THE IMPACT OF ORGANISATIONAL STRUCTURE

ON THE

PERFORMANCE OF VIRTUAL TEAMS

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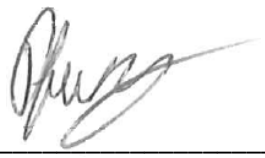
ABSTRACT

Globalisation and advances in Information and Communication Technologies (ICT) are contributing to the increased virtualisation of work teams within organisations. Researchers are in agreement that most modern day work teams have some degree of virtualisation (Workman, 2007) and that it is critical for researchers and practitioners alike to understand the impact of virtualisation on the inputs, process and outputs of work teams. Benefits commonly associated with increased team virtualisation such as increased knowledge retention (Dietz-Uhler & Bishop-Clark, 2001), cost savings (Bergiel, Bergiel, & Balsmeier, 2008) and flexibility (Clemons & Kroth, 2011) are proven and well researched. However we know that no benefit can be obtained without incurring some sort of a cost (Colander, 2010) and research showed that virtual teams typically incur additional challenges in the areas of communication, culture, technology and leadership (Kayworth & Leidner, 2000).

This research hypothesised that the three levers of organizational structure as defined by Satō (2010) namely the formalization, standardization and centralization of organisational elements can ease the negative effects caused by an increase in team virtualisation. We evaluated the impact that the organisational structure has on the performance of work teams throughout the team virtualisation continuum by conducting a set of interviews, a survey and performing descriptive quantitative analysis on the results. A total of three interviews were conducted which served as confirmation of our research questions and provided guidance to construct the questionnaire. A total of 87 respondents participated in our online survey of which 69 responses were included in the quantitative analysis phase. The responses received were equally distributed between four categories namely: Organic Face-to-face, Mechanistic Face-to-face, Organic Virtual and Mechanistic Virtual.

The results revealed that there is no statistically significant relationship between the organisational structure and the performance of virtual teams. We further noticed a higher variance in the performance scores of virtual teams which indicates that the performance of virtual teams are more inconsistent than that of Face-to-face teams. The key finding of the research is that virtual teams perform equally well in both organic and mechanistic organisational structures.

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.



_____ 2012/11/07

Signature **Date**

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"I'm a success today because I had a friend who believed in me and I didn't have the heart to let him down."

Abraham Lincoln

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CHAPTER 1 - BACKGROUND

1.1 INTRODUCTION

The current wave of globalisation is rapidly changing the way we compete in the global economy (Stiglitz, 2006). More companies are shifting their organisational boundaries and adopting a globally integrated enterprise business model (The Globally Integrated Enterprise, 2007). This enables organisations to perform work anywhere in the world across geographic, temporal, organisational and cultural boundaries. The ability to work together while apart has been largely supported by advances in Information and Communication Technologies (ICT) (Desai, 2000) and the adoption of teams as a standard construct to perform work within an organisation.

Globalisation is not the only force that is driving the adoption of virtual teams within organisations. The endless urge to improve shareholder value is forcing companies to constantly look at ways to improve their internal operations and distinguish themselves from the competition (Lazonick & O'Sullivan, 2000). ICT is playing an important part in this strategy and companies are always looking at ways to automate manual processes and how technology can assist and improve existing business processes. Team work is no exception and computer supported team work is becoming the norm in most organizations, even in co-located work environments (Bajwa, Lewis, Pervan, & Lai, 2005).

The consequences of these external forces on organisations are that more and more work are being performed by unconventional teams, commonly known as virtual teams. Virtual teams rely on ICT to facilitate team work across the boundaries of space and time. Although virtual teams offer undeniable benefits and unprecedented flexibility to organizations (Hertel, Geister, & Konradt, 2005) we know from macroeconomic theory that "*there ain't no such thing as a free lunch*" (Colander, 2010, p. 7). True to the theory, the management of virtual teams have shown to be a notoriously difficult task which compelled research to focus on the marginal benefits and cost of virtual teams (Bergiel, Bergiel, & Balsmeier, 2008) and ways to mitigate the weaknesses of virtual teams to improve their overall performance (Maynard, Mathieu, Rapp, & Gilson, 2012).

1.2 VIRTUAL TEAMS

The benefits associated with adopting virtual teams in an organisation are undeniable (Clemons & Kroth, 2011). Arnison&Miller (2002) argued that even conventional team structures can obtain these benefits by utilising Information and Communication Technologies

(ICT) to facilitate team work. Researchers are now also in agreement that "virtualness" can be seen as a potential characteristic of all teams (Griffith, Sawyer, & Neale, 2003) (Griffith & Neale, 2001).This, together with the notion that traditional teams should not be compared against virtual teams, but that the research should rather focus on the effect that an increase in the virtualisation of a team has on team working (Workman, 2007).

The proliferation of technological dependence within team work further suggests that an increase in the virtualisation of a team can lead to an increase in work team performance. However, Workman (2007) analysed the influence that the degree of virtualisation had on team performance and concluded that a certain degree of virtualisation increases the overall team performance, but fully virtual or proximal teams perform worse than hybrid teams. Therefore it appears that a certain degree of virtualisation of the team is a positive, but after that team performance starts to decay. This argument stands in sharp contrast to evidence that suggests pure virtual teams can deliver better results than hybrid or proximal teams (The Economist, 2010).

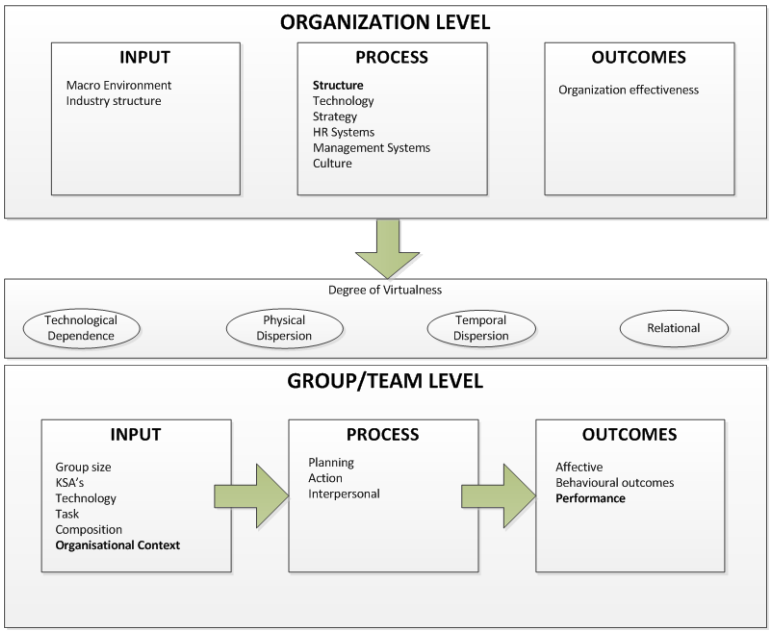


Figure 1 - Extended IPO Model

The question then arises, why do certain teams deliver higher performance with an increase in virtualisation whilst the performance of other teams appears to decay when virtualisation increases? This question has no easy answer and the study of team work performance is an extremely broad and complex field where researchers commonly used frameworks such as the Input Process Output (IPO) model to analyse the relationships between the inputs, processes and outcomes of team work (Martins, Gibson, & Maynard, 2004). Recently calls have been

made by Joshi, Pandey & Han (2009) to expand the IPO model which mainly focusses on the internal workings of a team to also consider the effect of the context of the team on work performance. This call is echoed by Maynard et al (2012) which requests future research to examine the effect that cross-level relationships between organisation, group and individual level might have on virtual team effectiveness.

The aim of this study is to heed these calls and to analyse the cross-level relationship between organisational structure, team virtualisation and work team performance as shown in Figure 2. It builds on existing research which defines the relationships between the degrees of team virtualisation and performance, and then expands on it by analysing the effect of the team context on the team's degree of virtualisation as shown in Figure 2. This ties in with recent research on the topics such as Multi Team Membership (Mortensen, 2009) and Global Virtual Teams (Sutanto, Kankanhalli, & Tan, 2011) which focus on attributes outside of the boundaries of the classical team IPO model.

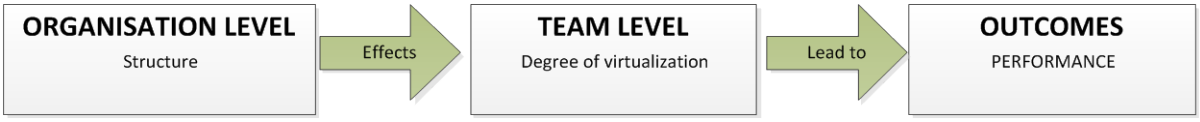


Figure 2 - Research Model

We argue that all the degrees of team virtualisation can be influenced by the organisational structure and this change in virtualness can have either a positive of a negative impact on team performance. Therefore the organisational structure within which the team operates is critical to the understanding of team performance. We then ask the question, which organisational structures increase both team virtualisation and performance. We aim to answer this question by looking at the degrees of virtualisation within teams that operate in different organisational structures and the performance outcomes of these teams.

1.2 CONCLUSION

Organisations are increasingly facing the daunting task of executing work across the boundaries of space and time. A virtual team is an organizational construct which give organizations the power and flexibility to execute work in this global setting. Even though virtual teams have been widely adopted in organisations, a lot of research still needs to be done to validate the optimal means for incorporating virtual teams in an organisation for optimal performance. This study will analyse the cross-level relationship between organisational structure, team virtualisation and work team performance.

CHAPTER 2 - LITERATURE REVIEW

2.1 INTRODUCTION

Team working has been a topic of research for many decades and a large body of knowledge exists within the fields of organisational behaviour, human resource management, general management and strategy (Ganguli & Mostashari, 2008). With the proliferation of ICT systems in the workplace, the fields of knowledge management and management information systems have joined the conversation to debate how technology can contribute towards the improvement of work team performance. Through technological enablement, team members are increasingly moving towards the idea of working together, apart (Zakaria, Amelinckx, & Wilemon, 2004) and the notion of the virtualisation of the team are well studied and debated (Hertel, Geister, & Konradt, 2005). The majority of research on team work and virtualisation can be modelled using an Input Process Output (IPO) model as described in Figure 1 (Martins, Gibson, & Maynard, 2004).

2.2 TEAM VIRTUALISATION

A "Virtual Team" has classically been defined as an organisational form that describes a group of geographically separated team members who rely upon technology to collaborate across the boundaries of space and time (DeSanctis & Poole, 1997). This definition has changed over time to add temporal and relational dispersion to the degrees of virtualisation. Temporal dispersion occurs when team members interact asynchronously and across multiple time zones which reduces their ability to collaborate in real-time (Kayworth & Leidner, 2000). Relational dispersion refers to the difference between team members' affiliation with other organisational structures and external organisations (Griffith, Sawyer, & Neale, 2003).

External forces such as globalisation, technological progress and increased inter-organisational cooperation are forcing many companies to adopt virtual teams even in co-located workplaces (Ganguli & Mostashari, 2008). This leads to the argument that all teams are virtual to an extent and that the degree of "*virtualness*" should be seen as an attribute of all modern work teams instead of evaluating the difference between standard and virtual teams. Martins et al (2004) argued that instead of trying to draw a clear distinction between conventional and virtual teams, one should rather evaluate a team based on its degree of "*virtualness*". They highlighted the need to further investigate the impact that the degree of virtualisation has on the social and socialisation outcomes of team interaction and consequently defined a virtualisation continuum defined by the proximal contact and technological intermediation

between team members. Arnison&Miller (2002) also argued that it might become impractical to clearly distinguish between virtual and conventional face-to-face teams due to the proliferation of the use of technology within organisations and that with proper organisational support and resources, both conventional and virtual teams can reap the benefits attributed to virtual teams.

Review of the relevant literature further suggests that there is a clear separation between the various forms of virtual work that can be differentiated upon based on the number of people involved, the degree of interaction between them, and the purpose for collaboration. These various forms are presented in Table 1 below. This research will be confined to the boundaries of virtual teams and will not consider any of the other forms of virtual work.

Virtual work form	Description	Reference
Telework	The task is performed either partially or completely outside of the company workplace and the worker is being assisted by information and communication technologies.	(Baily & Kurland, 2002)
Virtual Group	Virtual groups exist within an organisation when multiple teleworkers report to the same manager within the same organisation.	(Hertel, Geister, & Konradt, 2005)
Virtual Team	Virtual teams are formed when members of virtual groups interact and collaborate with each other to accomplish a common goal.	(Lipnack & Stamps, 1997) (DeSanctis & Poole, 1997)
Virtual Communities	A virtual community is defined as a larger entity which typically does not fall within the boundaries of a single organisation where distributed work is performed over the internet that is guided by a common set of purposes, norms and roles.	(Wellman, 1997)

Table 1 - The forms of virtual work

Research has proven that successful virtual teams can dramatically increase an organisation's flexibility thereby improving its capacity to meet customer demands in a rapidly changing business environment (Powell, Piccoli, & Ives, 2004). The potential advantages of virtual teams have been summarised on individual, organisational and societal levels as presented in Table 2 (Hertel, Geister, & Konradt, 2005).

Evaluation Level	Advantage
Individual	• Higher flexibility • Time control • Higher responsibilities • Work motivation • Empowerment
Organisational	• Flexibility • Strategic Advantages • Reduced cost • Increased time to market
Societal	• Develop regions with low infrastructure • Integration of people with handicaps that make them immobile • Decrease environmental impact

Table 2 - Possible advantages of Virtual Teams

From the available literature it is obvious that a higher degree of virtualisation within work teams holds promise not only to individuals and organisations but to society as a whole. Recent research has therefore shifted the focus on enhancing the effectiveness of virtual teams by looking at the type, structure, leadership and performance of virtual teams (Berry, 2011). This research builds on adding organisational context to the list of attributes that can improve a virtual team's effectiveness.

2.3 TEAM PERFORMANCE

2.3.1 CHALLENGES CAUSED BY TEAM VIRTUALISATION

Despite the advantages promised by virtual teams, the virtualisation itself does introduce significant constraints in terms of the way team members participate in the execution of tasks. These constraints are introduced by physical separation, time allocation and restrictions in the

communication technology itself (Cummings, 2011). Workman (2007) suggested that with the increase in virtualisation, the frequency of formal and informal communication tends to decrease, which isolates members from the rest of the team and increases both task- and relational ambiguity. By definition, the more virtual a team becomes the more communication is being performed through electronic media such as e-mail, instant messaging, telephones and video conferencing equipment, which takes away a lot of the non-verbal cues that are typically associated with verbal communication (Potter & Balthazard, 2002). Furthermore, Chesin, Rafaeli, & Bos (2011) warned that electronic communication methods can convey emotionally charged messages which can lead to conflict if there is incongruence between the message and the detected emotion.

Chidambaram and Tung (2005) further recognsed that virtual teams often suffer from heightened levels of "social loafing"; which can be defined as "…*the tendency of members to do less than their potential…*" (p. 149). They argued that as group size and member dispersion increased, individual members will contribute less and consequently group outcomes will suffer. This relationship between social loafing and negative group performance is further recognised by Ferrari and Pychyl (2012) who stated that social loafing has adverse consequences on group performance. These arguments are in line with the results of experimentation conducted by Blaskovich (2008) who concluded that team virtualisation negatively affects the performance of a team but that social loafing only partially explains these results.

Daim, et al. (2012) recognises the problems mentioned above but argue that the key problem faced within a virtual team is communication breakdown caused by factors that can be categorised under trust, interpersonal relationships, cultural differences, leadership or technology (p. 202). This finding is in line with the common issues that negatively impact performance as identified by Hertel, Gesiter, & Konradt (2005) namely: Disinhibited communication (flaming), misfit between communication medium and content, lack of non-job related communication, lack of motivation and trust, lack of team identification and team cohesion and reduced levels of team satisfaction.

Research on the topic of optimal team size has shown that an increase in individual performance within a group setting does not necessarily lead to an increase in the team's overall performance (Kerr & Bruun, 1983). Stewart (2006) showed that an increase in team size often leads to an increase in team performance but a decrease in individual performance.

Classic research done by Tziner & Eden (1985) also asked the question of whether the whole is equal to the sum of its parts.

Hoffman et al. (2011) however proved that the performance of the team is not only a function of the performance or ability of individuals, but also a function of the relationship between the individuals in the team. This argument is strongly supported by the theory of High Quality Relationships (HQR) (Brueller & Carmeli, 2011) which states that these relationships can improve overall team performance. We therefore support the argument that team performance is a function of the individual performances of team members and the relationships between them.

2.3.2 Individual Productivity Loss Theory

Mueller (2012) expanded on the widely accepted theory of individual productivity loss to define three elements of productivity loss that can occur in a group structure. The productivity loss that an individual may suffer is attributed to "*…the inefficiencies which detract from an individual's potential productivity*…" (Steiner, 1972). These inefficiencies were first defined by Steiner as motivational and coordination loss and they were later expanded by Mueller to include relational loss. Motivational loss occurs when team members are not motivated to perform the task at hand. As already shown by Hertel, Gesiter, & Konradt (2005), virtual team members may suffer from motivational loss due to being isolated from the rest of the team and not having the pressures that usually accompanies face-to-face interaction.

Coordination loss occurs when it becomes more difficult to coordinate the execution of the task at hand. As virtualisation increases within a team, the coordination effort required further increases (Montoya-Weiss, Massey, & Song, 2001). This increase in coordination effort is attributed to the dispersion and asynchronous execution of tasks. Some of the challenges with asynchronous communication that were highlighted are (Ocker, Hiltz, Turoff, & Fjermestad, 1996):

- The norm is for more than one topic to be active at the same time
- Information overload
- Contributions are being made at different times
- Reduced linkage between responses; and
- Long time lapses between communication cause discontinuous and disjointed discussions.

Relational losses defined by Mueller (2012) draw from the theory of social support which says that the perception of social support is a function of the quality of interpersonal relationships experienced by the team member. This perception is built on the availability of emotional support, instrumental support, appraisal support and informational support. This allows us to draw the following relationships between team virtualisation and team performance:

- When team virtualisation increases, individual team members find it increasingly difficult to coordinate tasks
- When team virtualization increases, individual team members become less motivated to perform team-related tasks
- When team virtualisation increases, individual team members' perception of the availability of support decreases; and
- When individual productivity loss occurred, the team's overall performance decreased.

One can therefore argue that as the virtualisation of a team increases the chance of individual productivity loss of a team member increases, which negatively impacts the overall performance of the work team. This inverse relationship between team virtualisation and performance reiterates the findings of Workman (2007), but it does not explain why some pure virtual teams are performing extremely well.

2.3.3 Virtual Team Performance

Based on the literature reviewed above it is fair to argue that an increase in team virtualisation can negatively influence the overall performance of a team. Table 3 below summarises the relevant theories that explain the challenges caused by team virtualisation and their impact on team performance.

