THE INFLUENCE OF NATIONAL CULTURE DIMENSIONS ON AGILE IMPLEMENTATIONS IN THE SOUTH AFRICAN SOFTWARE DEVELOPMENT CONTEXT

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ABSTRACT

Culture influences how agile frameworks are implemented, and agility is said to be suitable in contexts where flexibility and spontaneity are emphasized. While past studies have investigated the influence of national culture on Agile implementations in Western and Eastern contexts, studies focusing on a South African software development context is limited. Furthermore, few studies have focused on the effect of cultural differences within software engineering in general. The purpose of this study is to describe how national culture influences Agile practices within the South African software development context. The study was interpretive and was executed using a qualitative, semi- structured interview research strategy directed at Agile practitioners in South African software development teams. The thematic analysis technique was used to analyze the data. Seven propositions have been formulated to highlight how national culture dimensions influence Agile practices. The findings reveal that various national culture dimensions influence the decision-making process, the degree of sprint interruptions, participation in Agile ceremonies, adherence to policies and prescribed Agile practices, how teams reach agreement, approaches to process improvement and sprint planning.

KEYWORDS

Agile Software Development, National Culture, Agile Practices, South Africa

1. INTRODUCTION

Agile frameworks are underpinned by values and principles which are described in the Agile Manifesto for successful software implementations (http://agilemanifesto.org/). The Agile values emphasize collaboration and interaction to mitigate issues which often hamper the success of software projects (Joseph et al., 2016). Since agility is like a mindset or culture, it is imperative to have an environment that characterizes and supports the Agile software development process (Sidky et al. 2007). This is particularly important given that culture plays a role in how Agile frameworks are utilized and implemented (Sutharshan, 2013). For instance, the Agile culture requires the active involvement of team members and is said to be suitable where there is a flat structure (low power distance). Moreover, flexibility and spontaneity are emphasized (Siakas & Siakas, 2007). Cultures from Anglo countries, where Agile methodologies originate from, and Nordic countries, are closest aligned to Agile values (Palokangas, 2013). Since Agile values are based on Western culture, there is a need to investigate their suitability for contexts that demonstrate different values (Zhao, 2015). This is supported by recent concerns from Agile practitioners regarding whether it was possible to implement Agile practices with all nationalities and cultures (Gregory et al., 2016).

Zhao (2015) studied the impact of culture, namely Chinese and Swedish, on the implementation of Scrum, a type of Agile methodology. Their findings concluded that national culture influences Scrum implementations, in terms of how Scrum roles, ceremonies, and artifacts are utilized. Zhao (2015) proposed conducting their study in a different country context to China (Eastern culture) and Sweden (Western culture) to further explore how aspects of national culture might impact Agile implementations. This study has been conducted in response to this recommendation. Indeed, South Africa offers an interesting context of study, due to its heterogeneous cultural grouping (Mnkandla, 2013). While studies have been conducted to investigate the influence of national culture on Agile implementations in Western and Eastern country contexts, there is no research that explores the influence of national culture and the implementation of Agile methodologies in the

South African software development context. Furthermore, few studies have focused on the effect of cultural differences within software engineering in general (Darwish & Henryson, 2019).

According to Hofstede's culture classification, South Africa is identified as having high power distance, individualism, masculinity, and indulgence as well as low uncertainty avoidance and long-term orientation (Hofstede, 2013). For instance, South Africans enjoy clearly defined roles and therefore do not like to be called team members (Tanner & Noruwana, 2012). Moreover, South African culture is different to Western or Eastern culture in that it is less homogenous (Ward et al., 2015) and the introduction of different cultures in a team can be problematic for Agile implementations. Even though there is evidence in practice of Agile methods recently being incorporated in African countries, there is a lingering question about how its core values, with roots in western attitudes and behaviors, relates to non-western cultures (Jukich, 2018).

In response to the above-mentioned research problems, the purpose of this study is to describe how national culture dimensions influences Agile implementations within the South African software development context. This paper specifically reports on the findings related to the influence on Agile practices. The research question has been formulated as follows: How does national culture dimensions influence Agile practices within the South African software development context? This study contributes to Agile software development literature through 7 propositions articulating the influence of various cultural dimensions on Agile practices in South African software development teams. The findings are also relevant to other non-South African teams that demonstrate similar cultural traits.

