variation in team capability. Personal characteristics ($\hat{\beta}$=.377, p<.01), and societal culture ($\hat{\beta}$=.380, p<.01) are statistically significant in explaining team capability, thus confirming hypotheses H1a, and H2a. The model explains 15.6% of the variation in customer involvement. Personal characteristics ($\hat{\beta}$= .258, p < .01), and societal culture ($\hat{\beta}$= .186, p < .05) are statistically significant in explaining customer involvement, thus confirming hypotheses H1c and H2c. The model explains 47.7% of the variation in agile software development project success, having as statistically significant variables, team capability ($\hat{\beta}$= .382; p < .01), and customer involvement ($\hat{\beta}$ = .291, p < .01). Therefore, hypotheses H4 and H5 are confirmed. Personal characteristics and societal culture are not statistically significant in explaining agile software development project success, and consequently, H1b and H2b are not confirmed. Training and learning was assessed as a moderating variable in the relationship between team capability and project success (hypothesis H3a) and between customer involvement and project success (hypothesis H3b). Our results show that of the two hypotheses, only H3b is supported, and the paths are negative. For hypothesis H3b, because $\hat{\beta}$= -.098

and p<.05, the high value of training and learning traits weakens the effect of customer involvement on agile software development project success.

5.2.1. Results of the mediating role of team capability and customer involvement

The mediation effect (i.e., indirect effect or mediation) occurs when a third mediator construct plays an intermediary role in the relationship between two constructs (Carrión, Nitzl, & Roldán, 2017). This study has examined the mediating effect of team capability and customer involvement over the relation between personal characteristics and societal culture to project success. Hair et al.'s (2016) process supported our data analysis of the significance of the mediating effect of team capability and customer involvement. Table 5 presents the results, which fulfil the necessary condition to perform the mediator assessment. The results show that team capability and customer involvement can fully mediate the relationship between personal characteristics and societal culture to project success. Therefore, hypotheses H6a, H6b, H6c and H6d are confirmed.

Table 5 – Mediation analysis

	Beta	SD	t-Test	p-value
H6a				
(P1) Personal characteristics -> Team capability	0.380	0.069	5.493	< 0.01
(P2) Team capability -> Projects success	0.377	0.082	4.571	< 0.01
(P3) Personal characteristics -> Projects success	0.009	0.060	0.136	n.s.
(P1*P2) Personal characteristics -> Team capability -> Projects success	0.143	0.041	3.494	< 0.01
(P1*P2*P3)	0.001	0.009	0.111	n.s.
H6b				
(P1) Societal culture -> Team capability	0.381	0.068	5.626	< 0.01
(P2) Team capability -> Projects success	0.377	0.082	4.571	< 0.01
(P3) Societal culture -> Projects success	0.016	0.067	0.237	n.s.
(P1*P2) Societal culture -> Team capability -> Projects success	0.144	0.043	3.364	< 0.01
(P1*P2*P3)	0.001	0.010	0.141	n.s.
H6c				
(P1) Personal characteristics -> Customer involvement	0.262	0.074	3.561	< 0.01
(P2) Customer involvement -> Projects success	0.288	0.076	3.784	< 0.01
(P3) Personal characteristics -> Projects success	0.008	0.060	0.136	n.s.
(P1*P2) Personal characteristics -> Customer involvement -> Projects success	0.076	0.030	2.520	< 0.05
(P1*P2*P3)	0.000	0.005	0.094	n.s.
H6d				
(P1) Societal culture -> Customer involvement	0.187	0.074	2.514	< 0.05
(P2) Customer involvement -> Projects success	0.288	0.076	3.784	< 0.01
(P3) Societal culture -> Projects success	0.016	0.067	0.237	n.s.
(P1*P2) Societal culture -> Customer involvement -> Projects success	0.054	0.027	2.004	< 0.05
(P1*P2*P3)	0.001	0.004	0.221	n.s.

6. Discussion

6.1. Theoretical implications

This study combined people-factors to explain on-going agile software development project success. After performing the PLS-SEM analysis, the conditions are now favourable to provide a concise answer to the research question. Our results show that except for H1b, H2b, and H3a, the hypotheses are supported. We also provide new insight into how personal characteristics and societal culture directly or indirectly influence an on-going agile software development project's success. The results of PLS and mediation analysis confirm the full mediation relationship between personal characteristics and societal culture to project success.