Theory	Effect on team performance	Reference
Social Loafing is more prevalent in Virtual Teams.	An increase in social loafing decreases team performance.	(Chidambaram & Tung, 2005)
With an increase in team virtualisation, the **frequency of formal and informal communication** tends to decrease.	A decrease in the number of formal and informal communications decreases team performance.	(Workman, 2007)

Increase in team virtualisation increases **individual productivity loss**.	An increase in individual productivity loss decreases team performance.	(Mueller, 2012)
Communication breakdown is one of the biggest obstacles faced by Virtual Teams	An increase in communication breakdown decreases team performance.	(Daim, et al., 2012)
Virtual Teams require unique **leadership** capabilities	The lack of virtual team leadership capabilities lead to a decrease in team performance.	(Hambley, O'Neill, & Kline, 2007)
Technology Adoption is critical to the success of a Virtual Team	Collaborative Information Technologies have the capability to significantly improve communication and collaboration within a team.	(Bajwa, Lewis, Pervan, & Lai, 2005)

Table 3 - Theories effecting virtual team performance

In summary we agree with Kayworth and Leidner (2000) who concluded that virtual teams typically face significant challenges in the areas of communication, culture, technology and leadership.

Looking at the theories above it seems like an increase in team virtualisation will almost certainly lead to a decrease in team performance. A recent study conducted by the London Business School (Gratton, 2007) which surveyed more than 1,500 virtual team members from 55 teams found that there are a large number of pure virtual teams that perform exceptionally well. One only has to look at the successes obtained by companies such as Volvo which managed to decrease their travelling cost by approximately 50% whilst also improving employee's perception of added value by 75% (Adamson, 2009). The successes obtained by virtual communities such as the open source Linux community (What is Linux, 2012) and

Wikipedia (Wikipedia, 2012) are further examples of successful pure virtual teams which managed to overcome the performance decrease as predicted by the increase in team virtualisation. An interesting attribute to observe about these successful teams are that they operated in an organisational environment which is atypical to normal hierarchical organisational structures. They tend to be flexible and self-managed. Carte, Chidambaram and Becker (2006) showed that there is a relationship between internally self-managed virtual teams and performance. This leads us to the question, what impact does the organisation structure have on virtual team performance? Which attributes of the organisation structure influences the performance of virtual teams? How can an organisational structure assist in overcoming the challenges in the areas of communication, culture, technology and leadership?

2.4 ORGANISATION STRUCTURE

Hertel, Geiser & Konradt (2005) stated that the integration of virtual teams into the organisational context is critical for the team's performance. They further argue that organisational context variables such as boundary management, frequent communication and organisational support are critical elements to support team effectiveness and that empirical research on these elements are lacking within the context of virtual teams. We therefore turn our attention to organisation structure which is defined as "*… how overall work of the organisation is divided into sub units and how these sub units are coordinated for task completion.*" (Cummings & Worley, 2009, p. 315). This definition is perhaps too simple to clearly understand what is meant by the structure of an organisation and we believe it is better explained by a summary of the seminal work done by Mintzberg (1980)

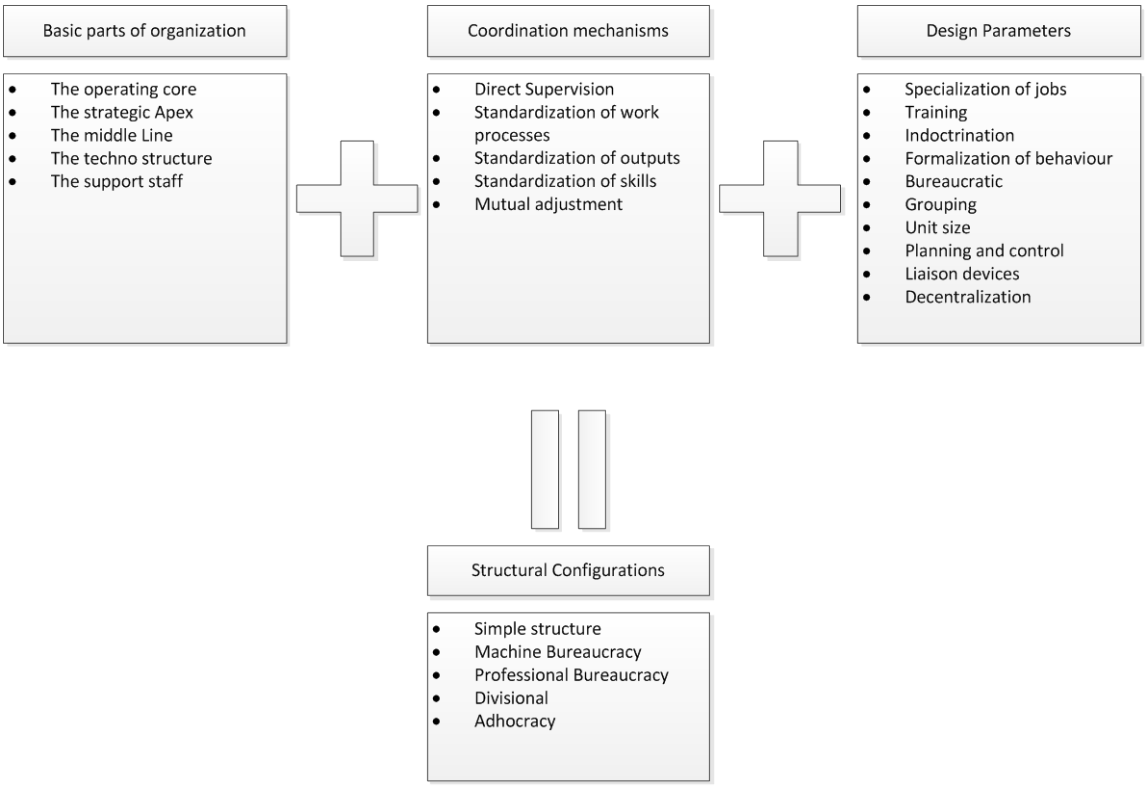


Figure 3 - Organisation structure adapted from Mintzberg 1980

As shown in Figure 3, Mintzberg concluded that there are broadly speaking five structural configurations for an organisation which is a function of the basic parts of an organisation, the coordination mechanisms and the design parameters implemented within the organisation itself. Cummings and Worley (2009) also summarised the basic organisational structures that exist as a functional structure, divisional structure, matrix structure, process structure, client-centric structure and a network structure. Even though the definitions do not exactly match that of Mintzberg, he recognised that different structural configurations can exist as long as they have a different coordination method and it is dominated by one of the basic parts of the organisation (Mintzberg, 1980, p. 339). Another definition of an organisation structure adopted by research was to define the structure as either Mechanistic or Organic. A Mechanistic structure is defined as being highly formalised, standardised and centralised versus an Organic structure that is low on formalisation, standardisation and centralisation (Satō, 2010). Organic organisational structures were typical of successful Japanese electronics companies such as Hitachi whilst their American counter-parts where more Mechanistic and often less successful (pp. 38-39). This observation that one structure might be more successful in an environment than another is in line with structural contingency theory (Donaldson, 1996).

Work done on structural contingency theory recognised that there is no single structure that would work for all organisations but that the structure of the organisation should be contingent with organisational factors such as strategy, size, technology and environment (Donaldson, 1996). The theory explains that an organisational structure can range from being highly Mechanistic to fully Organic and that a company can be successful as long as the structure fits the purpose (pp. 61-62).

This notion of fit for purpose resonates with Cummings and Worley which said: "*Organisation design is an input to group design….These cross-level relationships emphasise that organisational levels must fit each other if the organisation is to operate effectively.*" (2009, p. 92). The relationship between the structure on the organisational design level and the virtual team design on the group level can be clearly seen in the extended IPO Model (Figure 1) and it is clear that the organisation structure will have an impact on team level inputs (group size, technology, task and composition) and also on the process level (planning, action and interpersonal relationships) which in turn impacts the performance of the team.

By evaluating the effect that the organisation's structural configuration has on the key problem areas of virtual teams namely communication, culture, technology and leadership we aim to answer the questions of what attributes and configurations of organisation structure can counter the negative effect that team virtualisation can have on team performance? We'll then also try to answer which organisation structure(s) provides better fit for virtual teams? The objective of our study would be to analyse the attributes, advantages and disadvantages of each of these organisational structures and draw a relationship to determine whether the structure increases or decreases performance when team virtualisation increases. In short, does the particular organisation structure affect the communication, culture, technology or leadership in such a way that a team performs better when team virtualization increases?

2.5 CONCLUSION

In recent years, research has moved away from comparing virtual teams against conventional Face-to-face teams (Arnison & Miller, 2002). The consensus is that team virtualisation can be seen as a property of any work team and the virtualisation of the team should be presented on a team virtualisation continuum (Workman, 2007). Research further suggests that with the increase in team virtualisation, many challenges are introduced that can negatively affect team performance. These challenges typically occur in the areas of communication, culture, technology and leadership (Kayworth & Leidner, 2000).

Theory therefore predicts that an increase in team virtualisation might lead to a decrease in team performance. This is in stark contrast with studies that have shown significant increases in the performance of teams as virtualisation increases (Gratton, 2007) (Adamson, 2009). A further observation from real life examples are that a large percentage of successful pure virtual teams operate in an organisational environment which is atypical to normal hierarchical organisational structures, they tend to be flexible and self-managed. However no literature could be found to support the hypothesis that organic structure provides a better fit for high performance virtual teams.

This study therefore focuses on analysing the relationship between team virtualisation, organisational structure and team performance. We aim to analyse the team performance on a 2x2 matrix which will categorize a team on both the team virtualisation and organisational structure continuums.

	Team Virtualisation	
Organisational Structure	Organic Face-to-face	Organic Complete-Virtual
	Mechanistic Face-to-face	Mechanistic Complete-Virtual

Table 4 - 2x2 Matrix for evaluating team performance

CHAPTER 3 - AIMS AND OBJECTIVES

3.1 INTRODUCTION

To summarise, the aim of this study is to empirically evaluate the relationship between the organisation structure, the degree of virtualisation within work teams and the resultant team performance. The unit of analysis for this study is the virtual team itself and we will evaluate the influence that the organisation structure has on team virtualisation and performance.

3.2 RESEARCH QUESTIONS

- ***RESEARCH QUESTION 1 – CAN WE OBSERVE A RELATIONSHIP BETWEEN THE ORGANISATION STRUCTURE AND VIRTUAL TEAM PERFORMANCE?***

  From the literature review on organisational structure and team performance, it is clear that the organisational structure can influence team performance, but it is not clear whether the effect is significant enough to show an observable difference in virtual team performance.

- ***RESEARCH QUESTION 2 – CAN THE ORGANISATIONAL STRUCTURE ASSIST TEAM MEMBERS IN OVERCOMING THE CHALLENGES CREATED BY TEAM VIRTUALISATION IN THE AREAS OF COMMUNICATION, CULTURE, TECHNOLOGY AND LEADERSHIP?***

  The research on team virtualisation highlighted communication, culture, technology and leadership as the major issues that team members have to contend with when the team virtualisation increases. Research suggests that the organisational structure can influence all these attributes within an organisation; however it is not obvious whether the effect of the organisational structure is still relevant as the team grows more virtual.

- ***RESEARCH QUESTION 3 – WHICH ORGANISATION STRUCTURE(S) PROVIDES A BETTER FIT FOR HIGH PERFORMANCE VIRTUAL TEAMS?***

  If we answer yes to research question 1 and 2, it implies that there must be an organisation structure that is more suited for virtual teams than another. We aim to answer this question in Chapter 4 - Methodology.

CHAPTER 4 - METHODOLOGY

4.1 INTRODUCTION

To answer the research questions posed in Chapter 3 we conducted an empirical study that was descriptive in nature. This research design is in line with current research on virtual teams that are all of a descriptive nature (Gressgard, 2011) (Cheshin, Rafaeli, & Bos, 2011) (Brueller & Carmeli, 2011). The main reasons for choosing a descriptive research design was because the field of virtual teams is not a new field and already contains a substantive body of knowledge on which we could build, but descriptive research is necessary before we could embark on explanatory or causal research. Further to this, our research design didn't allow us to exclude all alternative explanations for fluctuations observed in team performance and we could therefore not use our results for causal research.

Quantitative data was then collected through the questionnaire survey with the primary aim of answering the following research questions.

Q1: Can we observe a relationship between the organisation structure and virtual team performance?

Q2: Can the organisational structure assist team members in overcoming the challenges created by team virtualisation in the areas of communication, culture, technology and leadership?

Q3: Which organisation structure(s) provides a better fit for high performance virtual teams?

The result of our questionnaire survey was then triangulated by conducting an analysis on secondary data made available by the organisations that formed part of the survey. Figure 4 below highlighted the process we followed during our research.

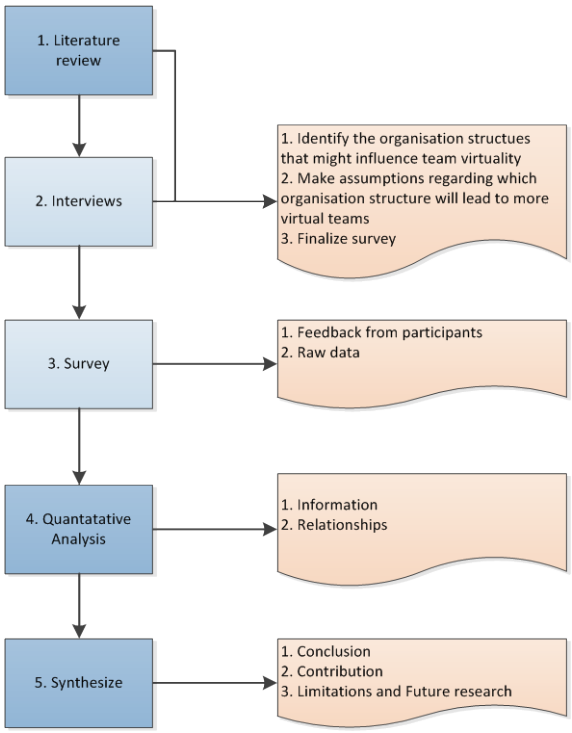


Figure 4 - Research process

4.2 SCOPE

We limited our scope of this study to five years to try and keep up with technological progress and to ensure that the respondents had access to similar technology whilst giving enough scope to gain access to a large enough population. A further restriction was to focus only on virtual teams that operated in the South African business environment. This restriction limited the variability of the operating environment and ensured that all organisations were exposed to similar external macro-economic forces. Due to the fact that we wanted to analyse the team performance in relation to organisational structure we did not focus on any other teams apart from business work teams. These are teams that work together towards a common goal within a business environment but exclude virtual groups, teleworkers and virtual communities. Our last restriction on scope was to reduce the population to only include companies that operated within the ICT industry, the reason for this restriction was another attempt to limit the variability that we will receive in terms of environmental and industry forces.

4.3 RESEARCH PROCESS

Our research started by conducting a thorough literature review in the areas of virtual teams, team performance and organisational structure. After understanding the body of knowledge we identified the relevant theories and started to collect qualitative data through a small

number of structured interviews with team-leaders of the categories identified in our population and sampling section. These results were used as input to validate our theories and finalised the questionnaire design that was distributed to all the team members.

After the literature review, the next phase of the research focused on conducting explorative interviews which were aimed at verifying our assumptions or pointing us into new directions with regard to the literature reviews. The reason we conducted interviews in the second phase of the research was to ensure that our theory was aligned with practice and to ensure that that we did not miss any important aspects from theory or practice.

Once the results of the interviews were synthesised we distributed the survey to our population and interpreted the results in our quantitative analysis phase. The reasons for choosing a survey was because it was the easiest tool to obtain a response from a large population and that with a proper questionnaire and controls in place, we were able to obtain extremely reliable and tangible data.

4.4 POPULATION AND SAMPLING

The population chosen for this study was team members that participated in any work team activity within the ICT industry in South Africa over the last five years. We evaluated team members that partook in virtual team activities at various degrees of virtualness and in different organisation structures. As discussed by the contingency theory (Donaldson, 1996) the structure of an organisation is contingent on factors such as strategy, size, technology and environment. By choosing a five-year time span in the same geographical location we were able to narrow down the impact that the technology and environment had on the companies that we surveyed. Our population was selected from people across both the organisational structure and team virtualness continuum as indicated in Figure 5 below.

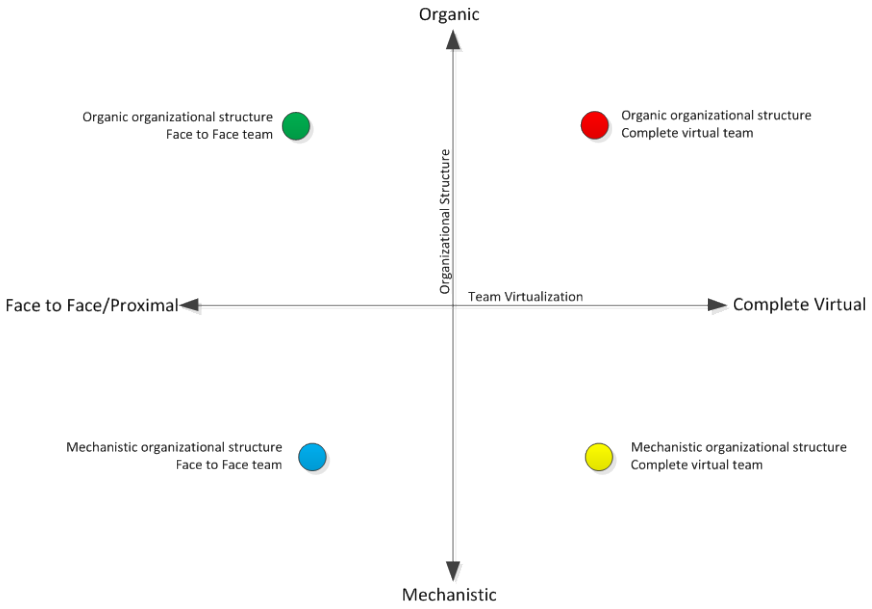


Figure 5 - Organisational structure and team virtualness matrix

Our population can therefore be classified into one of four categories, Organic complete virtual, Mechanistic complete virtual, Mechanistic face-to-face or Organic face-to-face. Initially interviews were conducted with the team leaders from each of the above-mentioned categories which helped us to establish whether our assumptions about the applicable theory were correct after which the survey was distributed to all teams.

Due to the fact that we were not able to get a complete sample frame of the population we had to use a non-probability sampling method for data collection. Purposive sampling was used to select four individuals for the interview phase. The individuals were carefully selected using extreme case sampling to obtain the identity of team members that fell in the extreme ends of both the virtualisation and organisational structure continuums as depicted in Figure 5. The underlying assumption behind this decision was that the findings from these extreme case interviews would be helpful in understanding the more typical cases.

To obtain proper data from our survey we aimed to obtain the response of at least 60 individuals from our population, evenly distributed into the four categories defined above. We used quota sampling to obtain responses for each category based on the characteristics of team virtualisation and organisational structure. The survey was distributed to 170 team members of 30 different teams in 20 different companies that fall within our population criteria. Half of the companies included in the survey were multi-nationals with operations spanning more than one continent and the other half were companies operating only in South Africa.

4.5 RESEARCH INSTRUMENT

4.5.1 INTERVIEW GUIDELINES

Our interviews took the form of semi-structured interviews that touched on the topics of teams within the organisation, structure influencing the team, technology adoption within the team and observed team performance. See Appendix A for more information on the interview guide. The interviews were started with introductory and probing questions to ensure that the individual being interviewed formed part of our sample population before we elaborated on the specific topics as described below.