The paper is organized as follows. Following on from the introduction, a review of literature is presented in relation to the research problem regarding national culture suited for Agile software development. The conceptual framework employed for this study is then described, followed by an overview of the methodology employed for the study. The findings are then described and discussed considering the extent literature to articulate the research contributions. The paper is then concluded.

2. LITERATURE REVIEW

2.1 Defining Culture and National Culture

Culture is composed of traits and characters peculiar to a group of people which makes them unique from other societies (Aziza, 2001). These traits include language, dress code, music, work, arts, religion, dancing and more. It also entails social norms, taboos, and values (Idang, 2015). Since culture is a broad term, in this research we will narrow the concept of culture to values and practices that people acquire by living in different countries i.e., national culture (Hofstede et al., 2010).

There are several frameworks used for studying national culture. Some examples include Hofstede (2013) and Hampton-Turner (1990). National cultures are a segment of the "mental software" we acquired during the first ten years of our lives and hold most of our basic values (Minkov & Hofstede, 2011, p. 14). This study focuses on the Hofstede and Globe national culture frameworks as data is available for South Africa pertaining to these frameworks. Moreover, other studies (e.g., Zhao (2015); Sutharshan (2013), Palokangas (2013)) have successfully employed these frameworks in the context of Agile software development. The frameworks are discussed in the Theoretical Framework section.

2.2 The South African Social Context

South Africa, which is also known as the "rainbow nation," has a culture that is one of the most multifaceted and diverse in the world (Tanner, 2009). It consists of 60.1 million people of which 30.8 million (51,1%) are female and 29.4 million (48,9%) are male (http://www.statssa.gov.za/, 2021). There are four distinct population groups namely, Black African, Colored, Indian/Asian, and White (South Africa. Statistics South Africa, 2016). In Southern Africa, among the traditional Nguni people which includes the Zulu, Xhosa, Ndebele, and Swazi people, there exists a common way of life known as 'Ubuntu' (Metz & Gaie, 2010). Ubuntu means humanity and the term can loosely translated as "I am because we are" (West, 2014). The core values of Ubuntu are summarized as respect for the dignity of others, group solidarity, teamwork, service to others, and the spirit of harmony and interdependence (i.e., 'each one of us needs all of us') (Mbigi, 2007). The fifth dimension, the

spirit of harmony and interdependence, was labelled as the spirit of Ubuntu. Wanasika et al. (2011) posit the philosophy of Ubuntu encompasses human existence and social relations. Wanasika et al. (2011) then argues, that while there are views of collectivism being associated with current relationships, Ubuntu is grounded in history and includes the present and future obligations to individuals as well. Another example of the collectivism in Ubuntu is that there is no phrase or concept of "Agree to disagree," therefore a consensus must be reached on mutual understanding and agreement regarding a matter through socialization (Nussbaum, 2003). which is associated with modern society and the related practices embedded in education.

2.3 Agility and its Value System

Agile frameworks are based on values and principles defined in the Agile Manifesto. From a cultural point of view, Agile frameworks call for minimal hierarchy, and favor self-organization, equity, empowerment, commitment, responsibility, participation, learning and continuous improvement, consensus, respect, compromises, trust, honesty, openness, and communication (Iivari & Iivari, 2011).

According to the Manifesto, agility values individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a prescribed plan. The Agile Manifesto also formulates twelve principles that guide the nature of Agile frameworks (Misra et al., 2012).

2.4 Scrum and its Value System

Scrum is one of the frameworks that falls within the Agile umbrella. The Scrum framework provides the flexibility to control and manage requirements and the development process by allowing software to be developed in small chunks in multiple iterations (Hayat et al., 2019). The life cycle of the Scrum framework includes planning, staging, development, and release (Sutherland, 2005). The Scrum values relate to Courage, Focus, Commitment, Respect and Openness and encourage management and team members to take responsibility instead of blame shifting (Neelima, & Saile, 2013). Schwaber and Sutherland (2017) suggest that Scrum teams need to become proficient in living the Scrum values to successfully use Scrum. The framework consists of three aspects namely roles, processes, and artifacts (Cervone, 2011), and are briefly summarized in Table 1.

