THE IMPACT OF A LEAN PHILOSOPHY ON ORGANISATIONAL CULTURE: EXPLORING THE CULTURAL CHANGE ASSOCIATED WITH THE IMPLEMENTATION OF LEAN

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STATEMENT OF AUTHORSHIP

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THE IMPACT OF A LEAN PHILOSOPHY ON ORGANISATIONAL CULTURE: EXPLORING THE CULTURAL CHANGE ASSOCIATED WITH THE IMPLEMENTATION OF LEAN

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Lean has been defined as a philosophy that will deliver value to organisations through altering the value structure towards a more flexible orientation. The rate of failure of implementations is high and the root cause of such is often put down to a lack of understanding, lack of commitment, or a lack of resources. This research aims to examine the culture of an organisation before the implementation of lean and understand the influence of the pre-existing culture on the adoption of the philosophy and the change in value structure during the implementation process.

The methodology used in this research included a retrospective examination of 2 terabytes of historic electronic source material from the organisation coupled with a further four years of surveys taken at 12-month intervals with 70 respondents to each survey throughout the lean implementation period.

The research initially establishes a culture dominated by control and an inward focus in delivering operations. As lean tools are implemented, even at an early stage, there is evidence of a change in this orientation towards a more flexible culture. The results of the retrospective examination demonstrate how lean tools, implemented partially, altered the values within the organisation before the formal implementation programme.

The research would suggest lean is not a philosophy for all, organisations considering implementing such a strategy need to carefully consider the existing culture before embarking on such an implementation. An empirical evaluation of the existing culture needs to take place before embarking on the implementation of lean. In the event congruence between the existing values and the espoused values of lean is established, the effort associated with the implementation will be considerably less than that required in the event of a lack of congruence.

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Chapter 1 – Introduction

Chapter Overview

Chapter one will outline the purpose and background for the present thesis and discusses the rationale for the structure selected. The thesis examines nineteen years of data to understand the level of cultural movement during the formal implementation of lean and the pre-existing culture in the organisation to determine the level of congruence with the philosophy before the implementation. The research involves two separate phases of examination, firstly a retrospective qualitative examination of historical data from 1998 up to 2013 to understand the pre-existing organisational culture, and secondly a quantitative analysis of the organisational values throughout the four years of a formal lean implementation. The chapter concludes by highlighting the significance of this research and describing the overall thesis structure.

1.1 Chapter Introduction

From the time of the industrial revolution and the move from artisan skilled craftspeople manufacturing goods to the mass manufacturing of goods by machines, there has been extensive research to identify the most effective means of structuring, organising, and delivering the needs of our businesses. The automobile sector, initially in the United States and later in Japan has been at the forefront of leading the development in delivering business operations through the use of unskilled workers (Womack, 1990). Initially, in his development of mass production, Henry Ford sought to organise unskilled workers to efficiently deliver repeatable tasks continuously (Wilson, 1995). The weakness of this approach lay in the risk of building in errors into the process leading to significant waste and costly rework. The Japanese automobile industry, led by Taiichi Ohno in Toyota, was the first to consider empowering workers to identify the best means of organising tasks. This ultimately led to the development of the Toyota Production System later coined by Womack and Jones as lean production (Liker, 2004). Lean has since moved out of Japan, the automobile industry, and even the manufacturing sectors to the delivery of services in many sectors across the world (Cadden, 2020; Iuga, 2013). 'Just in time' delivery has become synonymous with everyday life with the advent of internet-based organisations and lean supply chains delivering household goods to our doors daily. It is unlikely that many consider the origins of such principles; however, for those that do, there has been an interesting evolution to get to this point in relatively recent history. This research will consider the impact of a formal lean implementation programme on the value structure within an organisation. Consideration will be given to the potential change that might occur during such an implementation and the impact of the pre-existing culture of the organisation on the implementation.

1.2 Background to the Research

As international and geographical barriers have reduced in the more recent past the area of differences between cultures has come to the fore. Questions related to openness, control, flexibility,

and social norms are considered both from a national and organisational perspective (Gelfand 2018). In groups with higher levels of control and greater adherence to rules there can often be less lateral thinking and innovation. As a general manager responsible for operations within an SME organisation employing around one hundred people in the utility sector in Ireland, I have devoted significant time, effort, and resources to deliver continuous improvement, innovation, and empowerment in the organisation. I have been a champion of introducing total quality management within the organisation for many years, moving the organisation from a traditional procedure-driven contracting business to one that embraces education, seeking their input on how to deliver the needs of the business, and removing non-value adding activities and variation in output.