Topic	Explanation
1 Introduction	The purpose of this discussion is to introduce myself, give background on the research topic and gain some basic insights into the interviewee and his/her company. The most important outcome of this discussion should be for the interviewee to understand the research questions and for me to determine whether they fall within our sample population or not.
2 Teams within the organisation	The discussion around this topic should establish to which extent the organisation utilises teams and teamwork to complete daily operational tasks. The main outcome should be a basic understanding of the role of teams within the organisation.
3 Organisational structure	The discussion should now move from the organisation to the team level. What are the factors in the organisational structure that might impact communication, culture, technology and leadership elements found within the work team?
4 Technology use in teams	The discussion around technology in teams should establish to what extent the teams operating in the company are dependent on technology. The main outcome of this topic should be to understand where on the virtualisation continuum teams in this organisation find themselves.

Table 5 - Interview guide design

4.5.2 SURVEY DESIGN

Our survey was designed on the basis of the theoretical knowledge uncovered in Chapter 2 and it was further refined based on the feedback received from the interviews. The survey is structured around the main research questions as indicated below.

#	Explanation	Purpose
1-5	These questions are asked to ensure that the respondents fall within our sample population. The answers will determine whether the results received will be used in our analysis or not.	**Determine Sample population**
6	The statements made under Question 5 try to establish how successful teams operate within the organisation.	**Evaluate team performance**
7 – 10	These questions evaluate the structure of the organisation. The purpose of asking these questions is to try and establish whether the organisation structure can be classified as Organic or Mechanistic.	**Classify organisation on the structure continuum from Organic to Mechanistic**
11-17	These questions evaluate the use of technology within team work performed in the organisation. The purpose of this is to try and map teams on the virtualisation continuum.	**Classify the team on virtualisation continuum from Face–to-Face or Complete virtual**

Table 6 - Survey Design

4.6 LIMITATIONS

The research contains the following limitations:

- Surveys will be distributed to participants through an electronic medium. The limitation of this is that responses will typically come from people who are already familiar with technology and collaborating through the internet. This might introduce a non-response bias towards the low-tech end of the population that we want to survey (100% proximal teams).

- The sampling method is open for selection bias and no guarantee can be given that the correct population has been sampled. The author will triangulate the results as far as possible to try and reduce the effect of the selection bias.

- Other common errors associated with surveys such as non-response bias will be minimised by performing triangulation between our secondary data, theory and interview results.

- A common limitation of surveys is limited depth and insider knowledge; which were addressed by performing a small number of interviews before conducting the survey. It should however be noted that the number of interviews were restricted to four and therefore the study can still suffer from these limitations.

We do not take into consideration the effect that organisational strategy or size might have on team performance and we therefore suspect that we might find discrepancies in the data. We will attempt to account for these discrepancies by making use of the triangulation of survey results with available secondary data such as the organisation's Human Resources (HR) records, strategy documents, annual reports and financial statements (where available).

CHAPTER 5 - PRESENTATION OF RESULTS

5.1 INTRODUCTION

In this chapter we present the results obtained through our research methodology. To answer the research questions stated in Chapter 3 we undertook a literature review and conducted a set of interviews which formed the ground work for the questionnaire that was distributed to our sample population. This chapter presents the results obtained and aligns them with our research questions. An in-depth discussion of the results will follow in Chapter 6.

5.2 INTERVIEWS

After completion of the literature review, interviews were conducted with team managers to ensure that the questionnaire contained the correct questions and that the theory was relevant to the questions at hand.

5.2.1 SAMPLE DESCRIPTION

Three teams were randomly selected out of our sample population and the team manager was contacted to participate in a 30 minute interview. All three teams were IT companies based in South Africa and had an average team size of between 5 and 10 members. The number of employees employed at the three companies varied and was roughly 20, 50 and 500 for the respective respondents.

5.2.2 RESPONSES

The initial responses received from all three participants after introducing myself and explaining the purpose of the study was that they were all very excited about discussing possibilities to improve virtual team performance. All three respondents have been actively working as part of a team for the majority of their time at their companies and they all agreed that in general teams had clearly defined goals. Responses on whether teams successfully reached their goals have been varied. Respondent # 1 was positive that teams in his organisation constantly reach the goals that were set for him whilst the other two were more negative with respondent # 3 going so far as to say: "*Deadlines have lost their impact at our organisation because we constantly seem to ignore them as they go past. I can't remember the last time we actually delivered on time, in budget and in scope.*"

Once the conversation moved to the organisational structure the responses started to diverge even further. Respondent # 1 mentioned that he believed the strict and formal processes within his organisation is the determining factor in enabling teams to reach their goals, whilst

Respondent # 2 argued: " *Teams in our organisation have a lot of freedom to operate how they want, as long as they meet the quality standards of the organisation. The level of Quality Control in our organisation is what ensures that a quality product is delivered to our clients. This does sometimes come at the cost of time…* ". Respondent # 3 said that the organisation forces them to use technology which is outdated and irrelevant and this is one of the major reasons for teams performing badly. All three respondents mentioned that their organisation had some level of quality control varying from direct supervision, standardised processes, quality assurance and staff training.

When it came to the discussions around technological use and dependence, all three respondents agreed that they are dependent on the use of technology to execute their daily tasks. The technologies that they typically used to collaborate with are listed below:

- Email
- Instant Messaging
- Teleconferencing
- Video conferencing
- Online collaboration tools
- Online project and task management tools; and
- Social media.

5.2.3 IMPACT

All three respondents confirmed that the research is relevant in today's business environment. The responses also confirmed our suspicions that the organisational structure might affect the performance of virtual teams. The interviews further provided us with additional information on the type of technologies that are typically used in virtual teams today and also provided us with some commonly used quality assurance processes and tools.

5.3 QUESTIONNAIRE

The questionnaire (Appendix B) contains four sections. Section 1 consists of demographic and qualifying questions that were used to filter out respondents that do not fall within our sample population and will be used to build up a profile of the respondents. Section 2 focused on the perceived team performance and the results are used to make a statement towards the performance of the respondent's team. The questions in Section 3 are all aimed towards the structure of the team and the organisation; results from these questions were used to classify organisations on the organisation structure continuum from Organic to Mechanistic. Section 4

focused on the technological dependence of team members and the results were used to plot respondents on the team virtualisation continuum. To ensure reliability of the instrument, we ensured that each response that we required was covered by at least two questions, and when interpreting the results data was cleaned to remove respondents who had conflicting answers.

5.3.1 SAMPLE DESCRIPTION

170 participants were invited to partake in the survey using the purposive sampling technique described in Chapter 4. The survey was distributed electronically via email and a response rate of 51% was achieved with 87 online responses received within the data collection period. 17 responses were discarded because they weren't completed in full and 1 response was filtered out because the respondent had not been part of a work team in the last five years. The response data has been cleaned and adjusted to include a total of 69 valid responses which will be presented in this chapter.

5.3.2 SECTION 1: RESPONDENT PROFILE

All the respondents that participated in the survey are knowledge workers that performed work on IT projects in South Africa within the last five years.

COMPANY SIZE

We chose to measure company size by the number of employees being employed at the company. This measure was chosen because company structure is typically a function of the number of employees employed at an organisation. Almost 50% of the respondents were employed at organisations with more than 500 employees and only 3% at organisations who employ less than 10 employees.

Company size	Percentage
0-10 Employees	3%
11-50 Employees	14%
51-500 Employees	35%
> 500 Employees	48%

Table 7 - Company Size

TEAM SIZE

Team size is an important measure when it comes to team complexity and performance. There is a body of knowledge that argues that a team's performance decreases when the team size increases. When asked how many people form part of your average work team, the majority of

responses received fall within teams with less than 10 team members. Only 12% of respondents work in work teams with more than 20 members.

AVG Team size	Percentage
2-5 Team Members	35%
6-10 Team Members	41%
11-20 Team Members	13%
> 20 Team Members	12%

Table 8 - AVG Team size

INDIVIDUALS

All the individuals that participated in the study have been part of a work team in the last five years and 90% of them were members of a work team at the time of participating in the study. 49% of the respondents have been employed at their current company for less than two years while 27% have been with the same company for more than five years.

In summary, a typical profile of the respondents would be individuals who have been employed for less than two years at large organisations with more than 500 employees that actively participate in work teams with less than 10 team members.

5.3.3 SECTION 2: TEAM PERFORMANCE

To measure the performance of the work teams, we examined both external and internal measures of team performance. External measures are those that are clearly visible to people outside of the team such as reaching the goals set by management. Internal measures of performance are measures that are mostly visible only to members within the team.

EXTERNAL TEAM PERFORMANCE

68% of respondents either “Agreed” or “Absolutely Agreed” with the statement that their work team successfully reached the goals set out for them by management. No respondent “Disagreed” with the statement and 32% of respondents claim that they only “Sometimes” reached the goals set for them.

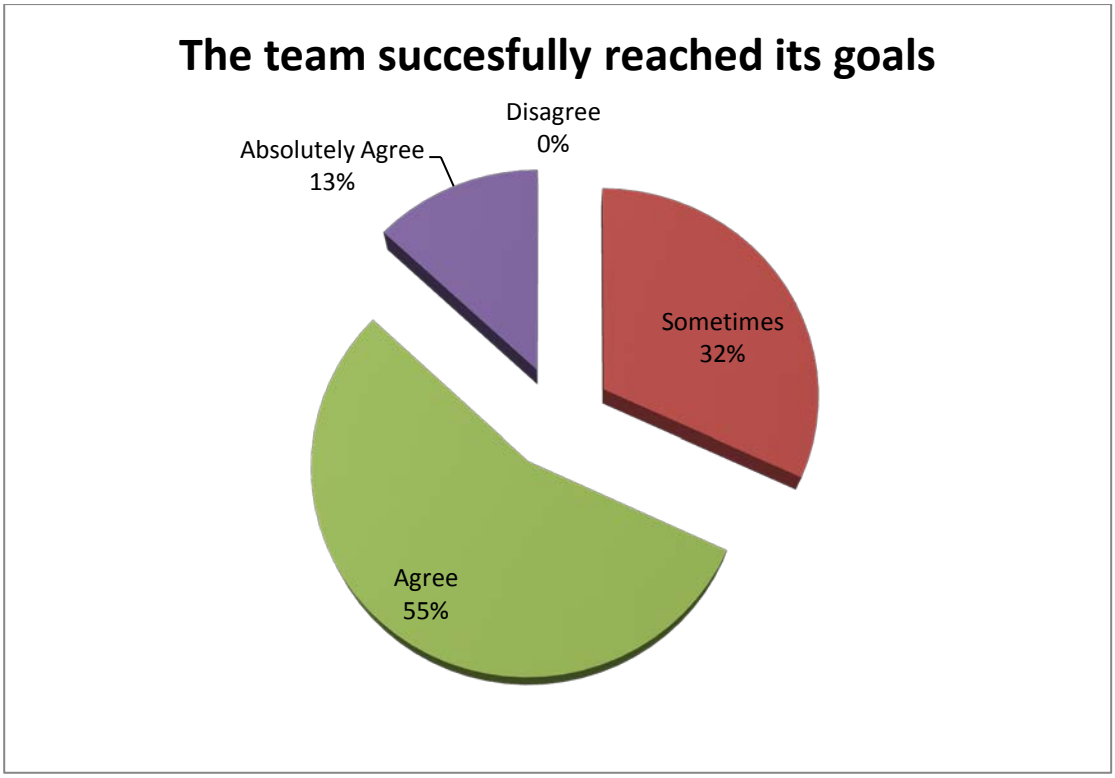
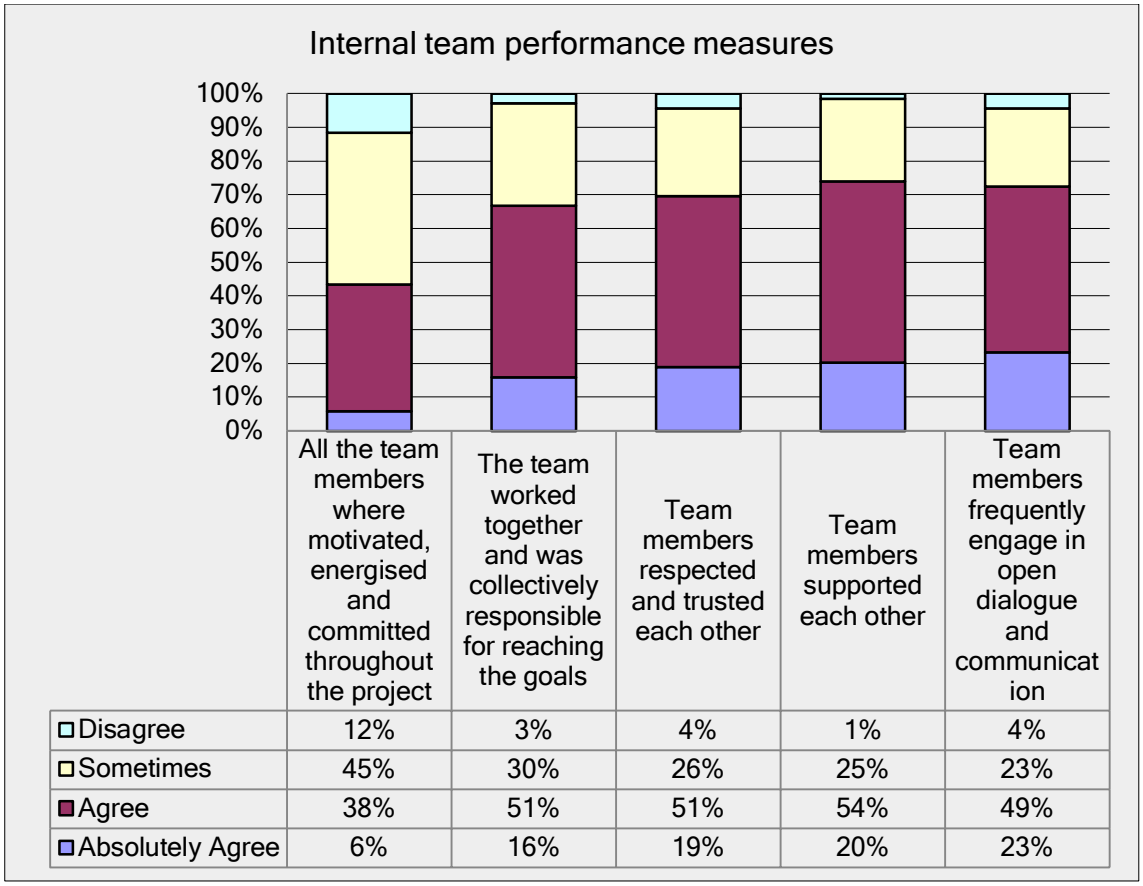


Figure 6 - External team performance

A further measure of external team performance was measuring whether team goals were clearly defined and shared amongst team members, 62% of the respondents "Agreed" or "Absolutely Agreed" with the statement that their team goals were clearly defined and shared by all the members within the team.

INTERNAL TEAM PERFORMANCE

Looking at internal measures of team performance such as motivation, mutual respect, collaboration and open communication; similar trends were identified as external team performance measures.



	All the team members where motivated, energised and committed throughout the project	The team worked together and was collectively responsible for reaching the goals	Team members respected and trusted each other	Team members supported each other	Team members frequently engage in open dialogue and communication
Disagree	12%	3%	4%	1%	4%
Sometimes	45%	30%	26%	25%	23%
Agree	38%	51%	51%	54%	49%
Absolutely Agree	6%	16%	19%	20%	23%

Figure 7 - Internal team performance measures

When examining the correlation between the internal and external performance scores we found a strong positive correlation of 0.7. This means that an increase in the internal performance scores will lead to an increase in the external performance scores. The exception to this were the results on the question around team member motivation. 57% of respondents either “Disagreed” or only “Sometimes Agreed” with the statement that all team members were motivated, energised and committed throughout the project. When looking at this question we found no significant difference in responses between virtual and face-to-face teams; both resulted in the same distribution amongst the possible answers and both had “Sometimes” as the most frequently selected answer.

To further analyse the performance of a team, we calculated a score for each respondent by allocating a mark to each answer as described in Appendix C. A higher score indicated a higher performing team in terms of both internal and external measurements. The results can be described using descriptive statistics as is summarised in the table below.

Team Performance	
Minimum	6.0
Maximum	30.0
Average	16.5
Median	16.0
Std. Dev.	5.62
Mode	17.0

Table 9 - Descriptive statistics: Team Performance

We further noticed a positively skewed distribution in performance scores, as can be seen in Figure 8 below. 83% of the respondents scored a performance score within one standard deviation from the median value.

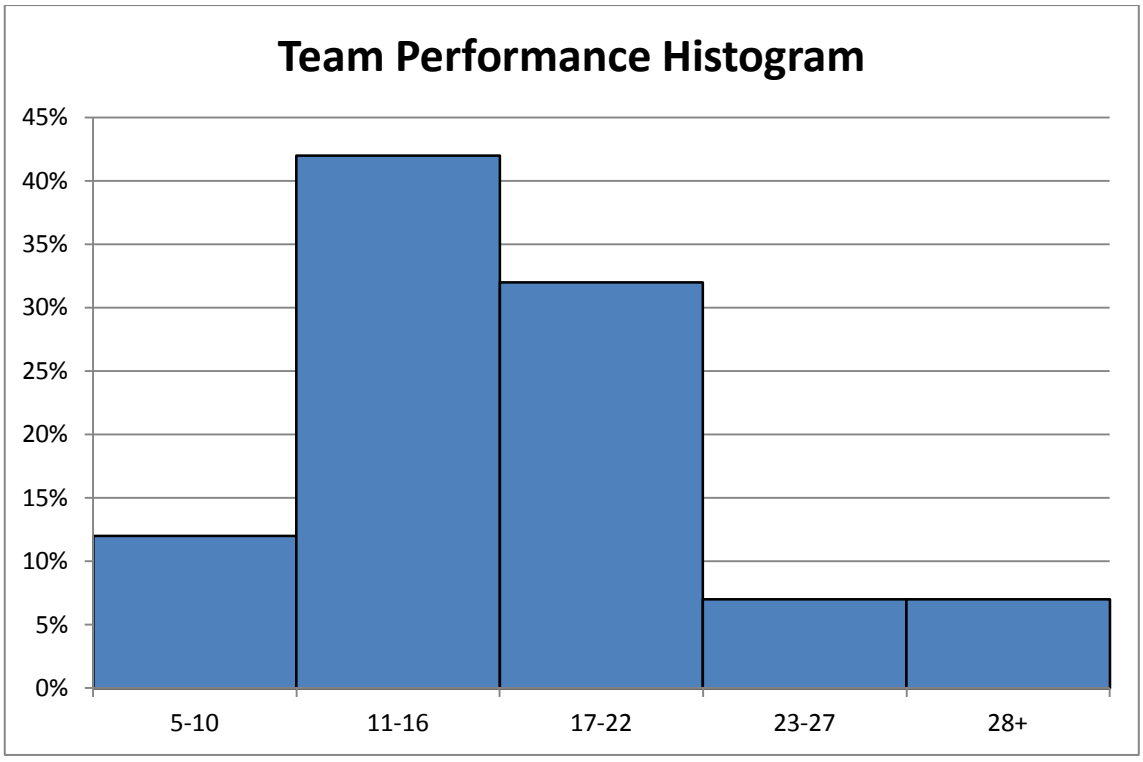


Figure 8 - Team Performance histogram

5.3.4 SECTION 3: TEAM AND ORGANISATIONAL STRUCTURE

The main purpose of the questions of section 3 was to be able to plot an organisation on the organisational structure continuum from Organic to Mechanistic. We looked at measures that evaluate the internal team structure and then also the relationship between the team and the organisation.