Table 1. Description of Scrum aspects

Scrum Aspects	**Description**
Artifacts – Product backlog	The product backlog is a prioritized list of tasks that contains the product requirements (Girot, 2013). The purpose of the product backlog is to keep track of all work that must be done as well as bug fixes (Tanner, 2013).
Artifacts – Sprint backlog	The sprint backlog contains a subset of requirements derived from the product backlog that can be completed during a sprint (Girot, 2013).
Artifacts – Burndown chart	The burndown chart shows a holistic view of how the project is progressing and allows for an assessment of the rate at which items are completed (Neelima, & Saile, 2013).
Artifacts – Task board	The task board is used to track the status of all tasks pertaining to user stories (Tanner, 2013; Cervone, 2011).
Roles – Product Owner	The Product Owner is responsible for providing requirements and maintaining the product backlog (Schwaber & Sutherland, 2017).
Roles – Scrum Master	The Scrum Master is responsible for enacting the Scrum values and practices, and to remove impediments (Cervone, 2011).
Roles – Scrum team members	Scrum team members are responsible for achieving the project goals. The characteristics of the Scrum team are: self-organizing; cross-functional; no titles for Developers; does not recognize sub-teams; and there may be individuals who have specialized skills, but the responsibility lies with the team (Schwaber & Sutherland, 2017).
Processes – Sprint	A Sprint that is an event time-boxed to a month or less, where a useable, and potentially a releasable product is created (Schwaber & Sutherland, 2017).

Processes – Sprint planning	At the beginning of a Sprint, a Sprint Planning meeting is held where the Product Owner will communicate which components, or features identified in the backlog, are to be prioritized into the next Sprint and which features can be developed in other Sprints (Neelima, & Saile, 2013).
Processes – Daily Scrum	The daily Scrum is a fifteen-minute time-boxed event held every day between the Scrum Master and the team members (Schwaber & Sutherland, 2017).
Processes – Sprint review	The sprint review is held at the end of sprint to inspect the increment (i.e., demonstration to Product Owner) and to adjust the product backlog if necessary (Schwaber & Sutherland, 2017).
Processes – Sprint retrospective	During the sprint retrospective, the team reviews its past processes and creates a plan to improve during the next Sprint (Schwaber & Sutherland, 2017).

2.5 Influence of National culture on Agile implementations

Past studies have found that national culture can impact Scrum implementations. According to literature, Power distance influences Agile roles in relation to leadership qualities, responsibilities, and decision-making power (Zhao, 2015). For instance, Sutharshan and Maj (2011) found that in cultures with low power distance, employees are not afraid to challenge authority and leaders are not autocratic or paternalistic. Instead, a consultative style of decision-making and participative management style prevails. In individualist countries, team members emphasize the importance of personal responsibility pertaining to the quality of tasks completed (Zhao, 2015).

In relation to Scrum practices, teams with a higher uncertainty avoidance index demonstrate more rigorous planning practices, and use tried and tested tools instead of being open to risk-taking (Darwish & Henryson, 2019). Uncertainty avoidance plays a role in certain software practices, such as requirements being specified upfront, test-first programming, and making early design decisions (Darwish & Henryson, 2019). The use of burndown charts and limitations on sprint interruptions are also more prevalent in cultures with a high degree of uncertainty avoidance (Zhao, 2015).

3. THEORETICAL FRAMEWORK

This study employed the Hofstede and GLOBE project national culture dimensions to inform its theoretical framework. Hanges and Dickson (2004) compared the national culture dimensions of Hofstede to the GLOBE project national culture dimensions. Their findings indicate similarities between Hofstede's and GLOBE's power distance dimension. Hofstede's and GLOBE's uncertainty avoidance dimension are also similar. Hofstede's and GLOBE's individualism and collectivism dimensions share similarities, but GLOBE further classifies collectivism as institutional collectivism and in-group collectivism. Lastly, Hofstede's masculinity dimension is like GLOBE's societal assertiveness' scale. Venaik, Zhu and Brewer (2013) mention that Hofstede long-term orientation dimension and GLOBE future orientation dimension capture various aspects of time orientation of societies. Hofstede's long-term orientation focuses on the past (tradition) versus future (thrift) aspect of societies, while GLOBE future orientation dimension captures the present versus future (planning) practices of societies. The GLOBE future orientation dimension also reflects societal aspirations and preferences for planning. Although criticisms regarding the inconsistency for Hofstede uncertainty avoidance and masculinity national culture dimensions exist (Minkov & Kaasa, 2021), the study provides findings for both extremes of these dimensions in the context of South African Agile software development teams.