Our research model validates the relationship between personal characteristics, societal culture, and team capability. The model explains 45.1% of the variation in team capability. Specifically, the findings demonstrate how important it is to enhance personal characteristics, and societal culture, and the influence of these on team capability. Personal characteristics and societal culture explain customer involvement in our model. The model explains 15.6% of the variation in customer involvement. Our hypotheses derived from personal characteristics and societal culture to explain customer involvement are supported. The results of personal characteristics and societal culture to explain customer involvement are consistent with those reported in similar studies (e.g. Misra et al., 2009).

The research model explains 47.7% of the variation in agile software development project success. Based on the result, we argue that team capability and customer involvement lead to agile software development project success. Results also indicate that team capability has a greater impact on agile software development project success than customer involvement. In brief, to maximise the chances of project success, team capability should be the priority, followed closely by customer involvement. Our results are consistent with those reported by Chow and Cao (2008) regarding the people dimension. The relevance of both factors was somehow expected since the agile manifesto for software development supports them. However, Stankovic et al. (2013) did not find them as influential, which might be explained by their sample characteristics. Team capability can be fitted within the fifth principle of the manifesto, in which an individual's motivation and support are advocated (Agile Alliance, 2001; Chow & Cao, 2008). Customer involvement is consistent with the findings of Sheffield and Lemétayer (2013), and the factor was indicative of software project agility in successful projects. Customer involvement is also cited in the third value of the manifesto, and it can also be compared to the fourth principle, which refers to the importance of having business people (customer

representatives) and developers working jointly throughout the project's duration (Agile Alliance, 2001; Chow & Cao, 2008).

For future research, our findings also highlight the importance to study not only the direct effects but also the indirect effects, through the moderation and mediation effect. For example, our results show that personal characteristics and societal culture do not have a direct effect on agile software development project success, which contradicts the Misra et al. (2009) study. On the other hand, by studying the mediation effect, we show that personal characteristics and societal culture through the mediator team capability and customer involvement are all significant to the success of agile projects. These results demonstrate that team capability and customer involvement are focused on contributing to agile projects' success.

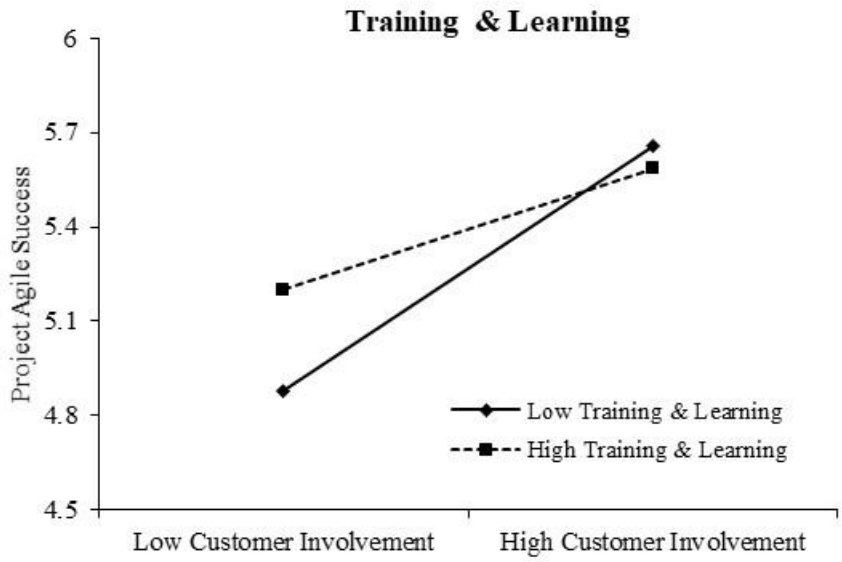

Figure 3. Moderator effects

Figure 3 shows the impact of a statistically significant moderator, namely training and learning over customer involvement in Agile project success. The graph shows us that customer involvement has a more significant impact on project success when training and learning is low. Moreover, when customer involvement is moderated by training and learning (H2b), it is observed that project success increases. The impact of training and learning might be explained by several organisational factors that constitute barriers to the learning value. When the moderating effect of training and learning is included in the model to predict project success, the variation of project success is 47.7%. Without this moderating effect, the variation of project success decreases to 46%. Inclusion of the moderating effect in the model to predict project success improves the variation by 1.7%.