TEAM STRUCTURE

52% of the respondents either "Agree" or "Absolutely agree" with the statement that management practices within the organisation allowed the team the freedom to work according to their own processes, structures and rules. This sentiment is echoed by the response to the statement that the team structure is defined by management external to the team to which 57% of respondents either "disagree" or only "Sometimes Agree". Even though most of the respondents were in agreement that the organisation provides the team some level of autonomy, 59% stated that their company dictates which technology they're allowed to use for work purposes and only 4% had complete freedom to choose which technology they want to adopt.

	Disagree	Sometimes	Agree	Absolutely Agree
The team structure and its members was defined by management who did not form part of the team	14%	42%	32%	12%
Team members had clearly defined roles and responsibilities	6%	43%	33%	17%
Management practices within the organisation allowed the team the freedom to work according to their own processes, structure and rules	14%	33%	38%	14%

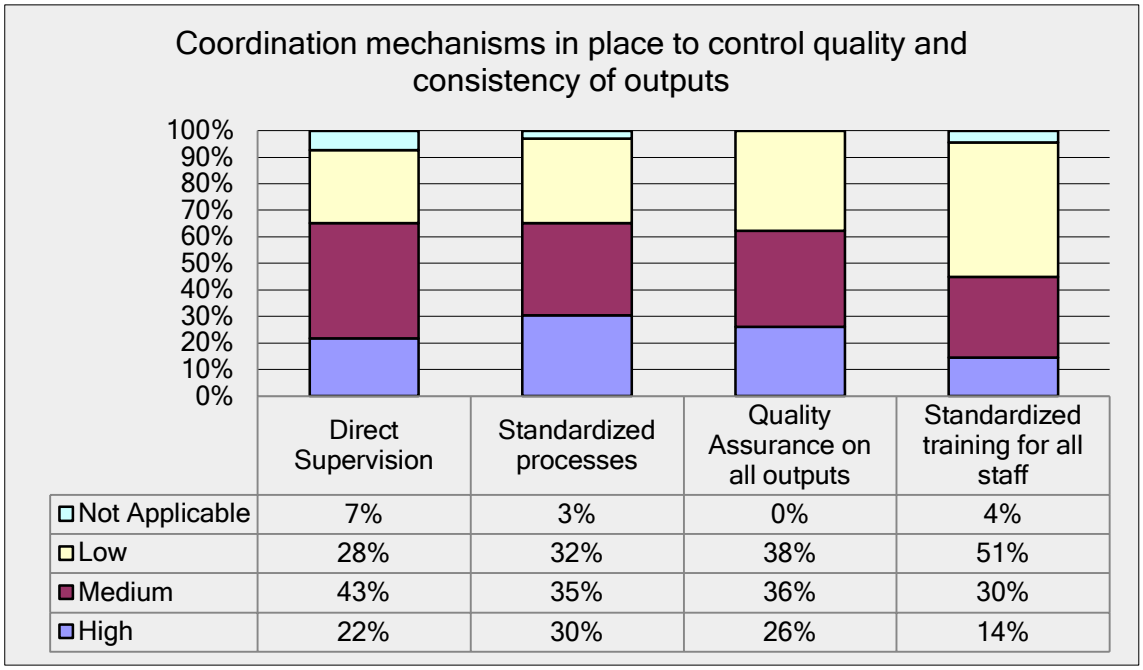
Table 10 - Team structure measures

Only 51% of respondents indicated that they "Agree" or "Absolutely Agree" with the statement that team members had clearly defined roles and responsibilities.

ORGANISATIONAL STRUCTURE

As discussed in Chapter 2, the organisational structure is a function of the basic parts of an organisation, the coordination mechanisms and the design parameters. In an Organic organisational structure there are fewer traces of these features as compared to a Mechanistic structure where everything is more standardised and formalised. 80% of responses received answered that their organisation does have a clearly defined organogram which describes the basic structure of the organisation. Out of these responses 31% indicated that the organogram is either out of date or that they're unsure of its current status. Standardised processes and

direct supervision were the most common coordination mechanisms found, with 65% of responses indicating either high or medium level of controls being present in their companies. Rather surprisingly, 55% of respondents indicated that standardised training is either not applicable at all or only low levels of standardised training exist in the company. Another interesting observation is that even though 100% of respondents said that quality assurance is performed on all outputs, nearly 40% of them responded that the level of quality assurance being performed on outputs were low.



	Direct Supervision	Standardized processes	Quality Assurance on all outputs	Standardized training for all staff
Not Applicable	7%	3%	0%	4%
Low	28%	32%	38%	51%
Medium	43%	35%	36%	30%
High	22%	30%	26%	14%

Table 11 - Coordination mechanisms

55% of respondents perceived their company structure as being more Mechanistic than Organic. Figure 9 below plots the organisations on the company structure continuum from completely Organic to completely Mechanistic. As we expected, the results indicate that most companies are neither completely Mechanistic nor completely Organic but rather only partially so. Not a single respondent selected completely Organic for all of the structural elements but 4% of the respondents indicated that their company is completely Mechanistic on all six structural elements.

Table 12 below shows the respondents' perception of how Mechanistic or Organic the structural elements are within their organisational structure. Coordination mechanisms were identified as the most Organic with 57% of responses being either completely or slightly Organic whilst Reporting structures were identified as most Mechanistic with 64% of responses indicating either slightly or completely Mechanistic.

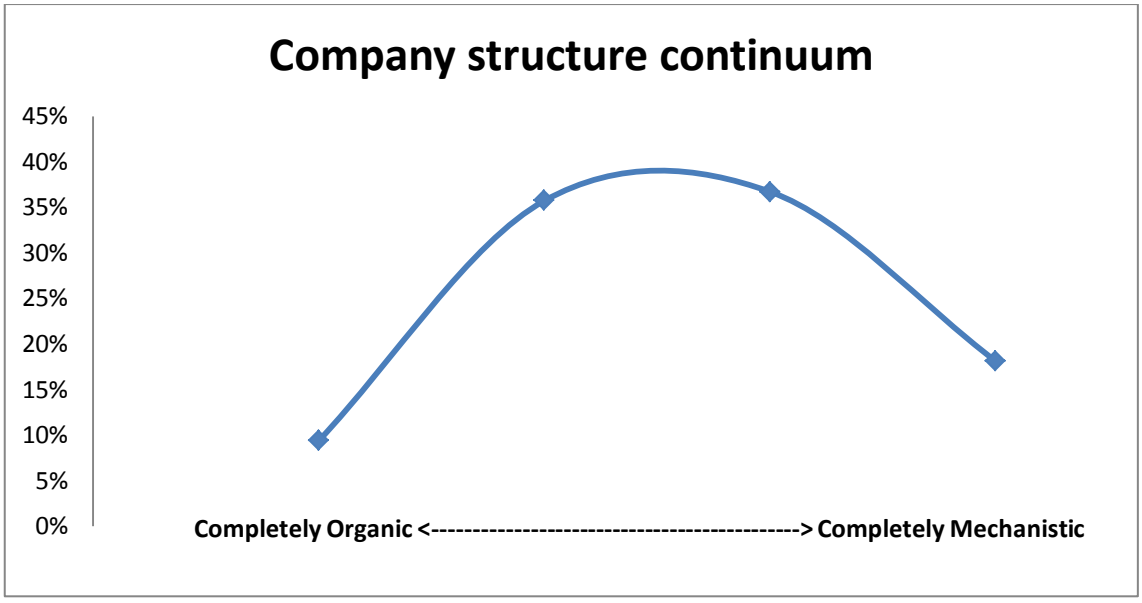
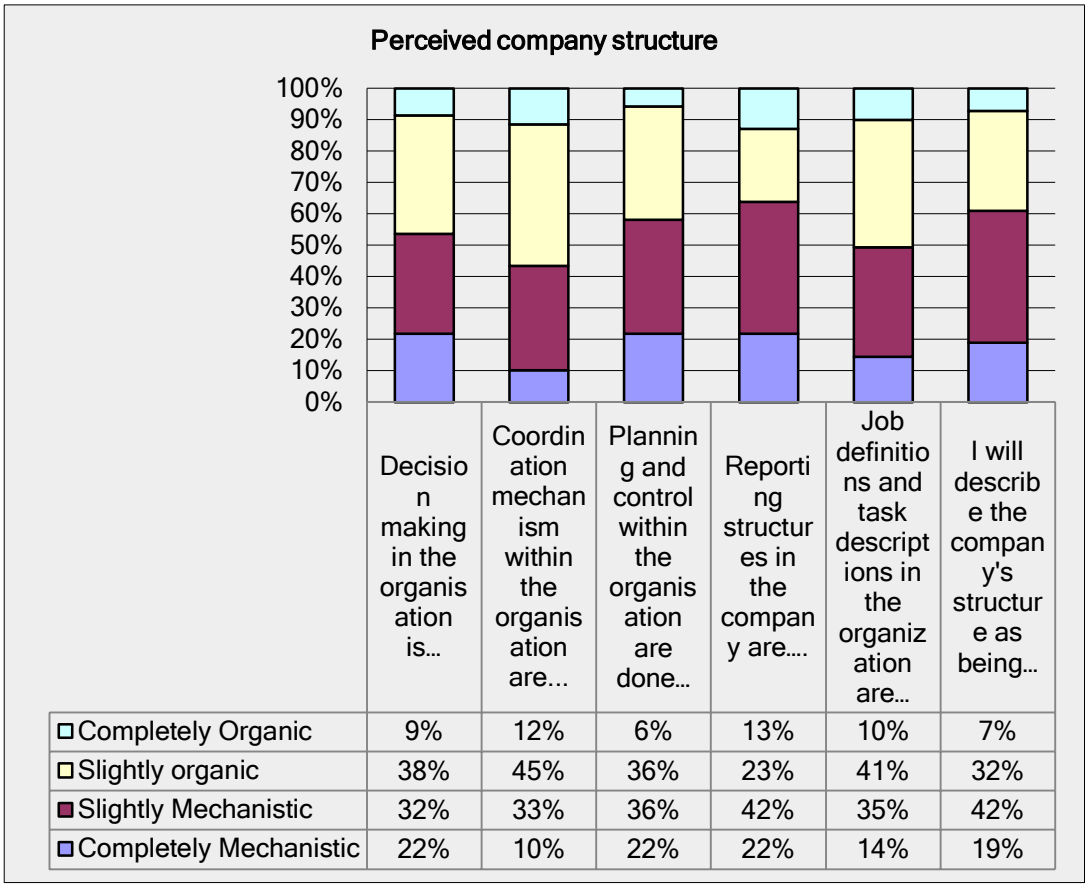


Figure 9 - Company structure continuum



	Decision making in the organisation is...	Coordination mechanism within the organisation are...	Planning and control within the organisation are done...	Reporting structures in the company are....	Job definitions and task descriptions in the organization are...	I will describe the company's structure as being...
Completely Organic	9%	12%	6%	13%	10%	7%
Slightly organic	38%	45%	36%	23%	41%	32%
Slightly Mechanistic	32%	33%	36%	42%	35%	42%
Completely Mechanistic	22%	10%	22%	22%	14%	19%

Table 12 - Perceived company structure

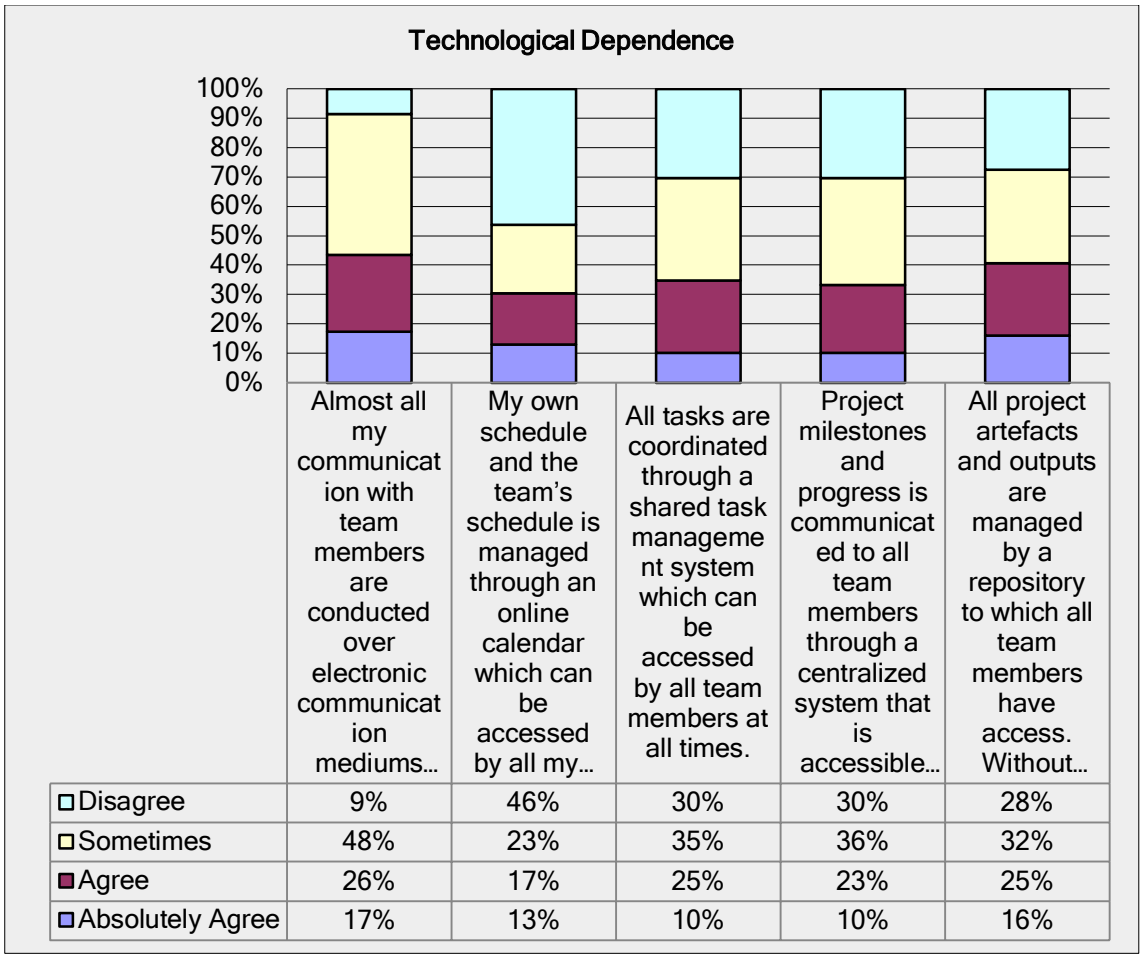
5.3.5 SECTION 4: DEGREE OF VIRTUALIZATION

As discussed in Chapter 2, the degree of a team's "*virtualness*" can be presented as a function of the technological dependence, temporal and geographic dispersion between team

members. This section of the questionnaire aims to map respondents on the virtualisation continuum by looking at these three elements of virtualisation.

TECHNOLOGICAL DEPENDENCE

Technological dependence was assessed based on respondents' dependence on technology to perform daily team tasks relating to communication, coordination and collaboration.



	Almost all my communication with team members are conducted over electronic communication mediums...	My own schedule and the team's schedule is managed through an online calendar which can be accessed by all my...	All tasks are coordinated through a shared task management system which can be accessed by all team members at all times.	Project milestones and progress is communicated to all team members through a centralized system that is accessible...	All project artefacts and outputs are managed by a repository to which all team members have access. Without...
Disagree	9%	46%	30%	30%	28%
Sometimes	48%	23%	35%	36%	32%
Agree	26%	17%	25%	23%	25%
Absolutely Agree	17%	13%	10%	10%	16%

Table 13 - Team member's technological dependence

Team members were most dependent on technology for communication-related tasks with 43% of respondents either selecting "Agree" or "Completely Agree" with the statement that almost all communication with team members are conducted over electronic communications mediums. Respondents were least dependant on technology for the coordination task of scheduling with 70% of respondents not frequently sharing calendars using technology.

TEMPORAL DISPERSION

73% of respondents work with team members that are mostly in the same time zone with 10% working across a time zone difference of more than four hours. 1% of respondents were unaware of the time zone difference between team members.

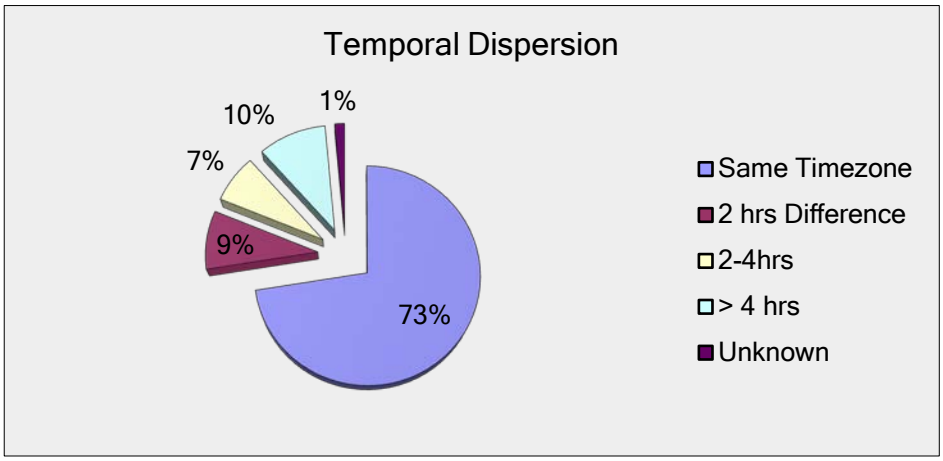


Figure 10 - Temporal Dispersion

GEOGRAPHIC DISPERSION

55% of respondents are geographically situated in the same building, while 26% of team members are dispersed over a single country and 19% of respondents are dispersed across more than one country. None of the respondents were unaware of the physical location of their team members.