Table 2. Description of Hofstede and GLOBE National Culture Dimensions

National Culture Dimensions	Description
Power distance - (Hofstede, GLOBE)	Power distance is the extent to which people with less power expect and accept that the decision-making power is distributed unequally (Hofstede, 2013; House et al., 1999).
Individualism & Collectivism – (Hofstede, GLOBE)	Individualism is the acceptance that people in a nation have learnt to act as individuals, whereas collectivism is where people act as a member of a group. The Individualism dimension of national culture is classified from collectivist to individualist (Hofstede, 2011).
Uncertainty avoidance - (Hofstede, GLOBE)	Uncertainty avoidance refers to whether people in a nation prefer structured over unstructured conditions which is classified from relatively flexible to extremely rigid (Hofstede, 2013).
Masculinity / Assertiveness – (Hofstede, GLOBE)	Masculinity is the degree to which masculine values prevail over feminine values. Masculine values include assertiveness performance, success, and competition, and is classified in a range from tender to tough. Feminine values include warm personal relationships, modesty, quality of life, service, and caring for the weak (Hofstede, 2013). Assertiveness refers to the extent to which individuals in organizations or societies are assertive, confrontational, and aggressive in social relationships (House et al., 1999).
Long-term orientation (Hofstede)	Long-term orientation is "the fostering of virtues oriented toward future rewards, in particular, perseverance and thrift" (Hofstede as cited by Zhao, 2015, p. 17). This refers to a nation's time orientation and is characterized by "patience, perseverance, respects for older, tradition and ancestors, obedience sense and the duty towards the larger good" (Zhao, 2015, p. 18).
Future orientation - (GLOBE)	Future orientation refers to the extent to which individuals in organizations or societies engage in future-oriented activities such as planning, investing in the future, and delayed gratification (House et al., 1999).
Indulgence – (Hofstede)	In an indulgent culture it is deemed good to be free. Acting on impulses of what one wants to do is viewed as a good thing. In a restrained culture, the general sense is that life is hard, and that duty, not freedom, is the normal state of being (Hofstede, 2013).

4. METHODOLOGY

The section describes the research methodology followed for this study. The study employed a subjectivist and qualitative stance. The questions in the study were "how" questions in that the researcher wanted to describe how national culture dimensions impact on Agile practices in the South African context. The data that emerged was descriptive meaning that the data was reported in words instead of numbers (Creswell, 2003). This paper was written from an interpretivist paradigm perspective. The research question was answered using a deductive research approach, using a framework which informed the coding process (Braun & Clarke, 2006).

Data was collected using qualitative semi-structured interviews. Initial interview questions aimed to set the context for the rest of the interview. The national culture dimension questions required the participant to expound on the responses given in relation to the culture dimension and the influence it exerted on the Agile practices. The researcher probed into unexplored themes that arose or asked the participant to clarify where the researcher felt more information could be retrieved regarding the context. A cross-sectional timeframe was chosen. No previous data was used, and no data was collected after write-up of analysis. The data was collected over about a six-month period from December 2020 to May 2021.

Purposive sampling was used in this study. Within purposive sampling, judgmental sampling was specifically used as the researcher targeted participants who could provide the relevant information to meet the objectives of the study (Etikan & Bala, 2017). The target population was Agile practitioners within the software development context. Interviews were held with participants from various roles within the Agile methodology as well as management to get a different perspective which was often a more holistic view than the responses from a team member. Participants were asked about all the various practices and ceremonies within the Scrum framework. Furthermore, the researcher also targeted participants from a wide range of cultural groups in South Africa. Twenty-six semi-structured interviews were conducted with various project team members and stakeholders such as the Scrum team, Product Owner, Scrum Master, management, end-users, and customers across different teams and companies in South Africa. The interviews were held via digital video communication platforms such as Google Meet, Microsoft Teams, and Zoom. All interviews were transcribed. The participants' demographics are shown in Table 3.