In this effort to empower the organization in developing solutions I came across lean. Initially the lean and six sigma tools were used to deliver total quality management improvements that I was seeking to drive; however, as our engineers and scientists began to use the lean project management tools more I began to realise the benefits that might be derived from embracing the philosophy on a more organisational level. The structured mathematical basis of the project management tools associated with lean fitted particularly well with the organisational audience and the values of the people within the organisation. Accountants, engineers, and scientists, of which a large proportion of the organisation are made up, all embraced the concepts developed by Taiichi Ohno in his search for excellence and it seemed a shame not to explore how far I could push this area of driving improvement (Liker, 2004).

As I carried out initial reviews of the successes and failures of lean I began to realise the potential of the philosophy for the organisation if introduced across all facets of the business. I began to explore what I might expect to realise if the philosophy was adopted in its entirety; little did I realise at this stage this was the preliminary literature review for my research masters. I immediately found the existing research examining the impact of improvement initiatives on organisational culture was

limited, and this limitation was a result of inadequate frameworks for measuring organisational values (Detert, 2000). The literature suggested this lack of understanding in the dimensions of culture that will be impacted by the implementation of improvement initiatives, and the impact of organisational culture on the improvement initiative itself, lead to practitioners and academics ignoring the innovation and performance improvement that could be delivered through adequately addressing the area of culture (Dorval, 2019).

There was little doubt, based on the early experience within the business, that lean could help in reducing costs, driving efficiencies, and removing non-value-adding work. As the literature has identified, the reduction in production variability, control of inventory, and managing of customers' needs and requests will deliver a lower cost of production (Liker, 2004). The question however was, whether the formal implementation of lean at an organisational level would alter the culture of the organisation towards one that would be more focused on continuous improvement. This initial question, driven by practical need, is the basis of this research and the question I will endeavour to answer throughout the next eight chapters.

Having carried out an initial review of the literature associated with lean, I realised there was far from agreement in relation to the benefits of the philosophy. It has been argued that many of these philosophies are much like fashion trends that move in and out of vogue depending on where they are in their lifecycle (Näslund, 2013). Furthermore, there were particularly high levels of failure in the implementation, and the reasons for such failure were suggested to be as simple as lack of understanding and lack of commitment. Much of the trade literature would suggest that if only the organisations devoted more resources they would succeed (Habidin, 2013); however, it was hard to believe that many of the authors of such trade literature were not conflicted as they more often than not also offered those resources to organisations seeking to implement lean. Therefore, I took it upon myself to endeavour to carry out a piece of unbiased research, or at least less biased and with my

biases identified, into the potential of lean to alter the culture of an organisation. An initial review of the lean literature that also addressed the area of organisational culture identified that a lean culture would be expected to be flexible, outward-focused, and team orientated (Erthal, 2021; Kadri, 2010).

As a general manager, I had a little understanding of personal values, team values, and organisational culture, however, as is so often the way, it was only as I began to look beneath the surface of organisational culture I realised how little I actually knew. I initially sought a clean straightforward scale to measure culture, identify movement in values, and measure the impact of lean only to realise that there is no aspect of culture that is straightforward and easy to measure. Following numerous attempts to bring the literature of lean and organisational culture together, I found O'Reilly's Organisational Culture Profile (OCP) model to be the most relevant (O'Reilly, 1991). The factors of innovation, stability, respect for people, results orientation, attention to detail, team orientation, aggressiveness, and decisiveness identified in the model were all values that were closely associated with lean.

The lean literature would suggest innovation, respect for people, team orientation, and decisiveness should increase whilst stability, results orientation, and aggressiveness should decrease (Dahlgaard, 2006; Vaishnavi, 2020). O'Reilly's research had sought to use the OCP model to determine the level of fit between personal values and those of the organisation by measuring the profile of both sets of values. I intended to use the model to measure the values of the organisation over the four years that I anticipated it would take to implement lean and seek to identify any relevant change in the profile of the organisational culture throughout that period. I undertook to measure the values of the organisation annually as the implementation of lean progressed, anticipating that I should see a level of change throughout the four-year programme.