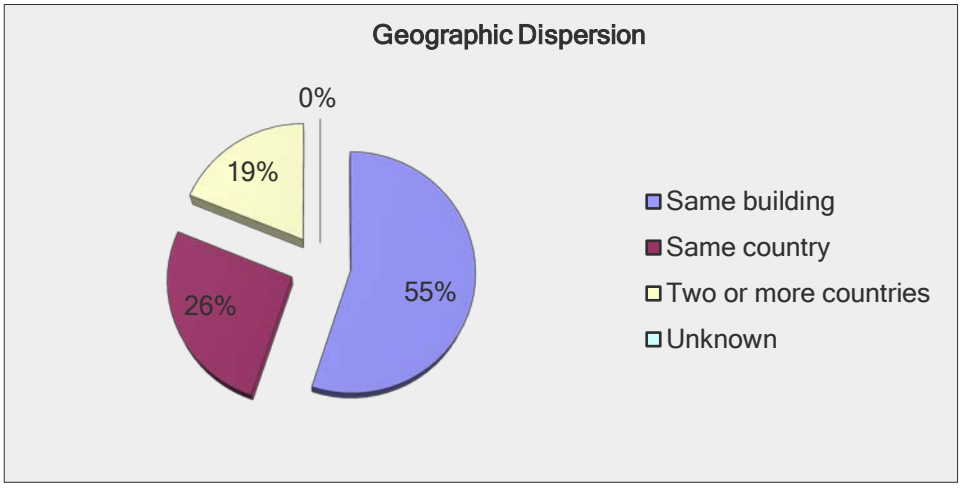
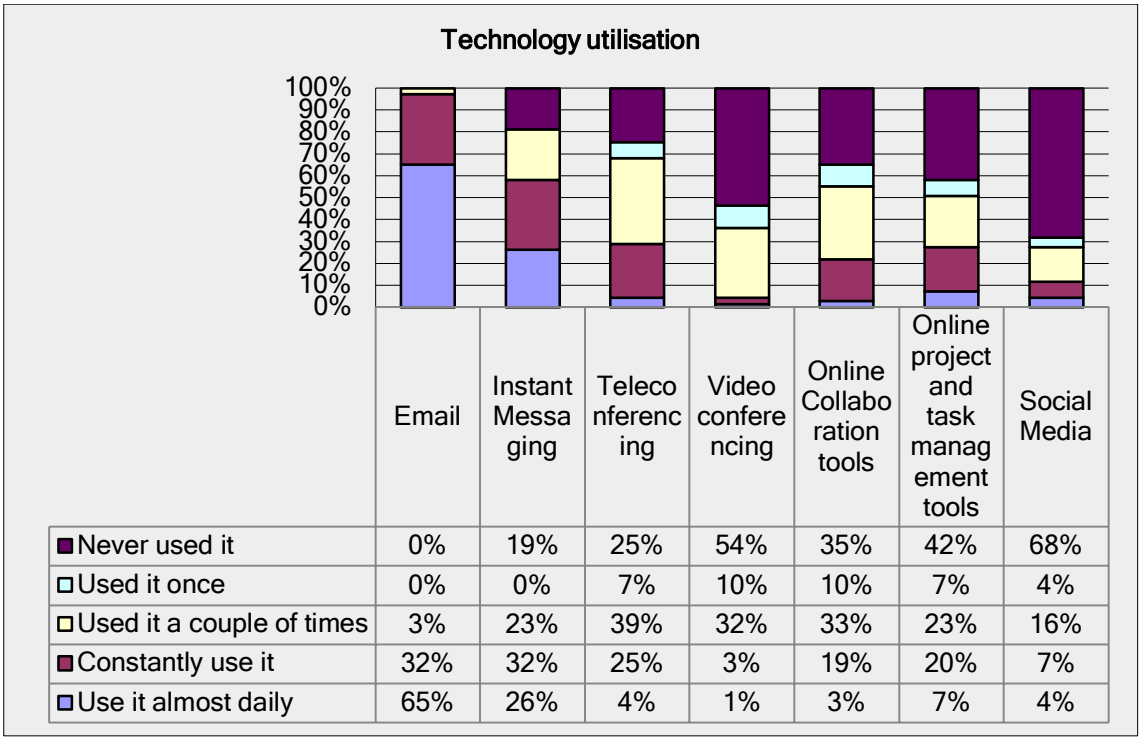


Figure 11 - Geographic Dispersion

TECHNOLOGY UTILISATION

Email was by far the most widely utilised technology amongst team members with 65% of respondents using it almost daily. In second place was instant messaging with 26% of

respondents using it almost daily. Social media was the least utilised technology with 68% of respondents having never used it for work purposes.



	Email	Instant Messaging	Teleconferencing	Video conferencing	Online Collaboration tools	Online project and task management tools	Social Media
Never used it	0%	19%	25%	54%	35%	42%	68%
Used it once	0%	0%	7%	10%	10%	7%	4%
Used it a couple of times	3%	23%	39%	32%	33%	23%	16%
Constantly use it	32%	32%	25%	3%	19%	20%	7%
Use it almost daily	65%	26%	4%	1%	3%	7%	4%

5.3.6 TEAM VIRTUALISATION CONTINUUM

Taking the above factors into consideration, we calculated a team virtualisation score as per Appendix C which enables us to plot each respondent on the team virtualisation continuum. Figure 12 below shows the frequency of responses per bin in a histogram. A negative score on the team virtualisation continuum indicates that the team is more face-to-face whilst a positive score indicate the team is more virtual.

Not a single response can be classified as either completely virtual of completely face-to-face and the majority of responses are grouped in the lower scores of more virtual than face-to-face. The histogram is positively skewed with 33% of responses having received scored a virtualisation score of between 1 and 5.The lowest category was that of respondents with a virtualisation score of between 10-15 with only 16% of respondents falling in that category.

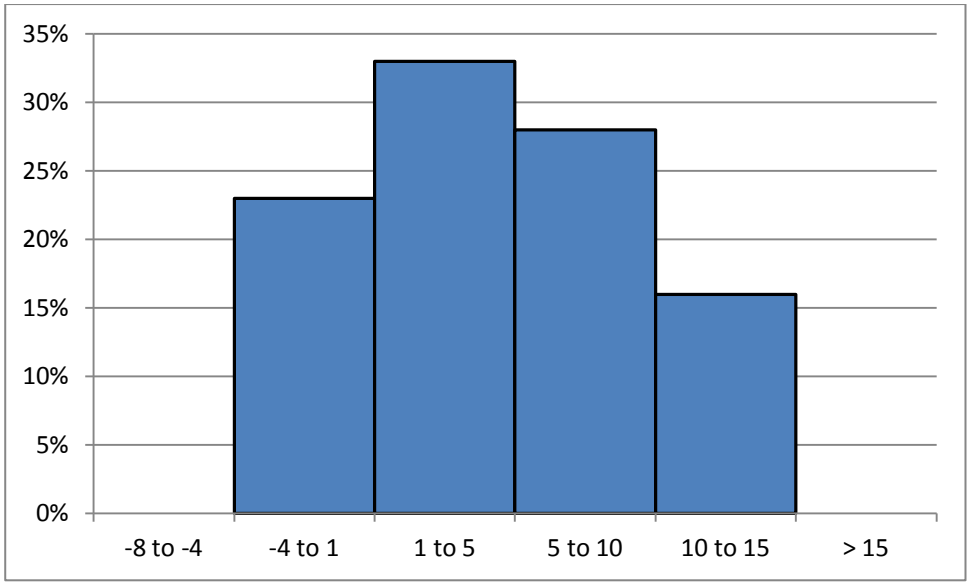


Figure 12 - Team virtualisation continuum frequency

5.4 RESULT CATEGORISATION

Before analysing the relationships presented in our research questions we have to categorise our results on the virtualisation and company structure continuums. In order to do so we calculate a score for each respondent on both the virtualisation and company structure continuums. A score of 0 indicates that the respondent is completely neutral on either the organisation structure or virtualisation continuum. Positive scores on the virtualisation continuum move towards being more virtual whilst negative scores move towards being more Face-to-face. Positive scores on the organisation structure continuum indicate a more Organic structure whilst a negative score indicate a more Mechanistic structure. The scores were calculated by assigning a positive or negative mark to the appropriate responses and then calculating a score as per appendix C.

Each response was then classified as Organic and Face-to-Face, Mechanistic and Face-to-Face, Organic and Virtual, Mechanistic and Virtual or Neutral. The distribution of responses are presented in Table 14 below.

Classification	Response
Organic, Face-to-Face	20%
Mechanistic, Face-to-Face	20%
Organic, Virtual	20%

Mechanistic, Virtual	29%
Neutral	11%

Table 14 - Response classification

The distribution of responses can also be viewed using a scatter plot as can be seen in the image below. Each quadrant represents a category defined by the respondents' organisational structure and its level of virtualisation. 29% of responses received fell within the Mechanistic, Virtual category whilst all three of the other categories had an equal distribution of 20% responses with 11% of the responses having a neutral categorisation on either one of the categories. No clear trend can be spotted between the performance of the teams and their categorisation apart from the fact that the Mechanistic, Face-to-Face teams' performance seems more consistent and on average lower than the other categories.

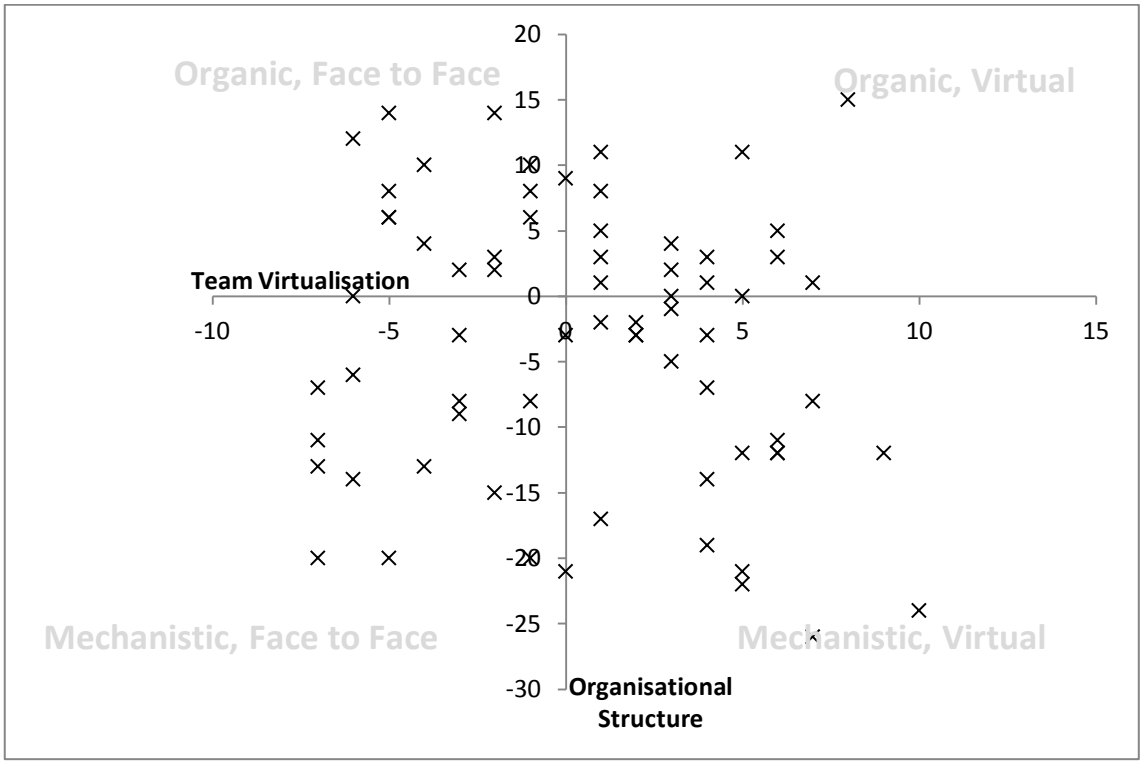


Figure 13 - Result categorisation – Scatter plot

The categories can be described in terms of the minimum, maximum, average, median and standard deviations of the responses using descriptive statistics. These results are summarised below.

	Organic, Face-to-Face	Mechanistic, Face-to-Face	Organic, Virtual	Mechanistic, Virtual	Neutral
Organisation Structure					
Minimum	2.0	-20.0	1.0	-26.0	-21.0
Maximum	14.0	-3.0	15.0	-1.0	9
Average	7.5	-12.0	5.2	-11.7	-2.6
Median	7.0	-12.0	3.5	-12.0	0
Std. Dev.	4.09	5.48	4.39	7.85	9.07
Team Virtualisation					
Minimum	-6.0	-7.0	1.0	1.0	-6.0
Maximum	-1.0	-1.0	8.0	10.0	16.0
Average	-3.3	-4.4	3.6	4.7	0
Median	-3.5	-4.5	3.5	4.5	0
Std. Dev.	1.8	2.3	2.5	2.4	3.4
Performance					
Minimum	8.0	5.0	7.0	7.0	6.0
Maximum	19.0	19.0	20.0	20.0	16.0
Average	13.0	12.0	13.0	12.8	10.7
Median	13.0	12.5	12.0	12.0	12.0
Std. Dev.	3.2	4.0	3.8	3.8	3.8

Table 15 - Category description

5.4.1 Organisation Structure and Performance

To analyse whether there is a relationship between the organisational structure and the performance of the teams we drew a scatter plot with organisational structure score on the X-Axis and performance on the Y-axis. The organisational structure continuum moves from Mechanistic being negative to Organic being positive.

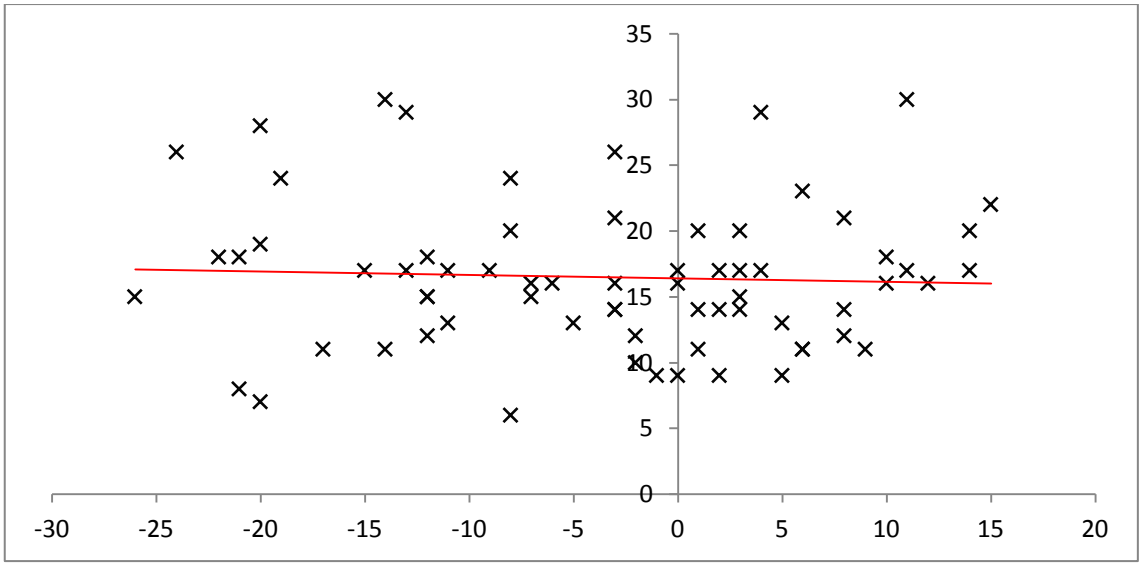


Figure 14 – Scatter plot: Organisation structure vs performance of all teams

From the figure above it is clear that no apparent relationship exists between the organisational structure and team performance. Calculating the correlation coefficient between the two datasets yields a result of -0.05 which confirms the findings evident in the scatter plot that there is no significant relationship between the two variables. We then filtered the teams to only include teams that are more virtual and found that the correlation between organisational structure and team performance for teams that are more virtual than face-to-face are still only -0.08 as can be seen in the scatter plot below.

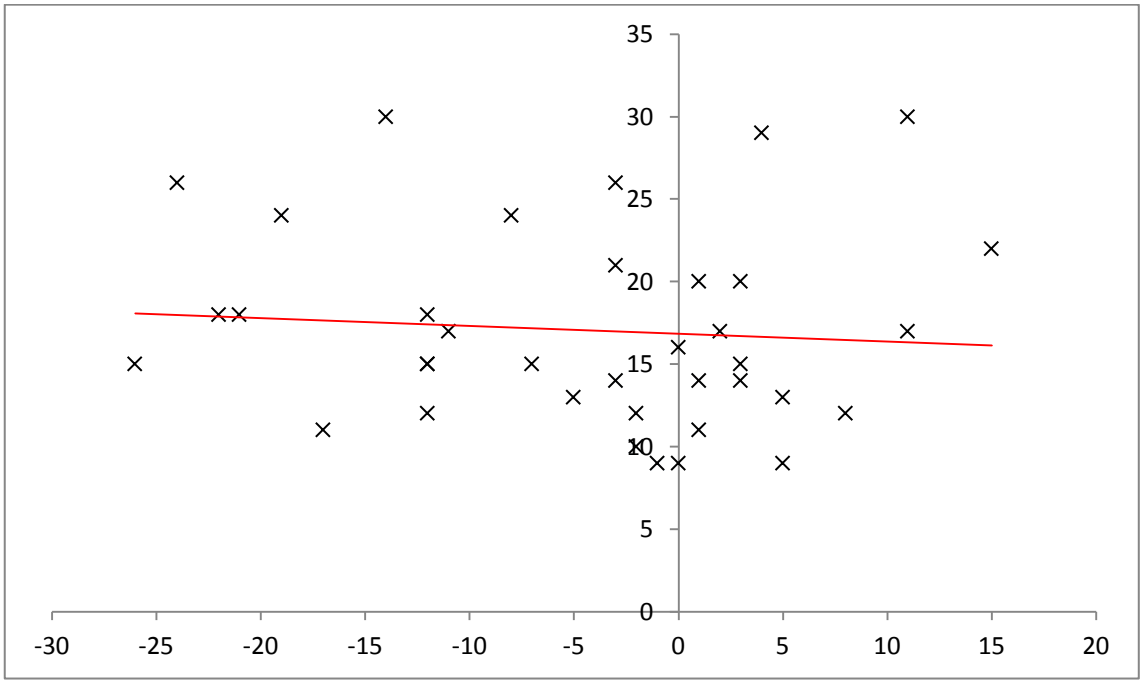


Figure 15 - Scatter plot: Organisation structure vs performance of virtual teams

When analysing the performance according to our categorisation of Mechanistic versus Organic, some interesting results can be observed as per Figure 16. The interquartile range (IQR) of Mechanistic organisational structure is much lower than the IQR of Organic organisational structures. This means that the performance of organisations with a more Mechanistic structure is more consistent than that of Organic structures whose responses are more widely spread out over a larger range.

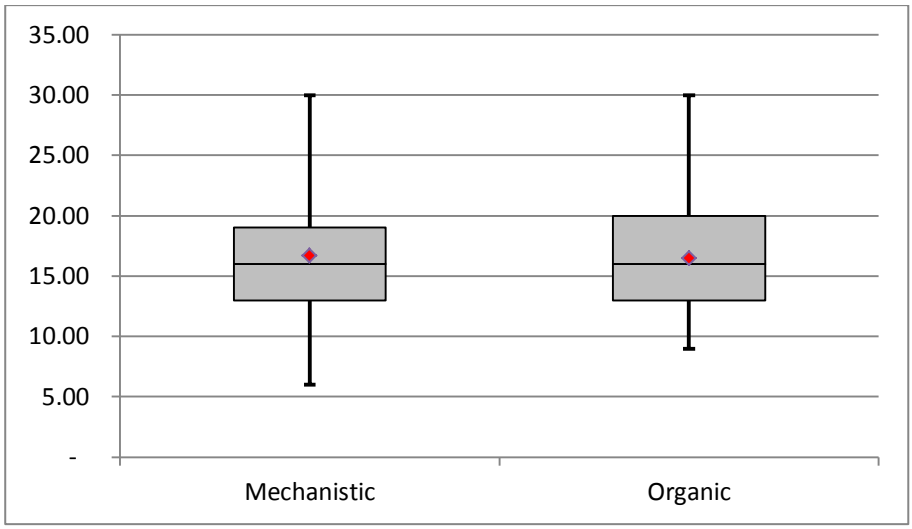


Figure 16 - Boxplot of Mechanistic vs Organic

Both structures obtained the same maximum performance of 30 and median of 16 whilst the average performance was also very close at 16.7 for Mechanistic and 16.4 for Organic. The Mechanistic structure had the worst performing team with a minimum score of 6.0 whilst the worst performing Organic structure had a score of 9.0.