This study provides new insights into how personal characteristics and societal culture influence team capability and customer involvement (directly or indirectly), and the on-going agile software development project success. On the one hand, these are significant results because - to the best of our knowledge - it is the first study to validate it empirically; on the other hand, the results are also expected in classic (waterfall) software development projects. Therefore, a complementary research question was then made: "in the case of agile projects, are there particular aspects of personal characteristics, societal culture, team capability, or customer involvement, determinant to project success?"

Aiming to get insights to answer this question, we complemented our quantitative research approach with a qualitative study, based on a focus group. A focus group is particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think but how they think and why they think that way (Kitzinger, 1995; Morgan & Spanish, 1984). Past research shows that focus groups are viewed as fast and cost-efficient, providing useful insights (Gold & Vassell, 2015).

The focus group was carried out with six experts in project management (including the moderator). The experts were invited considering their vast experience in managing waterfall software development and agile software development projects, as well as the management of multi-cultural teams. For anonymity purposes, the experts are identified as *En*. Experts *E1* and *E2* have more than 20 years of experience in project management (both waterfall and agile) and extensive experience managing multi-cultural teams. Expert *E3* also has more than 20 years of experience in project management (both waterfall and agile), but limited experience with multi-cultural teams. In the case of experts *E4* and *E5*, both have about ten years of experience in project management (waterfall and agile) in multi-cultural settings. The focus group was moderated by a researcher with prodigious experience in project management (about 25 years of experience and the management of hundreds of projects), both in academia and industry.

The discussion was initiated with the question: "What personal characteristics are desirable to find in the members of agile software development teams?" The participants mentioned the following characteristics: technical competence (*E1*, *E2*, *E3*, *E5*); teamwork (*E1*, *E2*, *E3*, *E4*); focus on work (*E1*, *E2*, *E3*); versatility (*E1*, *E3*, *E5*) - ease of adaptation to new situations (*E1*, *E3*, *E5*); ability to communicate (*E1*, *E3*, *E5*); responsibility and task fulfilment (*E1*, *E3*, *E5*); problem-solving - ability to understand and analyse problems, seek solutions and reach conclusions (*E2*, *E4*, *E5*); and autonomy (*E2*, *E4*, *E5*).

In the next question, the focus shifted to the team: “In agile development, do the characteristics and capabilities of the team (as a whole) have particularities when compared to classic development?” The experts highlighted several characteristics as key to good performance: the self-organisation ability of the team (*E1*, *E4*); the ability to communicate and interact inside (between team members) and outside the team (e.g., with the client), and articulate this communication in a transparent manner (*E1*, *E4*); the need for a real team spirit and positive energy between team members (*E2*), reflected for instance on solidarity and mutual help (*E5*); the team as a whole has to realise the limitations and potential of each element and act accordingly to that perception (*E3*); trust between the team members (*E4*); the ease of exposing work (*E4*) and the development of a collective critical sense (*E5*).

The discussion continued with the question "In the case of agile, does the societal culture (of team members) influence team capability or customer involvement? Is it different from the classic perspective?" Also, on this question, the view was virtually unanimous that cultural issues have specificities in the context of agile development. As noted by experts *E3* and *E4*, "in agile the issue of cultural difference can be more complex due to the need for frequent interaction."

We then sought to obtain experts’ opinion about the question: “Customer involvement is critical to the success of agile processes. In your opinion, how should this involvement be? ... and what differences are there from the classic outlook?” According to expert *E1*, "in the waterfall, client engagement occurs mainly at the beginning of the project, and later at the end of the project. In agile, it is completely distinct. The client must be present during the project execution, transmitting their real needs to the team, as well as understanding the challenges and difficulties faced by the team. This aspect makes him more tolerant of any deviations (if properly justified)." In agile, the degree of commitment has to be much higher: the customer must also be 'agile.'"

The last question discussed concerned the moderating variable "Training and Learning," in order to understand its influence on the customer involvement relationship with project success: "Do you think that training and learning can have some influence on customer involvement and, consequently, on the success of the project?" Expert *E4* answered first: “I think so, and people are often not trained and prepared for it. This nuance is particularly important because it is necessary to communicate properly. In some situations, people are free to speak to the customer directly. People must be prepared for it. It is also important to align the information within the team. The procedures to follow for the different types of communication need to be clearly defined.” Expert *E5* agreed and noted that “training is important in order to ‘know’ how to communicate with the parties. It is essential to define the communication levels (e.g., administrative, financial, technical).” Expert *E1* also agreed on the

importance of training and learning by saying that “a well-trained team will be able to manage customer engagement better, avoid any misunderstandings, and therefore this could lead to better results.” Expert E3 complemented the idea by stating that “a better-educated person is better able to understand the customer and manage their behaviour as needed.” Expert E2 agreed and complemented: “an agile junior team does not work… it can be a disaster. ‘Youth’ is not very friendly to criticism”.