As my research began to progress alongside the implementation programme and my understanding of organisational culture developed, I came across the area of cultural fit and particularly the outcomes associated with the implementation of philosophies such as lean in organisations with high and low levels of congruence with that of the chosen strategy (Zammuto, 1992; Shokri, 2021).

Given the pre-work that was effectively delivered in advance of adopting the philosophy, and the high degree of congruence as identified between the lean philosophy and the existing values of the organisation, it was likely this would have an impact on my research. Therefore, there was a need to not only examine the cultural values of the organisation during the implementation but also understand the values of the organisation as they evolved over the years before the implementation.

It was clear that O'Reilly's OCP model was not suitable to apply retrospectively and a more qualitative means of reviewing the historical development of the organisation was required. The aspects of the organisational culture that were most relevant to examine were the degree of flexibility and the level of outward focus as these are leading indicators of leanness (Bhasin, 2013). Quinn's Competing Values model was identified as the most applicable model to retrospectively examine the organisational culture over the years before the formal implementation of lean (Quinn, 1983).

Therefore, in summary, firstly, this research will seek to understand if the implementation of lean will alter the value system of an organisation or will it only deliver short-term operational efficiencies. Secondly, the research will seek to understand if there has been movement in the value system of the organisation towards one that is more associated with lean, and whether or not, and to what extent, this had happened before the formal implementation of lean through a level of preconditioning of the culture albeit inadvertently carried out.

1.3 Aim, Objectives, and Research Questions

The purpose of this research is to ascertain if lean, as implemented in the organisation under study, is an all-encompassing philosophy capable of altering the value structure within the organisation or is it little more than a set of very effective tools that deliver short term efficiencies.

Phase one of the research will qualitatively examine 15 years of data before the implementation of lean to evaluate the level of congruence between the pre-existing cultural values of the organisation and those of the philosophy seeking to be introduced. Through this longitudinal qualitative examination, Quinn's competing values model will be applied with the aim of determining the culture within the organisation and its movement, if any, throughout the 15 years. The pre-existing culture within the organisation will be considered and assessed to understand the level of influence it may have had in assisting or impeding the implementation of the lean philosophy.

The research will then proceed to phase two, quantitatively examining the culture change, if any, during the four-year formal lean implementation period. A variation of O'Reilly's organisational cultural profile tool will be used to empirically identify the dominant values within the organisation and track any movement in these values throughout the implementation process.

Research Structure

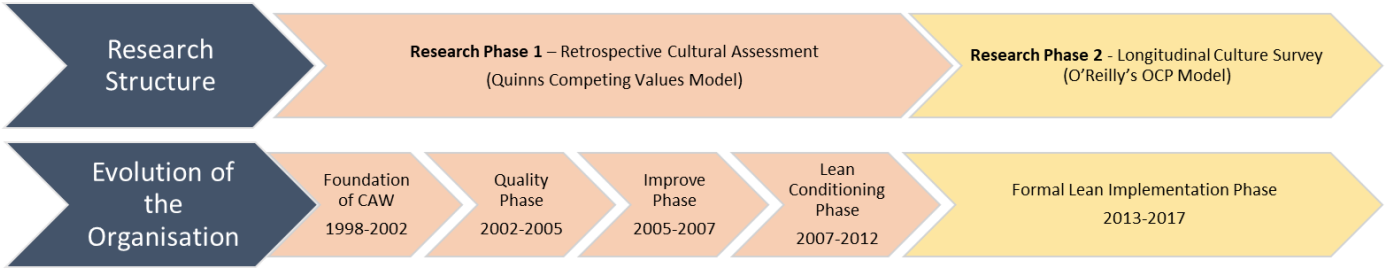


Figure 1.1 Research Structure

In Research Phase one I will retrospectively examine the values within the organisation and consider the impact of these values on the implementation of lean when it commenced towards the end of this phase. The literature would suggest that in circumstances where the values of the organisation are aligned with those of the chosen strategy to be implemented the implementation will benefit from less resistance and faster uptake of the new values (Canato, 2013; Paro, 2017).

Within the second phase of the research, I will examine the movement in the value structure of the organisation as lean is formally implemented into the organisation. The literature would suggest in this circumstance the value structure should alter towards one that is more flexible, open, and team orientated (Dahlgaard, 2006).