No apparent relationship exists between the structure of an organisation and its relative team performance. However the performance of teams that operate within a Mechanistic organisational structure is more consistent than that of teams that operate in an Organic organisational structure.

5.4.2 TEAM VIRTUALISATION AND PERFORMANCE

To analyse whether there is a relationship between the virtualisation of a team and the team's performance we drew a scatter plot with team virtualisation score on the X-axis and performance on the Y-Axis. The team virtualisation continuum moves from face-to-face being negative to virtual being positive.

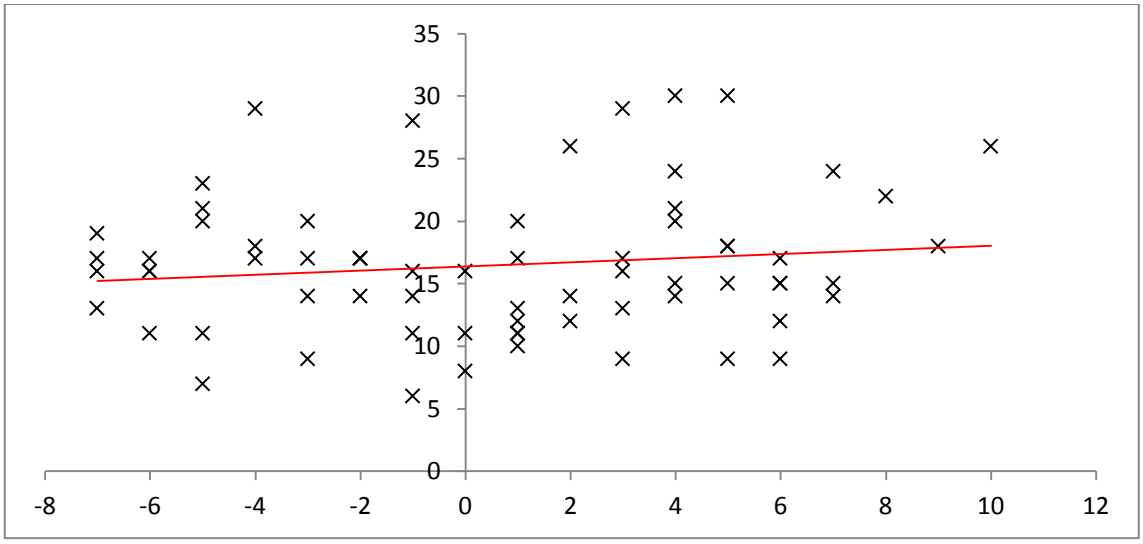


Figure 17 – Scatter plot: Team virtualisation vs Performance

From the figure above it looks like there might be a small correlation between the virtualisation of a team and its performance. Calculating the correlation coefficient between the two datasets yields a result of 0.13 which confirms the findings evident in the scatter plot that there is a weak correlation between team virtualisation and performance.

When analysing the performance according to our categorisation of virtual versus face-to-face, we observe some interesting results as can be seen in Figure 18. The interquartile range (IQR) of face–to-face teams is much lower than the IQR of virtual teams. This means that the performance of face-to-face teams is more consistent than that of virtual teams whose performance scores are more widely spread out.

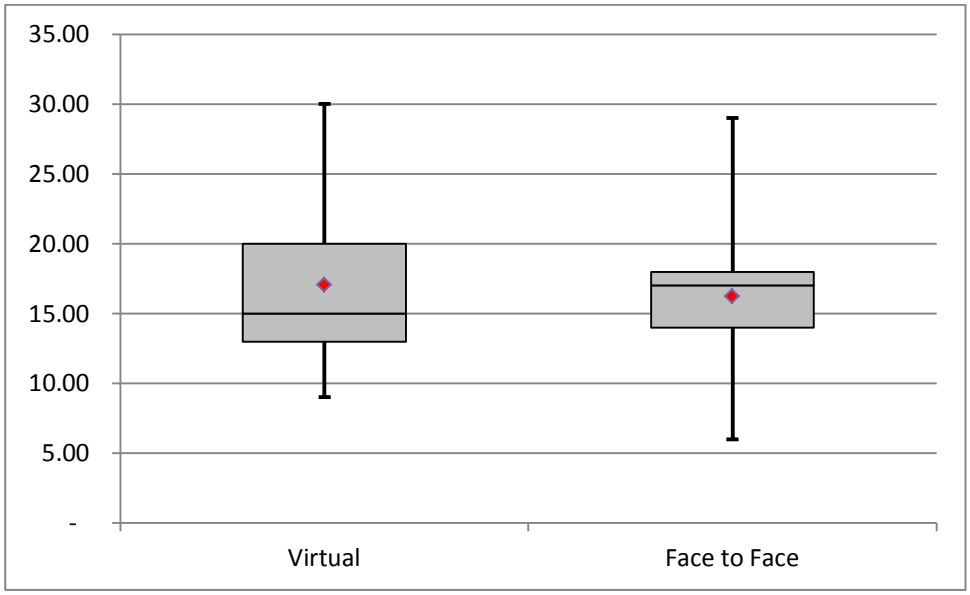


Figure 18 - Boxplot of Virtual vs Face-to-Face

Virtual teams outperformed face-to-face teams with a score of 30 versus a maximum performance score of only 28 being achieved by the face-to-face teams. The median performance score obtained by face-to-face teams was higher than the virtual teams with a score of 17 against 15. But the virtual teams once again outperformed the face-to-face teams with an average performance score of 17.1 against 16.2. The face-to-face teams had the worst performing team with a minimum score of 6.0 whilst the worst performing virtual team had a score of 9.0.

A weak positive correlation exists between the virtualisation of a team and its relative performance. However the performance of the face-to-face teams is more consistent than that of virtual teams.

5.4.3 Effect of Organisational Structure on Communication

To analyse what effect the organisational structure has on communication within a team we calculated a communication performance score as can be seen in Appendix C. Good communication within a team is defined as frequent, open and clear. To analyse whether there is a relationship between the organisational structure and the team's communication performance, we drew a scatter plot with the organisational structure score on the X-axis and communication performance on the Y-axis. The organisational structure continuum moves from Mechanistic being negative to Organic being positive. A high communications score indicates more frequent, open and concise communication within the team.

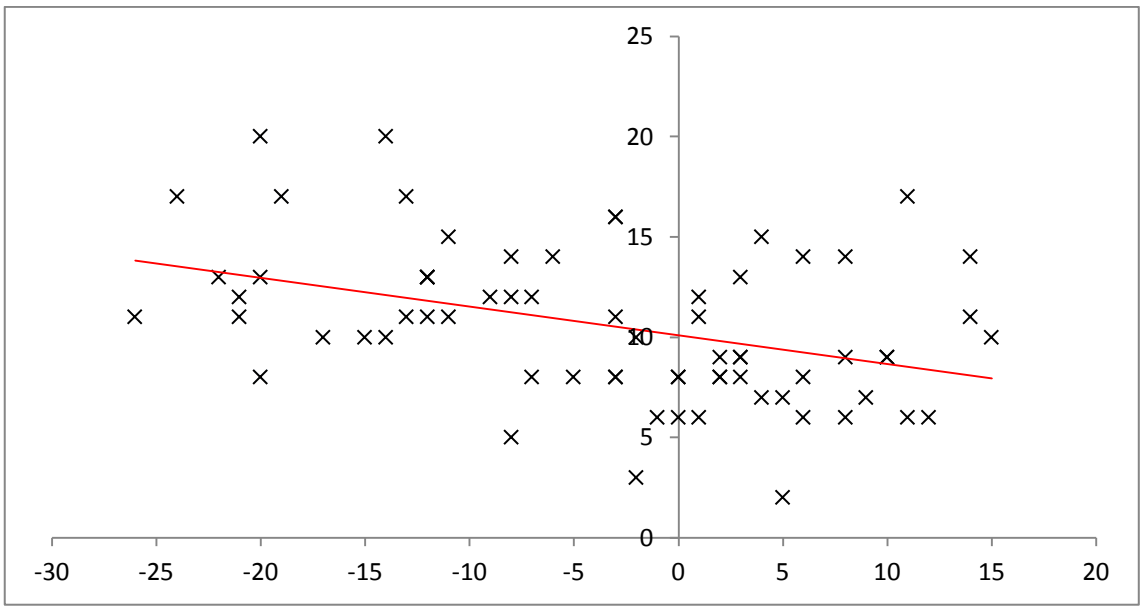


Figure 19 – Scatter plot: Organisational structure vs Communications score

From the figure above it is apparent that there might be a weak correlation between the organisational structure and its communication performance. The more Mechanistic the structure the higher the communications score. Calculating the correlation coefficient between the two datasets yields a result of -0.4 which confirms the findings evident in the scatter plot that there is a very small correlation between organisational structure and team communication performance.

5.4.4 Effect of Organisational Structure on Technology

To analyse what effect the organisational structure has on technology usage within a team we calculated a technology performance score as can be seen in Appendix C. A good technology performance score is allocated to teams who use innovative technology but still has control over the technology being used within the organisation. To analyse whether there is a relationship between the organisational structure and the team's technology performance, we drew a scatter plot with the organisational structure score on the X-axis and technology performance on the Y-axis. The organisational structure continuum moves from Mechanistic being negative to Organic being positive. A high technology performance score indicates more innovative use of technology within the team and more control.

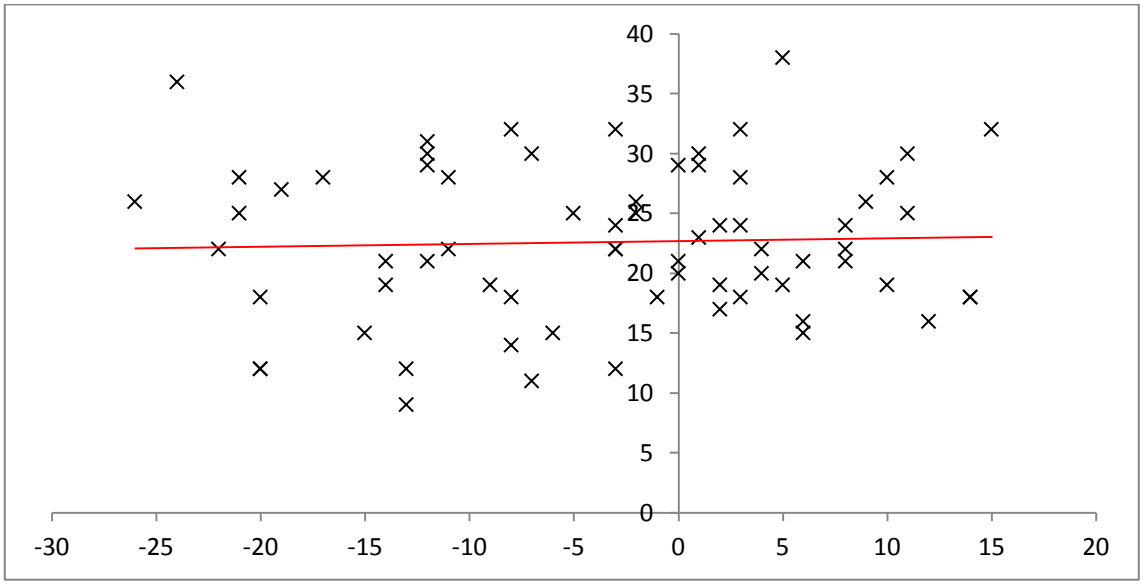


Figure 20 – Scatter plot: Organisational structure vs Technology score

From the figure above it is clear that no apparent relationship exists between the organisational structure and the team's technological performance. Calculating the correlation coefficient between the two datasets yields a result of 0.04 which confirms the findings

evident in the scatter plot that there's no significant relationship between the two variables. Despite this result, it is important to note that we did identify a difference in the level of control over technology between Organic and Mechanistic structures. The mode of responses amongst Organic organisations was "Sometimes" whilst the mode amongst Mechanistic organisations was "Almost Always".

5.4.5 Effect of Organisational Structure on Culture

To analyse what effect the organisational structure has on the culture within a team we calculated a culture performance score as can be seen in Appendix C. We define a good culture as one that promotes open communication and team members that trust and support one another. To analyse whether there is a relationship between the organisational structure and the team's culture performance score we drew a scatterplot with an organisational structure score on the X-axis and culture performance on the Y-axis. The organisational structure continuum moves from Mechanistic being negative to Organic being positive. A high culture performance score indicates a healthy culture within the team.

From the figure below it is clear that no apparent relationship exists between the organisational structure and the team's cultural performance. Calculating the correlation coefficient between the two datasets yields a result of 0.08 which confirms the findings evident in the scatter plot that there's no significant relationship between the two variables.

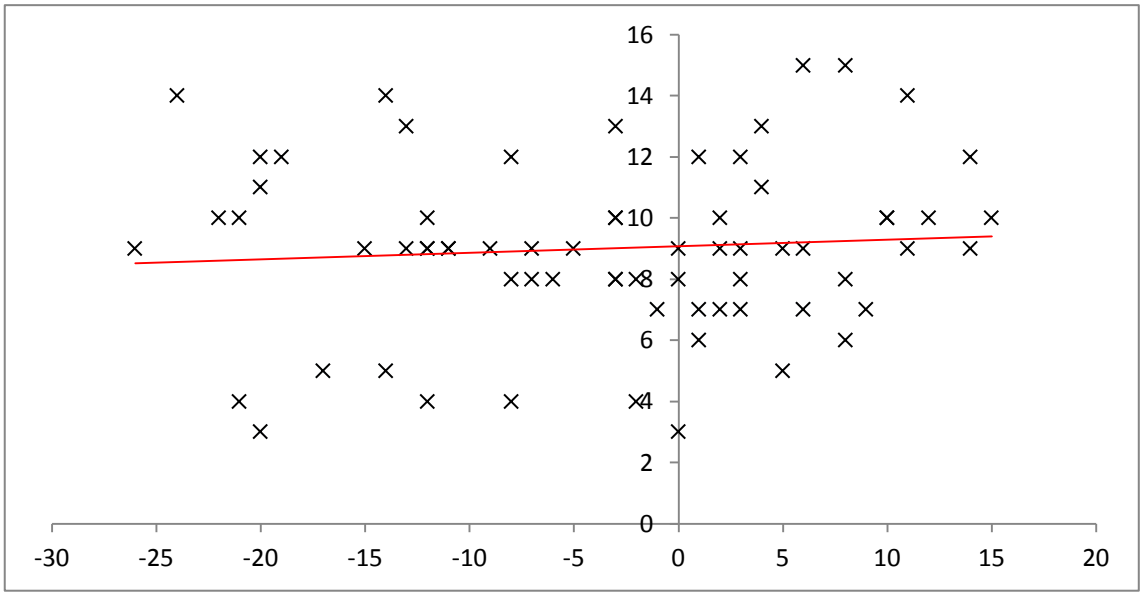


Figure 21 – Scatter plot: Organisational structure vs Culture performance score

5.4.6 EFFECT OF ORGANISATIONAL STRUCTURE ON LEADERSHIP

To analyse what effect the organisational structure has on the leadership within a team we calculated a leadership performance score as can be seen in Appendix C. We define good leadership as the ability to successfully guide a team towards their goal by setting a clear vision and assigning clear responsibilities to team members. To analyse whether there is a relationship between the organisational structure and the team's leadership performance score, we drew a scatter plot with an organisational structure score on the X-axis and leadership performance on the Y-axis. The organisational structure continuum moves from Mechanistic being negative to Organic being positive.

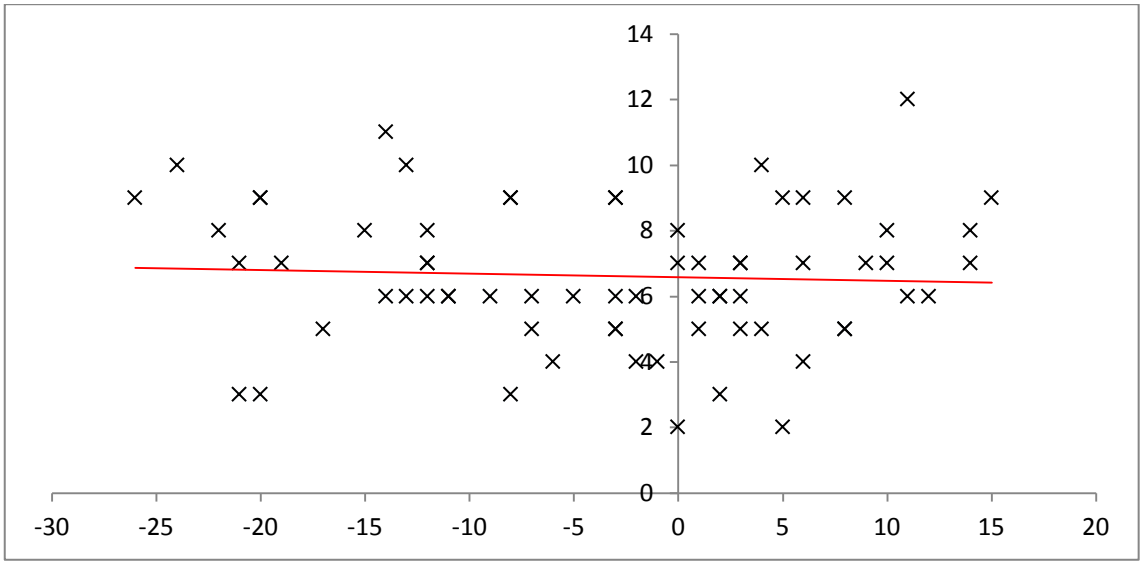


Figure 22 – Scatter plot: Organisational structure vs Leadership performance score

From the figure above it is clear that no apparent relationship exists between the organisational structure and the team's leadership performance. Calculating the correlation coefficient between the two datasets yields a result of -0.05 which confirms the findings evident in the scatter plot that there's no significant relationship between the two variables.

5.4.7 PERFORMANCE PER CATEGORY

The performance per category can be compared against each other using a boxplot diagram as can be seen in Figure 23. From the diagram we notice that Mechanistic virtual and Organic virtual teams have slightly higher means than the other categories.

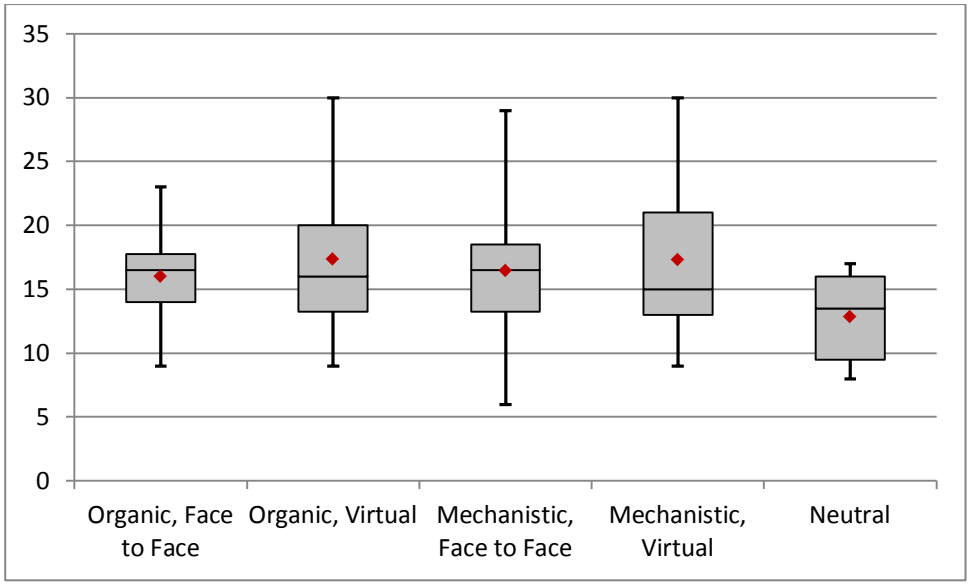


Figure 23- Boxplot of Performance per category

To test whether the difference in means is statistically significant we ran a one-way ANOVA test at a 95% confidence level to test the following hypothesis:

NULL HYPOTHESIS:

The mean performance score of all the categories are equal.