Table 3. Respondents' Demographics

Person	Role	Race	Years of experience in role	Team Size
P1	Scrum Master	Black	5 yrs.	16-25
P2	Agile Coach	White	8 yrs.	7
P3	Scrum Master	White	1 year	9-13
P4	Agile Coach	White	3 yrs.	12
P5	Product Owner	White	3 yrs.	4-7
P6	Technical Product Manager	White	5 yrs.	4-11
P7	Credit Analyst	Black	8 yrs.	12
P8	Agile Coach	Black	2 yrs.	13
P9	Scrum Master	White	2 yrs.	6
P10	Product Owner	Coloured	1 year	8
P11	Scrum Master	White	5 yrs.	8-9
P12	Agile Project Manager	Coloured	1 year	12
P13	Project Manager	Coloured	5 yrs.	6
P14	Application Support Specialist	Coloured	1 year	20
P15	Solutions Architect	White	8 yrs.	8-9
P16	Agile Coach	White	1 year	~14
P17	Scrum Master	White	6 yrs.	15
P18	Agile Coach	Indian	5 yrs.	7
P19	Agile Coach	White	1 year	7
P20	Head Of Application Development	White	4 yrs.	5-10
P21	Agile Coach	White	5 yrs.	~10
P22	Product Manager	White	1 year	6
P23	Scrum Master	Coloured	5 yrs.	6
P24	Centre of Excellence Manager	Indian	6 yrs.	6-9
P25	Business Analyst	Coloured	2 yrs.	6-7
P26	Agile Coach	White	1 year at organization 9 yrs. in role	3 teams of ~ 5 people

Each participant answered the questions in line with their Agile implementation context and the events experienced within the teams they were part of or managed. Participants were involved in projects in various phases of the software development life cycle. Some were part of mature Agile teams while other teams were involved in newly formed teams. Some participants changed companies and were too new to answer questions for the team they were in at that point in time and referred to the previous team or organization they were part of since they had more experience to refer to for those teams. The researcher then focused on that selected team as the context for the interview. Most of the interview responses were based on the current context of the team within their team formation stage and software development life cycle. However, some respondents also provided data looking retrospectively and gave insight into how the team dynamics, processes, and artifacts changed over time. These responses were noted in the data analysis and the discussion sections.

The data was analyzed using thematic analysis. Analysis and data collection were conducted concurrently. In thematic analysis, responses are used to identify, analyze, and report patterns or themes within the data (Braun & Clarke, 2006). By way of example, the researcher coded the responses in a qualitative data analysis tool called NVivo. Themes were identified within the data for each question and reported on in the data analysis and discussion chapters. The collected data was organized and described in rich detail and various aspects of the research topic was interpreted. Thematic analysis entails the following phases: familiarizing yourself with your data, generating initial code, searching for themes, reviewing themes, defining, naming themes, and producing the report (Braun & Clarke, 2006).

This study made use of the following verification strategies: selecting the appropriate sample (Morse et al., 2002), comparing cases to seek out similarities and differences across companies to ensure different perspectives are represented, using 'rich' and 'thick' verbatim quotes from participants (Noble & Smith, 2015), consulting multiple data sources such as suggested links to concepts and other resources (Buchan et al., 2017), and reflexivity, where the researcher made notes of questions to change after each interview (Noble & Smith, 2015).

5. FINDINGS & DISCUSSION

This section is organized as follows. For each dimension, the empirical results are first presented including relevant quotes. Theoretical propositions are then formulated, and the findings are then compared to literature.

5.1 Power Distance and Agile Practices

In South African Agile teams, the decision-making process is influenced by the degree of power distance prevailing in the team. For instance, in smaller South African Agile teams with a flatter organizational structure, power distance is low and decision-making power is more equal among team members. Furthermore, these South African Agile teams implement various mechanisms (e.g., voting) to support a more democratic decision-making process to reach consensus: *"when it comes to making decisions, it would be a team discussion; we would explain why it is beneficial for the team, get their feedback; and then they would normally agree and be game to try it out"* (P23). In contrast, larger South African teams are more hierarchical, and the final decision is sometimes made by the Team Leader, or even management: *"The teams that I work with are still operating in an environment where senior management make decisions that often override the team regarding delivery timelines and attention to building in quality"* (P24).

In South Africa, power distance also influences the number of interruptions experienced by the Agile teams as well as the team's ability to decide on the scope of the sprint. In instances where high power distance prevails, Agile teams face numerous interruptions by management to change the scope of the sprint. In those instances, teams are less in control of the scope of the sprint: *"In pure scrum, [interruptions] is not allowed. But I think that when the team is under fire then it is necessary for having the conversation and drawing attention to new tasks that may be assigned"* (P20). During the sprint planning meetings, the scope is often decided by empowered individuals, with less input and consensus from the team. In contrast, in South African Agile teams with low power distance, the sprint scope could only be changed by team, and they could agree on the sprint scope through consensus. Furthermore, changes could be actioned by anyone, provided that the reason was valid. In line with the above findings, the following proposition is formulated: ***Proposition 1: In South African Agile teams, power distance influences the decision-making process and the degree of interruptions experienced by the teams during the sprint***

According to the findings, it can be posited that greater agility is achieved in South African teams with low power distance as this promotes self-organized teams. Indeed, Agile principle 11 states that self-organized teams achieve the best architectures, requirements and designs (https://agilemanifesto.org). The findings concur with literature whereby low power distance promotes shared understanding, discussion and consensus (Zhao, 2015). The principle of self-organized teams (Schwaber & Sutherland, 2017) is also supported when teams face minimal interruptions during the sprint, and when they can agree on the sprint scope democratically. Past studies have also found that in cultures with high power distance, interferences are often experienced and deemed acceptable (Zhao, 2015).