This examination, both from a qualitative and quantitative perspective, will provide an account of how this organisation prepared for and reacted to the implementation of a lean philosophy. The level of cultural change first before the implementation programme, and secondly during the formal implementation programme will be assessed to determine the actual impact of the implementation process and determine the significance of such an implementation on the culture of the organisation.

From a practitioner's perspective, this examination will provide managers with a documented case study on the impact of implementing lean in an SME in the utility sector in Ireland and will assist practitioners in drawing comparisons to their own organisation.

The bespoke culture measuring tool, developed as part of this research project, based on O'Reilly's organisational culture profile (OCP) model will provide managers with a simple means of quantitatively measuring and comparing the values within the organisation over a period of time and during any management interventions.

The retrospective examination of data from within the organisation using Quinn's competing values model will inform managers on how the cultural orientation of an organisation may be determined in the absence of complex tools and limited historic culture-related data. This will further inform

managers of the nature and level of resistance that may be anticipated in implementing a new strategy.

The many and varied discussions in both academia and practice relating to lean and culture provide a thought-provoking backdrop to examine this particular implementation project. The initial question considered was simply if the implementation of lean could alter the values within the organisation.

Unlike a conventional research project, the business requirement to deliver sustainable performance improvement was the driver for this project as opposed to the gap within the literature. As a manager within the organisation the advantage of long term knowledge of how the organisation had evolved was a benefit; however with that came the traditional biases that could be expected from a long-serving member of the organisation. There was a need to consider and recognise the unconscious biases that might influence the research at each juncture.

As the implementation project progressed within the organisation, and the existing literature was reviewed, it became apparent there were two main areas for consideration. The first consideration is related to the existing value structure within the organisation and how this developed. The second consideration is related to the more direct question of cultural change as a result of the implementation project. This combination of considerations provided a new lens through which the organisation could be considered and one which could illuminate the literature surrounding the implementation of lean.

Research Questions	Research Phase
Question 1: How are the values in the organisation now structured post the formal implementation of lean?	Phase 2
Question 2: How did the value structure change in the organisation over the course of the formal implementation of lean?	Phase 2
Question 3: How were the values in the organisation structured prior to the implementation of lean?	Phase 1 & 2
Question 4: Was there a change in the value structure within the organisation prior to the implementation of lean?	Phase 1

These considerations provided the framework and guidance to develop a set of questions that will contribute to the discussion surrounding lean, its impact on organisational culture as the philosophy is implemented, and the impact of the pre-existing culture on the implementation project itself.

Question one and two will be answered exclusively using data from the phase two research and question 4 will be answered using phase one research. Question three will be considered from both phases one and two given it is taking into account the cultural values at the end of phase one and the start of phase two. Through the use of multiple methodologies and models used in the different phases of research the reliability and validity of the data will in effect be tested as the results from both methods should confirm each other.

The thesis will address these four main questions, test the proposed propositions, discuss the findings in this particular organisation, and finally put them in context through discussion in the light of the broader lean and culture literature.

1.4 The Research Rationale

The implementation of lean has been credited with improving performance, reducing waste, and introducing a culture of flexibility and continuous improvement through external focus within organisations (Bhasin, 2006). Much has been documented on the performance improvements associated with successful implementations, and indeed the reasons for the associated high rates of implementation failure, relatively less has been documented on the cultural aspects of such implementations (Dorval, 2019). There has been a lack of meaningful research examining the impact of organisational culture on the implementation of improvement initiatives and how culture itself may assist or impede the implementation of such initiatives (Detert, 2000; Cadden, 2020). In a recent literature review of over one thousand references, it was found that 86 per cent of them only discussed lean culture in a superficial manner (Dorval, 2019). Whilst there has been a very significant

examination of the efficiencies that continuous improvement initiatives such as lean can deliver there has been much less related to the organisation, human, and cultural aspects of such philosophies (Hernandez-Matias, 2020). Frameworks for the implementation of lean have been developed which largely focus on the implementation of lean tools as opposed to lean values (Mostafa, 2013; Singh, 2020). The readiness of organisations to implement lean has been examined and a scale has even been developed, however, this specifically relates to the readiness to implement lean tools such as supply chain optimisation, planning and control, and reduction in variability in production as opposed to considering the values of both the organisation and the philosophy (Garza-Reyes, 2018).