In short, the characteristics of individuals, team capacity, societal culture, customer involvement, training and learning are all important variables and bare significant influence on the success of projects. The present study allowed the empirical confirmation of this in the case of agile projects. Notwithstanding these characteristics also being important in the case of waterfall development, certain characteristics are of particular importance in the specific case of agile development. The qualitative component of the research made it possible to deepen the knowledge of these characteristics.

Unlike earlier research, this study focused on a single dimension “People”, and we intended to reach those agile projects in which success might be conditioned by human capital. From our perspective, we have created a scalable and comprehensive model, referring to important features that characterise people and their actions that can be used by future agile researchers.

6.2. Managerial implications

After demonstrating the people-factors influencing agile software development project success, some practical implications will be disclosed as a way to help managers make informed decisions.

According to our findings, customers should always be involved in the project, and the lack of their involvement may be translated into a substantial increase of project risks and subsequent failure (Wallace et al., 2004). The frequent delivery of working software, which is advocated by the Agile Alliance (2001), is dependent on customers’ collaboration, and the more involved a customer is, the more satisfied he may be with the project (Bendapudi & Leone, 2003). Therefore, we emphasise that agile software development projects should have at least one customer representative working as an active member of the project team. The customer representative should be empowered to make project-related decisions such as approvals, rejections, and to establish priorities in terms of project requirements. Another paramount aspect is related to the maintenance of a favourable relationship with the customer. Due to the nature of agile, which focusses on face-to-face interactions and customer collaboration, a favourable healthy relationship between the customer and the project team is crucial.

This relationship will most likely dictate how well the agile methodology will be applied, which could be mirrored in the project's outcome.

Personal characteristics should meet the requirements of the position. The aim is a fit of the personal characteristics for different project types to substantially improve the expected results. For instance, by considering the impact of personal characteristics while developing an organisational project management standard will lead to greater team capability and increase customer involvement, which will lead to an increase in the successful completion rate of the project.

Regarding team capability, we stress that a project team should be composed, if possible, by highly motivated professionals who can commit to project success. Proper technical training should also be provided, with a focus on the subject matter and agile processes, assuring team synchronisation. The team facilitator role must be held by an individual knowledgeable in agile processes and principles, who should also undertake an adaptive management style, encouraging continuous adaptation and flexibility.

In summary, an agile software development environment should be created around talented, committed, and professional people. Equipped with this information, managers and teams will be able to establish priorities and act accordingly when deciding about which factors, they should be focusing on to maximise the probability of project success.

6.3. Limitations and future work

We must acknowledge some limitations. First, we recognise the inherent complexity of our variables, suggesting that there are certainly more items that could have been used to characterise each people factor or even project success better. Future research should focus on validating and scaling up our model, finding additional items to measure aspects such as "individual's capability to respond to change", which was not included in our study and plays an important role in agile software development. Second, the study was undertaken in a single country (Portugal), which is a constraint on generalisability. Future works should gather data from different countries, combining different perspectives.

Additionally, it would be interesting to have a comparison between different nations, and further on to study the differences between geographic regions, for instance, northern and southern countries in Europe. In this study, a significant part of the sample may not have an adequate insight of project success, which cannot be representative for the population, but it is a very important group in the

context of agile methods. Our sample consisted of agile-knowledgeable users, which may include responses for users under on-going projects. Future studies may examine only respondents that have experienced the ending of projects. This research only applied two of Shenhar et al.'s (1997) dimensions, efficiency, and customer benefit. Including business success and preparing for the future dimensions could be interesting in subsequent studies and could provide further insights on agile software development project success. This study only applied a quantitative method. Future studies could combine quantitative and qualitative methods in a single evaluation to understand the project success phenomenon better. Since our research only considered short-term success measures, future work can examine other key constructs when building models that are salient to long-term success measures.

7. Conclusions

Since agile software development relies on human capital to be successful, our research focused on disclosing the people-factors contributing to the success of these types of project. After an extensive review of the literature, we built a model of factors that were proven to be influential for agile software development project success, and their validity was thus retested in the Portuguese context. The conceptualised model offered a concise characterisation of the people dimension. Future researchers are invited to validate and build upon our work, making the model more detailed and reliable.