ALTERNATIVE HYPOTHESIS:

At least one category has a different mean performance score.

The results of the ANOVA test are presented in Table 16 below.

Anova: Test of equal means						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Organic, Virtual	14	243	17.35714	39.78571		
Organic, Face to Face	14	224	16	15.69231		
Mechanistic, Virtual	21	363	17.28571	34.31429		
Mechanistic, Face to Face	14	230	16.42857	42.87912		
Neutral	6	77	12.83333	15.76667		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	107.4555	4	26.86387	0.841237	0.504177	2.515318
Within Groups	2043.762	64	31.93378			
Total	2151.217	68				

Table 16 – ANOVA Results

Based on the results of the ANOVA test we have to accept the Null hypothesis at the 95% confidence interval level because the P-Value is > 0.05 and the F-Value is < F crit. The consequence of this is that the difference in means we observed in Figure 23 is not statistically significant and we can conclude that the mean performance scores of all five categories are equal.

5.5 CONCLUSION

This chapter covers the interview, survey and quantitative analysis phases of our research methodology. The interviews revealed that our research is relevant and it confirmed our suspicions that the organisational structure might affect the performance of virtual teams. Our survey was distributed to 170 participants and it resulted in 87 responses of which 69 could be used for analysis. This chapter then presented and categorised the results which revealed the following interesting observations:

- We noticed a strong correlation of 0.7 between the internal and external performance measures of a work team.
- Not a single respondent selected their company as being completely organic but 4% of the respondents indicated that they perceive their company as completely mechanistic on all 6 structural elements.

- 43% of respondents indicated that they are dependent on ICT for communication with team members.
- Email was by far the most widely utilized technology amongst team members with 65% of respondents using it almost daily.
- Organic structure allowed more freedom in technology but this did not lead to an increase in the technological sophistication of the company.
- Responses were equally distributed in our 2x2 categorization model Organic and Face to Face, Mechanistic and Face to Face, Organic and Virtual, Mechanistic and Virtual. A limited number of responses was categorized as neutral.
- No apparent relationship exists between the organisational structure and team performance.
- The interquartile range (IQR) of mechanistic organizational structure is much lower than the IQR of organic organizational structures.
- A weak positive correlation of 0.13 exists between the virtualization of a team and its performance.
- The interquartile range (IQR) of Face to Face teams is much lower than the IQR of virtual teams.
- A weak negative correlation of -0.4 exists between organizational structure and team communication performance
- No apparent relationship exists between the organisational structure and the team's technological performance.
- No apparent relationship exists between the organisational structure and the team's cultural performance.
- No apparent relationship exists between the organisational structure and the team's leadership performance.

We finally executed an ANOVA test of equal means at a 95% confidence level and found that we have to accept the Null hypothesis which states that the mean performance score of all team categories are equal.

CHAPTER 6 - DISCUSSION OF RESULTS

6.1 INTRODUCTION

This chapter brings together the questions asked in Chapter 3, with the results presented in Chapter 5, and the theoretical background of Chapter 2. The main aim of this Chapter is to indicate whether or not we have reached our research objectives and to highlight any concerns we've identified during the research process.

6.2 DISCUSSION OF QUESTION 1

The first question we asked in this research was whether we could observe a relationship between the organisation structure and virtual team performance.

Organisation structure is an important input into the design and process level activities of a work team (Cummings & Worley, 2009). This relationship is evident in the extended IPO model presented in Figure 1 which further shows the relationship between team design, its process activities and the expected outcome (Martins, Gibson, & Maynard, 2004). Building on the argument of Arnison & Miller (2002) that it is impractical to clearly distinguish between virtual and face-to-face teams, we decided to measure team performance across a team virtualisation continuum which moves from face-to-face to completely virtual. The results presented in Figure 12 confirmed the notion that no team in our sample population was completely virtual or completely face-to-face and all teams had some element of virtualisation in them.

To answer the question of whether we can observe a relationship between the organisational structure and virtual team performance we first looked at team performance in general, then analysed the effect that organisational structure has on team performance and what impact the team virtualisation has on team performance. Lastly, we examined the effect of organisational structure on teams that are more virtual than face-to-face.

6.2.1 TEAM PERFORMANCE

Team performance is an extremely relative term which varies wildly based on the specific factors the authors are investigating (Berry, 2011). For the purpose of our study we constructed a definition of team performance around the classical definition of virtual teams, namely that virtual teams are formed when members of virtual groups interact and collaborate with each other to accomplish a common goal (DeSanctis & Poole, 1997). From this definition we've identified internal and external measures of team performance. Internal measures of team performance relate to the team's ability to interact and collaborate with

each other whilst the external performance measures relate to the team's ability to reach their goals. This definition is in line with the research done by Sinclair et al (2012) which agrees that team performance is not only a function of a team's ability to reach their goal but also that of the internal human factors within the team. Our research confirmed this relationship between the internal and external team performance by showing a strong positive correlation of 0.7 between the two scores. We did however notice that on average team motivation scored much lower than any of the other measures of team performance. This result was consistent for both virtual and face-to-face teams which showed similar distribution in responses.

6.2.2 Organisational Structure and Team Performance

Our research found no significant relationship between the mean performance scores of work teams and the organisational structure. We can therefore not say whether the performance of a work team will increase or decrease depending on the type of organisational structure. Structural contingency theory specifies that there is no single structure that would work for all organisations but rather that for an organisation to be successful the structure needs to be contingent with other organisational factors such as strategy, size, technology and environment (Donaldson, 1996). Our results therefore echo the notion of structural contingency theory which states that looking at the organisational structure alone is not sufficient to make any assumptions regarding the expected performance of a virtual team in the organisation. Organisational structure is also only one input into team level design and even though theory suggests that it will affect the inputs and processes within the team (Cummings & Worley, 2009) we cannot say whether the effect is large enough to impact on the performance of the team.

We did however find that teams who operate within a Mechanistic organisational structure performed more consistently than teams who operate in an Organic structure. The results presented in Figure 16 show that teams who operate in an Organic organisational structure had a much larger IQR than Mechanistic teams. An Organic structure is defined as one that is low on formalisation, standardisation and centralisation (Satō, 2010). It is therefore expected that performance of teams in an Organic structure will have more variance because of the lack of formal and standardised quality control processes. This notion is further confirmed by our research which showed that companies who are more Organic on average scored lower on the questions relating to systems and controls to ensure consistent quality output. Our results do however contrast the theory of complex adaptive systems (Ellis & Herbert, 2011) which views virtual teams as an adaptive self-organising entity that thrives in a more Organic structure.

Research done by Yoon (2008) showed that the majority of virtual teams follow a pattern of adaptive progression through the group development phases, which means that in order for Organically structured teams to be successful they typically start off being unsuccessful and then iterate through the group development phases to become more successful as a team. Our research did not take into consideration the time which the virtual teams have been working together nor did we consider the number of group development iterations being made by each team. Research done into the effect of shared mental models on virtual team performance (Roar, Bjørn Helge, & Jarle, 2011) also showed that teams who've worked together for a large amount of time generally perform better than newly-formed teams. Future research might have to consider this factor while evaluating the performance of a virtual team.

6.2.3 TEAM VIRTUALISATION AND TEAM PERFORMANCE

Our research found a weak positive relationship between an increase in team virtualisation and an increase in team performance. Teams categorised as virtual not only had higher mean performance scores than face-to-face teams but they also had a higher minimum and maximum scores. These results are in line with the findings of Powell (2004) who concluded that an increase in virtualisation has the potential to provide organisations with increased flexibility and performance. Hertel et al (2005) took this further and added that the improved performance of virtual teams can be contributed to individual, organisational and societal level advantages of team virtualisation. These advantages clearly came through in our research with results showing that virtual teams on average outperformed the face-to-face teams.

Despite the higher mean team performance noticed in virtual teams we noticed that the more virtual the teams become the more inconsistent their performance becomes. The IQR of teams that was categorised as face-to-face was much smaller than that of teams categorised as virtual. Cummings (2011) noted that physical separation between team members, time allocation and restrictions of communication technologies prohibits virtual teams from performing to their full potential. Social loafing (Chidambaram & Tung, 2005), communication breakdown (Daim, et al., 2012) and individual productivity loss (Mueller, 2012) are three more commonly cited theories that have the potential to decrease the performance of virtual teams. The greater variability we found in performance scores of virtual teams echoes the notion that managing virtual teams present more challenges to organisations and team members than normal face-to-face teams. Our results further show that virtual teams that manage to

overcome these obstacles have the potential to out-perform face-to-face teams. But those who do not manage these issues correctly risk performing worse than face-to-face teams.

6.2.4 Organisational Structure and Virtual Team Performance

Our research did not find a relationship between the organisational structure and the performance of work teams. However to be able to answer research question 1, we must evaluate whether the organisational structure can influence the performance of virtual work teams. We therefore filtered out all the teams that were categorised as being face-to-face and only compared the performance of teams that were categorised as being virtual. During this test we also found no significant relationship between the organisational structure and the performance of virtual teams.

6.2.5 Conclusion

Our research showed no statistically significant evidence that organisational structure has an influence on the performance of work teams within the organisation. We did, however, notice that the performance scores of teams that operate within Organic structures have more variance in response and typically have a wider range of performance scores. The effect of organisational structure on the performance of work teams was the same for both face-to-face and virtual teams and we could not find any evidence to suggest that a change in organisational structure can lead to improved or reduced virtual team performance.

6.3 Discussion of Question 2

The second question we asked in this research was whether the organisational structure can assist team members in overcoming the challenges created by team virtualisation in the areas of communication, culture, technology and leadership.

Sato (2010) defined a Mechanistic structure as being highly formalised, standardised and centralised in comparison to an Organic structure which is low on formalisation, standardisation and centralisation. Our research tried to establish whether these three components of organisational structure can be used to overcome the challenges typically associated within virtual teams in the areas of communication, culture, technology and leadership (Kayworth & Leidner, 2000) as suggested by the research done by Hertel et al (2005).

6.3.1 Communication

The 7 C’s of effective communication are a widely accepted management guideline to define good communication within a business environment (7 C's for effective communication, 2012).

The attributes of effective communication are: Completeness, Conciseness, Consideration, Concreteness, Courtesy, Clarity and Correctness. Using this definition as our base for defining a communication score for each respondent, our study found that there is a weak correlation between the organisational structure and the communication score achieved by team members. The more Mechanistic the team, the higher the observed communications score. Another noteworthy observation from our results was that reporting structures were considered to be the most Mechanistic or formal organisational element amongst the respondents.

These results that we observed are in line with the seminal work done by Griffith, Gray and Mayhew (1973) that showed there is a relationship between the formal organisational chart and the communication in an organisation. Meyer and Rowan (1977) however, warned that formal organisational structures later become institutionalised to such an extent that they can become separated from the demands of work activities which can lead to inefficiencies in terms of communication and collaboration within the work environment. We believed that we spotted evidence of this phenomenon in our results with a high percentage of respondents that indicated they operate in a Mechanistic organisation and are aware of the fact that their company's organogram was out of date.

6.3.2 CULTURE

Corporate culture has been linked to many organisational variables which have been empirically proven to have a relationship with organisational performance such as commitment, innovation, purpose and coordination (Byles, Aupperle, & Arogyaswamy, 1991). Research in virtual teams has however, proven that the more virtual a team becomes the more challenging it becomes to foster a binding corporate culture amongst all team members. This lack of performance is supported by theory that suggests virtual team's members suffer from individual productivity loss which means that team members typically find it more difficult to coordinate tasks, are less motivated and perceive a lack of support. We therefore define a good corporate culture as one that counters the effects of individual productivity loss and promotes open communication, trust and support amongst team members.

Our study found no statistically significant relationship between the organisational structure and the culture score achieved by team members. This result seemed to be in contrast with research that suggests there is a close relationship between social structures and culture, which is best described in the words of Gans (2012, p. 131): "*Thus, structural sociologists must*

understand that social relationships, whether in families or in giant corporations, always involve values, tools, meaning-making and other surrogates of culture".

Our research however, only focused on three components of organisational structure namely the formalisation, standardisation and centralisation of an organisation's structure. The results we obtained seemed to suggest that these three components do not have a significant impact on the underlying culture of the organisation and that a culture which promotes open communication, trust and support amongst team members can exist in both an Organic and a Mechanistic company structure. Further research will have to be done to determine which elements of organisational structure do have an influence on company culture.

6.3.3 TECHNOLOGY

Measuring technology use within an organisation has been a hot topic of research for the last couple of years (Melville, Wallace, Kraemer, & Gurbaxani, 2004). To try and determine whether the organisational structure can influence the technology use within an organisation, we subscribed to the measurements proposed by Raymond, Par and Bergeron (1995). They suggested that technological sophistication has to be measured along two dimensions, firstly technology use and secondly technology management or control. In light of this we argued that a good technology performance score is allocated to teams who use innovative technology but still has control over the technology being used within the organisation.

Our research found no statistically significant relationship between the organisational structure and the team's ability to make better use of technology. The technological dependence of team members in Mechanistic and Organic team structure was found to be the same and both structural configurations showed similar usage patterns for the types of technology they use. Although we did notice a difference in the level of control being exercised over technology use in the company, this did not affect the overall technology use. Email was by far still the most widely adopted technology with over 65% of respondents making daily use of email for work purposes, followed secondly by instant messaging with 26% adopting it on a daily basis. Surprisingly social media was the least utilised technology with 68% of respondents having never used it for work purposes.

We can conclude that even though our results have shown evidence that Organic structures allows team members more freedom in the technology tools they choose to use for work purposes, this did not lead to any improvement in the technological sophistication of the

company and no other relationship could be identified between the organisational structure and technology use within the organisation.

6.3.4 LEADERSHIP

Bell and Kozlowski (2002) stated that the number one priority for any team leader is to ensure that the team reaches its goal by constantly monitoring the team's performance and making required adjustments. They further added that: "*Virtual teams provide the capability for more flexible organisational responses, which means that the roles attributed to virtual team members will often be substantially more dynamic than in traditional settings*" (p. 34). From this definition we defined good leadership as the ability to successfully guide a team towards their goal by setting a clear vision and assigning clear roles and responsibilities to team members.

Our research showed no statistically significant relationship between organisational structure and leadership performance. We can therefore conclude that the leadership's ability to successfully guide a team towards their goal is not influenced by the organisational structure. Teams that operated in an Organic and Mechanistic organisational structure performed equally well in leading the team towards their goals. Future research might have to elaborate on the leadership styles that were used in these two settings to try and determine whether the same leadership styles can be used on both contexts.

6.3.5 CONCLUSION

Our research showed that there is a weak positive correlation between the organisational structure score and the team's communication performance score. This means that we observed more efficient communication in teams that operate within a Mechanistic organisational structure than teams who operate in an Organic organisational structure. However, we did not find any statistically significant relationship between the organisational structure and any of the other elements that commonly contribute to weaker performance in virtual teams namely culture, technology and leadership.

These results suggest that organisational structure might be one element required to ensure virtual team performance, but having the correct organisational structure in place is definitely not enough to eliminate the negative effects caused by the virtualisation of a work team.

6.4 DISCUSSION OF QUESTION 3

The last question we asked was to determine which organisational structure provides a better fit for virtual teams.

The inputs, processes and outcomes model (IPO) is commonly used to describe the relationship between work team elements (Martins, Gibson, & Maynard, 2004). This study's aim was to evaluate the relationship between the organisational level and the team level of the IPO model and to conclude what impact this will have on the outcomes of the work team. We focused on a single element on the Organisational level namely the organisational structure, which is an input into the team's design and implementation. The evaluation of questions 1 and 2 revealed that organisational structure alone does not have sufficient influence on the inputs and processes of work teams to affect the performance of a virtual team. This finding is in line with structural contingency theory (Donaldson, 1996) which says that the organisational structure should be aligned with other organisational elements for optimal performance. The effect that an organisational structure has on the team on its own is not powerful enough to improve or reduce the overall performance of the work team.

To confirm these findings we analysed all the responses per category using our organisation structure and team virtualness matrix and ran an ANOVA test of equal means to evaluate whether the slight differences in performance means means that what we observed are statistically significant or not. The result of the ANOVA confirmed that we cannot reject the null hypothesis and we have to accept that the mean performance score of all the categories are equal. Looking at the results in a boxplot Figure 23 we do however notice some interesting trends. Organic face-to-face teams performed much more consistently than any other category of teams. While Mechanistic, Virtual teams achieving the biggest IQR and the most inconsistent performance observed between all the categories.

6.5 CONCLUSION

The aim of this chapter was to discuss the results observed in chapter five and draw the relationship between the results, our research questions and the literature review.

Research question one asked whether we could observe a relationship between the organisation structure and virtual team performance. Even though our interviews indicated that there might be a relationship we could not find any evidence from our survey results to suggest that a change in organisational structure can lead to improved or reduced virtual team performance. This result is in line with structural contingency theory which states that looking at the organizational structure alone is not sufficient to make any assumptions regarding the expected performance (Donaldson, 1996). We did, however, notice that the performance scores of teams that operate within organic structures have more variance in response and

typically have a wider range of performance scores, which might be an interesting phenomenon to evaluate during future research.

Research question two asked whether the organisational structure can assist team member in overcoming the challenges created by team virtualization in the areas of communication, culture, technology and leadership. We observed more efficient communication in teams that operate within a mechanistic organisational structure than teams who operate in an organic organisational structure. However we did not find any statistically significant relationship between the organizational structure and any of the other elements that commonly contributes to weaker performance in virtual teams namely culture, technology and leadership. An interesting observation we found in our results that might require additional research was the evidence that organic structures allowed team members more freedom in the technology tools they may use for work purposes, but this did not lead to any improvement in the technological sophistication of the company.

Our research therefore suggests that organisational structure might be one element required to ensure virtual team performance, but having the correct organisational structure in place is definitely not enough to eliminate the negative effects caused by the virtualisation of a work team.

Research question three asked which organizational structure provides a better fit for high performing virtual teams. An ANOVA test of equal means confirmed that we cannot reject the null hypothesis and we have to accept that the mean performance score of all the categories are equal. We can therefore conclude that high performance teams can exist in any of the organisational structures and that no single organisational structure provided a better fit for high performing virtual teams.