5.2 Individualism / Collectivism and Agile Practices

In South African Agile teams, the degree of individualism / collectivism influences the members' degree of participation in Agile ceremonies. In individualist teams, members do not actively participate in ceremonies. For instance, these members are only expected to provide feedback on their specific work items during daily stand-ups: *"With artifacts, there is an expectation to be involved overall for the team. Generally, there is a bit of a barrier to that and separation; for example, you would do what is in your lane instead of everyone working together on something. They were looking at who was accountable for something"* (P4). In contrast, in South African Agile teams with collectivist traits, members prepare for and participate in all meetings, whilst collectively providing input on all items on the agenda: *"We do a Sprint review which forms part of our planning. In terms of artifacts, reviews, and planning there is a collective responsibility. There is never an instance where one person runs the sprint planning. As we unpack stories, developers give their input. The expectation is that everyone in the team has to contribute to the sprint reviews, planning and artifacts"* (P23). However, in both individualist and collectivist teams, the degree of participation is mitigated by the team members' role. For instance, during sprint planning meeting 2, Business Analysts and Quality Assurance Testers might not have much to contribute as the meeting focuses on technical design tasks. In line with the above findings, the following proposition is formulated: ***Proposition 2: In South African Agile teams, the participation of team members in Agile ceremonies is influenced by the degree of individualism / collectivism manifested in the team.***

Based on the findings, it can be inferred that South African teams with collectivist traits are better able to adhere to the Agile value pertaining to collaboration. None of the past literature that was reviewed provided insights into the influence of individualism and collectivism on participation in Agile ceremonies. Past studies only mentioned that individualist teams require workshops and group social events to increase group cohesiveness (Brockmann & Thaumüller, 2009). The study therefore provides new insights into the role of individualism / collectivism in a team's ability to achieve agility.

5.3 Uncertainty Avoidance and Agile Practices

The study found that uncertainty avoidance influences the extent to which teams are comfortable with uncertainty and ambiguity during the sprints. South African Agile teams from larger companies typically demonstrate high uncertainty avoidance. Hence, they tend to strictly follow due procedures: *"They have become less tolerant of unorthodox methods and instead trying to become more team-orientated"* (P4). Smaller Agile teams, where low uncertainty avoidance is demonstrated, are flexible and less strict on adherence to policies. There might also be no documented policy and instead a standard way of working is commonly accepted in team: *"We aren't strict with regards to policies, procedures and Scrum processes, because I think you can lose agility as this is all about change and adapting"* (P23).

South African Agile teams with low uncertainty avoidance are also flexible and experiment with the sprint duration to suit their business practices. Intellectual autonomy prevails and team members are also encouraged to pursue their own ideas. Curiosity and creativity are valued, and the team is supported to experiment with Agile frameworks. In teams from larger companies, intellectual autonomy is also encouraged in theory, but not well implemented in practice. In line with the above findings, the following proposition is formulated: ***Proposition 3: In South African Agile teams, the degree of uncertainty avoidance influences the extent to which teams adhere to policies and prescribed Agile practices.***

South African teams with low uncertainty avoidance are more inclined to adapt their business processes and are therefore better adhering to the principle of empiricism of which transparency, inspection and adaptation are pillars (Schwaber & Sutherland, 2017). The findings concur with literature whereby teams with a higher uncertainty avoidance index use tried and tested tools instead of being open to risk-taking (Darwish & Henryson, 2019). Moreover, while past studies indicate that such teams tend to minimize risks (Darwish & Henryson, 2019), the findings from this study further reveal that this is achieved through strict adherence to policies and procedures.