A total of 216 agile professionals were surveyed from a variety of business areas. The results obtained using PLS-SEM indicate that team capability and customer involvement can greatly explain the variance in agile software development project success. However, we did not manage to find evidence suggesting that personal characteristics, training and learning, or societal culture are important factors in this context. Nevertheless, these findings were triangulated and supported with a qualitative approach focus-group.

This work offers a valuable contribution to agile practitioners who are currently or will in the future, be involved in an agile software development project. According to our findings, managers are encouraged to select a highly capable team, and to promote customer involvement and collaboration, since these factors are more likely to lead an agile software development project to success. Lastly, this research offers a mixed-method approach which provides more positive and solid inferences than

a single method. Applying a combination of quantitative and qualitative approach allowed us to deepen the analysis and findings.

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Appendix

Table A1. Items

Constructs	Items	Adapted from
Personal Characteristics	PC1 - The project team consisted of people with strong interpersonal and communication skills.	(Misra et al., 2009)
	PC2 - The project team consisted of people who were honest.	
	PC3 - The project team consisted of people who were motivated.	
	PC4 - The project team consisted of people who had a collaborative attitude.	
	PC5 - The project team consisted of people who had a sense of responsibility.	
	PC6 - The project team consisted of people who had the readiness to learn.	
Training and Learning	TL1 - The project team members were, in general, always willing to continuously learn from one another.	(Misra et al., 2009)
	TL2 - The project team members were, in general, always willing to train each other through mentoring and professionally guided discussions than through formal training.	
Societal Culture	SC1 - The people of our country who worked on the project were, in general, communicative.	(Misra et al., 2009)
	SC2 - The people of our country who worked on the project were, in general, dynamic.	
	SC3 - The people of our country who worked on the project had, in general, a progressive attitude.	
	SC4 - The project team had a similar social culture, even though they might belong to different nationalities or provinces.	
Team Capability	TC1 - The project team members had high technical competence and expertise (i.e. problem-solving, programming, subject matter).	(Stankovic et al., 2013)
	TC2 - The project team members had great motivation and were committed to the project's success.	
	TC3 - The project provided appropriate technical training to the team, including training on the subject matter and agile processes.	
	TC4 - The project team facilitator/coordinator was knowledgeable in agile principles and processes.	
	TC5 - The project team facilitator/coordinator had light-touch and/or adaptive management style (i.e. encouraging a creative, flexible working environment while taking advantage of mutual interactions amongst the project's various parts and steering them toward continuous learning and adaptation).	
Customer Involvement	CI1 - The project had strong customer commitment and presence (i.e. having at least one customer representative on site working hard and full-time as a member of the project team).	(Stankovic et al., 2013)
	CI2 - The customer representative on the project had full authority and knowledge to make decisions on-site, such as approving, disapproving, and prioritising project requirements and changes.	
	CI3 - There was a good customer relationship within the project.	
Agile Software Development Project Success	S1 - Regarding costs (i.e. delivered under or within budget) the project was…	(Stankovic et al., 2013)
	S2 - Regarding time (i.e. on-time delivery), the project was…	
	S3 - Regarding customer satisfaction (i.e. the product's performance managed to overcome the end-users' expectations), the project was …	

Table A2. Measurement model loadings and cross-loadings

Constructs	Indicator	PC	SC	TC	CI	S
Personal Characteristics (PC)	PC1	**.671**	.390	.308	.237	.228
	PC2	**.678**	.371	.402	.259	.302
	PC3	**.788**	.423	.556	.258	.389
	PC4	**.809**	.504	.461	.308	.363
	PC5	**.821**	.423	.472	.312	.310
	PC6	**.732**	.481	.428	.266	.320
Societal Culture (SC)	SC1	.371	**.752**	.334	.225	.244
	SC2	.493	**.863**	.469	.223	.308
	SC3	.559	**.912**	.633	.361	.464
Team Capability (TC)	TC2	.584	.572	**.756**	.342	.474
	TC3	.333	.339	**.683**	.384	.453
	TC4	.469	.467	**.865**	.420	.544
	TC5	.461	.476	**.842**	.352	.485
Customer Involvement (CI)	CI1	.274	.196	.366	**.842**	.389
	CI2	.283	.255	.346	**.832**	.405
	CI3	.345	.360	.459	**.838**	.515
Agile Software Development Project Success (S)	S1	.314	.291	.429	.377	**.846**
	S2	.388	.355	.516	.394	**.864**
	S3	.380	.405	.600	.540	**.829**