CHAPTER 7 - CONCLUSION

7.1 INTRODUCTION

In an increasingly connected world where technological advances are consistently reducing the cost of going global, more and more companies are making use of virtual teams to expand their operations across the globe. The potential benefits that can be gained from virtual teams are undeniable (Clemons & Kroth, 2011). Some of the most commonly cited benefits associated with the increase in team virtualisation are:

- Virtual teams can rapidly increase an organisation's ability to transfer knowledge across geographic and time boundaries (Dietz-Uhler & Bishop-Clark, 2001).
- Virtual teams can lead to significant cost savings in terms of time and travel expenses. (Bergiel, Bergiel, & Balsmeier, 2008)
- Virtual teams can reduce power differences amongst team members and eliminate the negative effect that non-verbal cues might have on team members (Bower, et al. 2001)
- Virtual teams can create equal opportunities at work, especially for people with physical disabilities (Heller, et al. 2010); and
- Virtual teams can also reduce incidents of race, age or sexual discrimination due to the fact that the person and his/her appearance can remain anonymous and team members are only judged on their performance. (Bergiel, Bergiel, & Balsmeier, 2008).

To a large extent, virtual teams are not living up to these promises due to the inherent challenges created by the increase in team virtualisation, especially in terms of communication, culture, technology and leadership (Workman, 2007). To rectify this situation recent research has started to analyse the effect that various organisational elements can have on the performance of virtual teams (Hertel, Geister, & Konradt, 2005). This study joined the conversation by analysing the effect that organisational structure might have on the performance of virtual teams. We specifically focused on three levers of organisational structure namely the formalisation, standardisation and centralisation within the organisation which defines whether an organisational structure is Mechanistic or Organic (Satō, 2010).

7.2 RESEARCH FINDINGS

Our study resulted in 87 active members of work teams being surveyed on the level of virtualisation within their work team, the performance of their team and the organisational

structure within which the team operates. The survey was structured to answer the following three questions:

1. Can we observe a relationship between organisational structure and virtual team performance?
2. Can the organisational structure assist team members in overcoming the challenges created by team virtualisation in the areas of communication, culture, technology and leadership?
3. Which organisational structure provides better fit for high performance virtual teams?

To analyse the responses we calculated a team performance score, a team virtualisation score and an organisational structure score which allowed us to perform statistical analysis on the results. This also enabled us to categorise the respondents into the team virtualisation and organisational structure continuum as can be seen in Figure 24 below. A respondent with a negative score on the team virtualisation continuum will be categorised under Organic whilst a positive score will be categorised as virtual. Similarly a respondent with a negative score on the organisational structure continuum will be categorised as Mechanistic whilst a positive score will be categorised as Organic. The size of the bubble in Figure 24 below indicate the performance score achieved by the respondent, a bigger bubble equals a higher score.

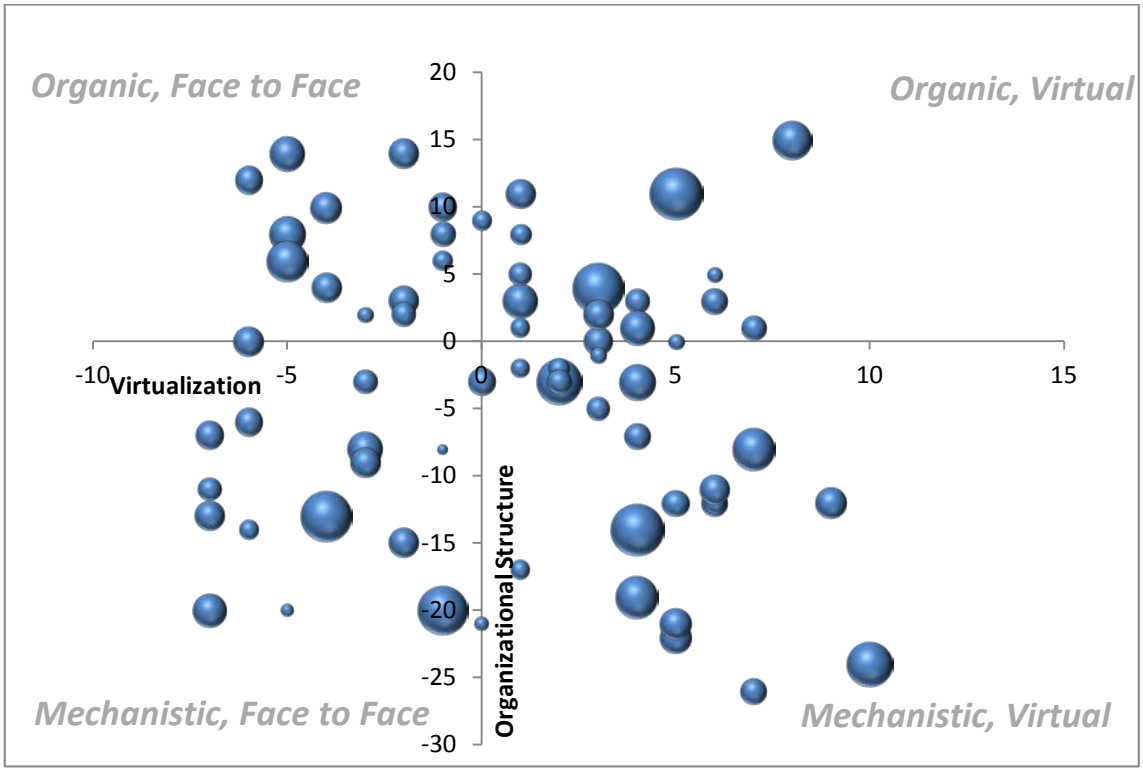


Figure 24 - Team Performance per Category

Our research didn't find any statistically significant relationship between the structure of the organisation and the performance of the work team. We ran an ANOVA test of equal means to compare the mean team performance scores between the various categories and this confirmed that the variances we do see are statistically insignificant at the 95% confidence level. We further noticed that the performance of virtual teams were not as consistent as face-to-face teams. Virtual teams had a higher interquartile range (IQR) and higher maximum scores than the face-to-face teams. In summary we were able to answer our research questions as follows:

1. **Can we observe a relationship between organisational structure and virtual team performance?**

   No statistically significant relationship could be found between the organisational structure and the mean team performance. The performance of teams who operate within a Mechanistic structure was more consistent than the performance of teams who operate in an Organic structure. However the mean performance scores of the two categories were the same.

2. **Can the organisational structure assist team members in overcoming the challenges created by team virtualisation in the areas of communication, culture, technology and leadership?**

   Our research showed a weak negative correlation between the organisational structure and the team communication score. This lead us to conclude that communication is more effective in a Mechanistic structure than in an Organic organisational structure. The organisational structure did not have a significant impact on the other problem areas of culture, technology and leadership.

3. **Which organisational structure provides better fit for high performance virtual teams?**

   Our ANOVA test of equal means determined that the average team performance is the same for teams operating in both a Mechanistic and an Organic organisational structure. We can therefore conclude that no organisational structure provides a better fit for high performance virtual teams.

7.3 RESEARCH IMPLICATIONS

With the increase in globalisation and technology adoption throughout the corporate environment, team virtualisation is guaranteed to intensify. Virtual teams offer many benefits to organisations over traditional face-to-face teams. This study has shown that even though

virtual teams have the potential to perform better than face-to-face teams, the average performance of virtual teams is not as consistent as the performance of face-to-face teams. This result ties in with research that recognised the many challenges caused by team virtualisation and is searching for ways to make virtual team performance more consistent (Hertel, Geister, & Konradt, 2005). Our study evaluated the impact that the organisational structure can have on the performance of virtual teams and we showed that the organisational structure does not impact the performance of virtual teams.

The implication of these findings for managers are; when organisations optimise the performance of their virtual teams they should not only look at changing the structural elements of the organisation, but rather look at ensuring that there is alignment between the structural components of the organisation and other organisational factors such as strategy, size, technology and environment as explained by structural contingency theory (Donaldson, 1996).

7.4 FUTURE RESEARCH

Our research clearly showed that the variances in performance of virtual teams are larger than that of face-to-face teams. Existing research (Chidambaram & Tung, 2005) (Workman, 2007) (Mueller, 2012) (Daim, et al., 2012) have focused on the problems commonly experienced in an increase in team virtualisation. However, these researchers are not evaluating the impact of these issues on the overall performance of the team. Future empirical research needs to be conducted to allow us to predict the impact that these issues will have on team performance. This will then enable us to explain the variances observed in the team performance of virtual teams.

This study also didn't consider other aspects of team dynamics such as the length of time a team has been working together or the complexities involved in multiple team membership. Virtual teams are known to be more flexible (Bell & Kozlowski, 2002) than traditional face-to-face teams and team members typically belong to more than one team or move between virtual teams rather quickly (Maynard, Mathieu, Rapp, & Gilson, 2012). Research done into the effect of shared mental models on virtual team performance (Roar, Bjørn Helge, & Jarle, 2011) showed that teams who've worked together for a longer period of time generally perform better than newly-formed teams.

Our research showed that leaders who managed teams in an Organic and Mechanistic organisational structure performed equally well in leading their respective teams toward their

goals. Future research might have to elaborate on the leadership styles that were used in these two settings to try and determine whether the same leadership styles can be used on both contexts. Recent studies have focused on the leadership attributes required to successfully lead a virtual team (Mukherjee, Lahiri, Mukherjee, & Billing, 2012) but to date they haven't taken the organisational context into consideration.

Lastly, our research has indicated that the organisational structure has an influence on the communication effectiveness within an organisation. We further noticed that the Mechanistic nature of the reporting structures within an organisation might be the attribute that had the largest impact on this relationship. However we didn't elaborate on this possible relationship any further and future research should be conducted to identify which attributes of the organisational structure give effect to the relationship that we've identified.

7.5 CONCLUSION

The increase in team virtualisation is a phenomenon encouraged by globalisation and technological progress. It is fair to argue that in order to stay competitive, modern organisations will have to be equipped with the tools and techniques to effectively manage virtual teams. This study once again highlighted the fact that it is more difficult to manage a virtual team than it is to manage a Face-to-face team. As team virtualisation increases it introduces challenges in the areas of communication, culture, technology and leadership (Kayworth & Leidner, 2000). This was evident in the bigger performance variance observed in results for teams that are distributed more towards the complete virtual side of the team virtualisation continuum.

Our research analysed the relationship between team virtualisation, organisational structure and team performance. We found that there is no statistically significant relationship between the organisational structure and the performance of virtual teams. We therefore conclude that virtual teams can perform equally well in both mechanistic and organic organisations.

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APPENDIX A: SEMI-STRUCTURED INTERVIEW GUIDE

TOPIC 1: INTRODUCTION

The purpose of this discussion is to introduce myself, give background on the research topic and gain some basic insights into the interviewee and his/her company. The most important outcome of this discussion should be for the interviewee to understand the research questions and for me to determine whether they fall within our sample population or not.

TOPIC 2: TEAMS WITHIN THE ORGANISATION

The discussion around this topic should establish to which extent the organisation utilises teams and teamwork to complete daily operational tasks. The main outcome should be a basic understanding of the role of teams within the organisation. Some starting questions might include:

- In how many teams have you been involved with at the company?
- What was the purpose of the team(s)?
- Do you think that your team(s) reached their goals?

TOPIC 3: ORGANISATIONAL STRUCTURE INFLUENCING THE TEAM

The discussion should now move from the organisation to the team level. What are the factors in the organisational structure that might impact communication, culture, technology and leadership elements found within the work team?

- What did the company do well in supporting the team?
- What would you have done differently?
- Would you liked more freedom/responsibility within the team?
- How do you control quality within the organisation?

TOPIC 4: TECHNOLOGY SUPPORTING WORK TEAMS

The discussion around technology in teams should establish to what extent the teams operating in the company are dependent on technology. The main outcome of this topic should be to understand where on the virtualisation continuum teams in this organisation find themselves.

- Does the company dictate what technology people must use for work purposes?
- Are you dependant on technology to perform your daily work tasks?
- What are the typical technologies that you utilise to collaborate with team members?

APPENDIX B: QUESTIONNAIRE

The impact of organizational structure on the performance of virtual

GORDON INSTITUTE OF BUSINESS SCIENCE

As part of my MBA studies I am doing research on the effect of organizational structure on virtual team performance. To that end, you are asked to consider your current work environment and answer the related questions. This survey will help us understand what impact the organizational structure might have on the performance of virtual teams. Completing the questionnaire should not take longer than 20 minutes of your time. Your participation is voluntary and you can withdraw at any time without penalty. All data will be kept confidential. By participating in this survey you indicate that you voluntary participate in this research. If you have any concerns, please contact me or my supervisor on the details provided below.

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1. For how many years have you been employed at the company?

- ◯ 0-2 Years
- ◯ 3-5 Years
- ◯ 6-10 Years
- ◯ > 10 Years

2. How many people are employed at your company?

- ◯ 0-10
- ◯ 11-50
- ◯ 51-500
- ◯ >500

3. Are you currently a member of a work team?

- ◯ Yes
- ◯ No

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4. How big is your current work team ?

- ◯ 2-5
- ◯ 6-10
- ◯ 11-20
- ◯ > 20

5. Have you been a member of a work team in the last 5 years?

- ◯ Yes
- ◯ No

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Team and Organizational Structure

6. Consider a specific team which you worked in within the last 5 years and rate your feeling towards the statements below

	Disagree	Sometimes	Agree	Absolutely Agree
The team shared clearly defined goals	◯	◯	◯	◯
The team successfully reached the goals that has been set for them.	◯	◯	◯	◯
The team structure and its members was defined by management that did not form part of the team	◯	◯	◯	◯
Team members had clearly defined roles and responsibilities	◯	◯	◯	◯
All the team members where motivated, energised and committed throughout the project	◯	◯	◯	◯
The team worked together and was collectively responsible for reaching the goals	◯	◯	◯	◯
Management practices within the organisation allowed the team freedom to work according to their own processes, structure and rules	◯	◯	◯	◯
Team members respected and trusted each other	◯	◯	◯	◯
Team members supported each other	◯	◯	◯	◯
Team members frequently engage in open dialogue and communication	◯	◯	◯	◯

7. Does your organisation have a clearly defined organogram which shows the organisation's structure?

◯ Yes

◯ No

◯ I don't know

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8. Is the organogram up to date?

- ◯ Yes
- ◯ No
- ◯ I Don't know

9. Please rate your company's structure on the scale from organic to mechanistic by completing the sentences below. A Mechanistic structure can be described as highly formalized, standardized and centralized versus an organic structure that is low on formalization, standardization and centralization.

	Completely Organic	Slightly organic	Slightly Mechanistic	Completely Mechanistic
Decision making in the organisation is...	◯	◯	◯	◯
Coordination mechanism within the organisation are...	◯	◯	◯	◯
Planning and control within the organisation are done...	◯	◯	◯	◯
Reporting structures in the company are....	◯	◯	◯	◯
Job definitions and task descriptions in the organization are...	◯	◯	◯	◯
I will describe the company's structure as being...	◯	◯	◯	◯

10. Please indicate which of the following control mechanisms are in place within your organisation to control the quality and consistency of outputs produced by your current company

	Not Applicable	Low	Medium	High
Direct Supervision	◯	◯	◯	◯
Standardized processes	◯	◯	◯	◯
Quality Assurance on all outputs	◯	◯	◯	◯
Standardized training for all staff	◯	◯	◯	◯

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Technology Dependance

11. My company specifies which technologies I'm allowed to use for work purposes

- ◯ Never
- ◯ Sometimes
- ◯ Almost Always
- ◯ Always

12. Please rate your dependence on technology by answering the questions below on a scale from Disagree to Absolutely Agree

	Disagree	Sometimes	Agree	Absolutely Agree
Almost all my communication with team members are conducted over electronic communication mediums such as email, instant messaging and video conferencing	◯	◯	◯	◯
My own schedule and the team's schedule is managed through an online calendar which can be accessed by all my team members	◯	◯	◯	◯
All tasks are coordinated through a shared repository which can be accessed by all team members at all times.	◯	◯	◯	◯
Project milestones and progress is communicated to all team members through a centralized system that is accessible to all team members.	◯	◯	◯	◯
All project artefacts and outputs are managed by a repository to which all team members have access. Without access to this repository I cannot perform my daily tasks	◯	◯	◯	◯

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13. How regularly does your team have scheduled face to face meetings?

- ◯ Daily
- ◯ Weekly
- ◯ Monthly
- ◯ Quarterly
- ◯ Never

14. How many people in the team have you personally met face to face?

- ◯ All of them
- ◯ Most of them
- ◯ Only a few
- ◯ None of them

15. When working with team members we typically use the following technologies to communicate and coordinate work

	Never used it	Used it once	Used it a couple of times	Constantly use it	Use it almost daily
Email	◯	◯	◯	◯	◯
Instant Messaging	◯	◯	◯	◯	◯
Teleconferencing	◯	◯	◯	◯	◯
Video conferencing	◯	◯	◯	◯	◯
Online Collaboration tools	◯	◯	◯	◯	◯
Online project and task management tools	◯	◯	◯	◯	◯
Social Media	◯	◯	◯	◯	◯

Other (please specify)

APPENDIX C: SCORE CALCULATION

	Team Virtualization continuum
Question 12	Disagree (-2)
	Sometimes (-1)
	Agree (+1)
	Absolutely Agree (+2)
Question 13	Daily (-2)
	Weekly (-1)
	Monthly (+1)
	Quarterly (+2)
	Never (+3)
Question 14	All of them (-2)
	Most of them (-1)
	Only a few (+1)
	None of them (+2)
Question 15	Same building (-1)
	Same country (+1)
	Two or more countries (+2)
	Unknown (+3)
Question 16	Same (-1)
	1- 2 hrs (+1)
	2-4hrs (+2)
	> 4 hrs (+3)
	Unknown (0)

	Company structure continuum
Question 6.3	Disagree (+2)
	Sometimes (+1)
	Agree (-1)
	Absolutely Agree (-2)
Question 6.4	Disagree (+1)
	Sometimes (+2)
	Agree (-1)
	Absolutely Agree (-2)

Question 6.5	Disagree (-2)
	Sometimes (-1)
	Agree (+1)
	Absolutely Agree (+2)
Question 7	Yes (-1)
	No (+1)
	I Don't know (0)
Question 8	Yes (-1)
	No (+1)
	I Don't know (0)
Question 9	Completely Organic (+2)
	Slightly Organic (+1)
	Slightly Mechanistic (-1)
	Completely Mechanistic (-2)
Question 10	Not Applicable (+2)
	Low (+1)
	Medium (-1)
	High (-2)
Question 11	Never (+2)
	Sometimes (+1)
	Almost Always (-1)
	Always (-2)
Performance Calculation	
Question 6	Disagree (0)
	Sometimes (+1)
	Agree (+2)
	Absolutely Agree (+3)
Communication Score	
Question 6.1 and 6.10	Disagree (0)
	Sometimes (+1)
	Agree (+2)
	Absolutely Agree (+3)
Question 8	Yes (+1)

	No (0)
	I Don't know (-1)
Question 9.4	Completely Organic (0)
	Slightly Organic (+1)
	Slightly Mechanistic (+2)
	Completely Mechanistic (+3)
	Technology Score
Question 11	Never (0)
	Sometimes (+1)
	Almost Always (+1)
	Always (0)
Question 12	Disagree (+1)
	Sometimes (+2)
	Agree (+3)
	Absolutely Agree (+4)
Question 17	Never used it (0)
	Used it once (+1)
	Used it a couple of times (+2)
	Constantly use it (+3)
	Use it almost daily (+4)