5.4 Masculinity / Assertiveness and Agile Practices

According to the findings, masculinity / assertiveness influences Agile practices relative to how teams reach agreement, resolve conflict and the degree to which team members speak up during meetings. For instance, in South African Agile teams demonstrating low levels of masculinity, a democratic process is used to reach consensus. During this democratic process, each team member can provide input: *"To ensure consensus I use planning poker in order to get different perspectives of the complexity, uncertainty, risk and effort associated with the work to be committed to in the sprint. It also provides us with the final velocity score so that the team can agree on the commitment for the sprint"* (P26). In teams with a high degree of masculinity, team members with the most knowledge on a topic typically makes the decision: *"At the moment it doesn't feel like willing consent from all team members, more a kind of 'I don't want to argue about it, so I'll just go with it'"* (P4). Masculinity is mostly prevalent in newly formed Agile teams but as the team matures, it often demonstrates less masculinity and instead use the method of willing consent. Masculinity also influences how conflict is resolved in South African Agile teams. Agile teams with a high degree of masculinity resolve conflicts through direct confrontation or in the presence of management: *"A conflict resolution that we had was with the Scrum Master where we suggested that we have a conversation with the each one's manager to try and resolve the conflict"* (P4). In teams where a low degree of masculinity is manifested, conflict (especially personal conflict) is avoided or resolved through conversation that the Scrum Master facilitate (P17).

The findings also reveal that different team members can demonstrate different degrees of assertiveness. In South African Agile teams, when some members are more assertive, others in the team tend to not speak up to give their opinion or ideas (P6). However, this can be circumvented if the Scrum Master ensures that all voices are equally heard. In line with the above findings, the following proposition is formulated: ***Proposition 4: In South African Agile teams, masculinity / assertiveness influence how members reach agreement and resolve conflict.***

The Scrum value of commitment proposes that team members come to an agreement on the commitments they make as a team and as individuals (Schwaber & Sutherland, 2017). The findings reveal that the national culture of masculinity (Hofstede, 2013) and assertiveness (House et al., 1999) influence the extent to which this Scrum value is adhered to. Masculinity influences the conflict resolution mechanisms in South African Agile teams. Past studies have mostly related the issue of conflict resolution to the power distance cultural dimension (Sutharshan & Maj, 2011). This study reveals that masculinity also influences how conflict is resolved, in line with Hofstede (2013) who states that masculine cultures resolve conflict by fighting.

5.5 Long-Term (Short-Term) Orientation and Agile Practices

In South African Agile teams, the long-term (short-term) orientation national culture dimension influences how members approach the retrospective meetings to improve on their work practices. In particular, the findings reveal that short-term orientated teams mostly reflect on the past sprint i.e., "what went well" and "what did not go well" during retrospective meetings. They do not necessarily focus on long-term results, future actions, or how the team can improve: *"In retrospective meetings, there is an aspect of focusing on continuous improvement but there is a larger aspect of focusing on the past. The conversations about the future become a frustration for the team because they feel that it won't change anything"* (P4). Teams with long-term orientation instead have in-depth discussions around improvements for future: *"It was very much backward-looking at first. Once we started putting measures in place, things started to change so that we focus on how we can get better going forward"* (P20). In line with the above findings, the following proposition is formulated: ***Proposition 5: In South African Agile teams, long-term (short-term) orientation influence teams' approaches to process improvement.***

The findings are in line with literature relative to long-term orientation, whereby the team members display habits that show consideration for future events by preparing for them in the present (Darwish & Henryson, 2019). Furthermore, in long-term orientated teams, members actively engage in tasks that lead to continuous improvement and are willing to brainstorm how to do things better. This is in line with literature that states that long-term orientation cultures emphasize schooling (learning) and have conversations about the effectiveness of Agile methods to deliver working software (Brockmann & Thaumüller, 2009). It can therefore be posited that long-term orientated teams are better able to adhere to the Agile principle stating that "at regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly" (Beck et al., 2001).

5.6 Future Orientation and Agile Practices

Future orientation influences Agile practices in relation to how product backlog refinement sessions are conducted. In South African Agile teams that are future oriented, members are more forward-looking during product backlog refinement sessions. These Agile teams not only plan for the next sprint but sometimes plan for future sprints as well: *"We plan for every sprint. In some cases, we plan two sprints ahead. This depends on the PO and business because they buy into the product, so we wait for them to give us the requirements"* (P1). Future orientation traits are prevalent in mature Agile compared to novice teams, and this translates in their level of planning of the sprints. In line with the above findings, the following proposition is formulated: ***Proposition 6: In South African Agile teams, future orientation influence teams' approaches to sprint planning.***

Literature states that limiting planning to only a sprint prevents developers from thinking ahead, while planning for two or more sprints helps the developers focus on the product vision and to maintain the bigger picture (Cockton, Lárusdóttir, Gregory & Cajander, 2016). Therefore, while Scrum proposes only planning for the next sprint ahead due to the future being uncertain beyond two weeks, there is value in helping teams see the bigger picture.

5.7 Indulgence and Agile Practices

In South African Agile teams, indulgence influences Agile practices relative to whether enjoyment during Agile ceremonies is encouraged. According to the findings, teams with high degrees of indulgence are encouraged to have fun by celebrating together, playing snooker, having remote games as a team, use humor or banter during ceremonies. Humor or banter is used to ease tension and teams allocate time for fun activities during ceremonies like the retrospective meeting. This further improves team cohesion. In contrast, in teams with a low degree of indulgence, the ceremonies are formal, and members do not speak about their personal lives during meetings: *"It is always encouraged in the processes. We always start with a bit of banter. With a retro we would have some fun in the first thirty minutes and have lunch together offsite. When we were in office, we would get lunch every day and people might breakaway to do a puzzle or something like that"* (P3). In line with the above findings, the following proposition is formulated: ***Proposition 7: In South African Agile teams, the degree of indulgence influences the extent to which members are encouraged to have fun during ceremonies.***

Findings indicate that teams that emphasize indulgence, have better team cohesiveness. This agrees with literature which states that in societies with a high degree of indulgence, individuals tend to show positive attitude which helps to maintain team motivation (Ayed et al., 2017). Literature also states that teams with a low degree of indulgence display fatigue (Ayed et al., 2017). The findings reveal a similar trend where low indulgence teams do not have fun activities due to being busy with projects and not having time to build team morale. Team morale increases commitment to the Scrum team goals and the sprint goals. Therefore, teams that manifest a high degree of indulgence, are closely aligned to the Scrum value of commitment and the Agile principle of building projects around motivated individuals (Beck et al., 2001).

6. CONCLUSION

Culture can be an impediment to Agile implementations in that cultural issues can cause a lack of trust, challenges collaboration and diminishes collective ownership and team success. There exist many empirical studies that have investigated the relationship between organizational culture and the deployment of Agile. However, few studies have focused on the influence of national culture dimensions Agile Implementations, especially in the South African context. This thesis provides a useful contribution to research and practice as it provides insights into the role of a consolidated set of cultural dimensions on Agile practices.

Seven propositions have been formulated to highlight how Hofstede (2013) and GLOBE (House et al., 1999) national culture dimensions influence Agile practices. The findings reveal that various national culture dimensions influence the decision-making process, the degree of sprint interruptions, participation in Agile ceremonies, adherence to policies and prescribed Agile practices, how teams reach agreement, approaches to

process improvement and sprint planning, as well as the extent to which team members are encouraged to have fun.

Although in South African culture hierarchical order is accepted to a greater extent (Hofstede, 2013), the hierarchical dynamic assisted the Scrum Master to manage novice team, give direction, and coach the team to get them back on track. In addition, the collectivist cultural trait in South Africa was found to more suitable to Agile implementations than the South African individualistic cultural trait. In collectivist South African software development teams, democratic decisions (consensus) are mostly used but over time as teams trust one another they use the method of willing consent. Therefore, the Ubuntu collectivist culture is leaner over time as collectivist teams experiment with other Agile methodologies to optimize for continuous flow, and community-orientation. Lastly, teams with low masculinity are better suited to Agile implementations in terms of the team's interactions and the team's focus on the work in the sprint and the goals of the team.

The findings not only contribute to theories around the impact of culture in Agile teams, but also provide key insights to practitioners on what cultural manifestations might be at play in their project teams. It is important to understand the cultural driving forces at play behind the challenges that they might be experiencing. The findings can help inform Agile implementations in practice, and therefore help managers and teams curate Agile teams for appropriate environments.

Most of the respondents provided input in relation to the Scrum framework. Future studies could focus on a wider sample of respondents with experience in a broader range of Agile frameworks. Future studies could also focus on the influence of national culture dimensions on Agile implementations in teams other than those in software development. A longitudinal study could be conducted to obtain deeper insights into the cultural manifestations over a longer period. This might provide more insights into how teams cultural traits changes over time as the teams mature. Further opportunities to explain the findings with other theoretical frameworks such as Complex Adaptive Theory (CAS) also exist.

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