The underlying changes in the organisational culture associated with implementation and the need for an organisational culture congruent with the lean practice being implemented have been much less explored areas of research (Erthal, 2020). Consideration of the existing culture within the organisation and potential for preconditioning of such cultures to maximise the opportunity for successful implementation has been almost disregarded in the effort to apportion lean implementation failure to lack of management understanding and buy-in, and lack of resources during implementation (Näslund, 2013).

The organisation examined was established in 1998 and initially adopted many of its institutional shareholder's management systems leading to a highly control-orientated value system. Over 19 years this control orientation evolved to ultimately successfully implement a flexible lean philosophy leading to an interesting example of how an organisation can go about implementing a strategy that is incongruent with the pre-existing value structure of the organisation.

The introduction of individual lean or six sigma tools in almost any form will deliver productivity gains within an organisation (Laureani, 2012). However, equally, it may be argued that any concerted focus by management on productivity will lead to improvement in the short term (Soriano-Meier, 2002). Organisations seeking to implement lean in a meaningful way are seeking something much greater than just short-term productivity gains; they are seeking to provide the organisation with a self-

sustaining model to internally drive continuous improvement. This is where lean differs from a simple set of tools to be implemented to deliver improvement at a point in time; an organisation must be flexible to continually deliver improvement over a prolonged period.

There is a significant gap within the literature when it comes to providing a thorough examination of the success, or not, of attempting to implement these more strategic benefits and altering the culture of an organisation through the introduction of such a new philosophy. A lean philosophy is considered to be centred on measurement, analysis, and data-driven decision making, and yet there is little by way of simple tools to measure the implementation of the strategic benefits of the philosophy.

The research will provide two simple tools for practitioners to use to access the strategic readiness for such an implementation and the progress on realising the strategic benefits throughout the implementation process. These tools, based on Quinn's competing values and O'Reilly's organisational cultural profile tool, will enable managers to qualitatively and quantitatively determine the organisation's values prior to and during the implementation.

There is a challenge for the researcher that will need to be considered throughout the project. The researcher and author of this thesis is a senior manager within the organisation and will carry biases that need to be considered in the process of conducting the research. These biases will be addressed later in this chapter and also in the methodology, discussion, and conclusion chapters.

1.5 The Theoretical Foundations of the Thesis

The examination of the implementation of the lean production system has been of particular interest within practice and academia, with organisations citing both successes and failures associated with attempts to achieve that greater strategic goal of implementing a self-sustaining continuous improvement model (Karlsson and Åhlström 1996, Achanga, Shehab, et al. 2006, Badurdeen,

Wijekoon, et al. 2011, Bhasin 2012, Laureani and Antony 2012, Canato and Ravasi 2013, Näslund 2013, Bhamu 2014, De Weck, Reed et al. 2014). Flexibility is largely influenced within the organisation by the prevailing culture with values such as a focus on productivity, efficiency, planning, objective setting, evaluation, stability, and information management being largely associated with a control-oriented value structure and focus on communication, resources acquisition, external support, readiness, HR, morale, and cohesion largely associated with a flexible orientated structure (Quinn and Rohrbaugh 1983).

It has been argued that the success or failure of the implementation and the range of benefits associated with successful implementation are directly influenced by the pre-existing culture within the organisation (Raymond 2005). In other words, the congruence between the pre-existing underlying values of the organisation and those of the proposed strategy will directly impact the implementation (Ansari, Fiss et al. 2010). The concept of congruence of values, or cultural fit requirement, between the inputs to an organisation to deliver the required outputs has long been considered (Nadler and Tushman 1980). Congruence models developed by early theorists such as George Homan and Harold Levitt have been advanced to examine specific behavioural elements of the organisation looking at the inputs the organisation requires, the outputs the organisation produces, the transformation process carried out by the organisation and the interaction between these elements (Nadler and Tushman 1980). O'Reilly et al (1991) developed the organisational culture profile (OCP) instrument as a means of measuring the cultural fit between organisations and individuals. While we are less concerned in this research about the fit between the individual and the organisation, the instrument developed provides an acceptable means of quantitatively defining the existing culture within an organisation and providing the basis for a real-time comparative longitudinal study.

It has also been argued that the culture of some organisations, whilst dynamic over a period of time, are immune to planned change and therefore would be prevented from creating this receptive climate

to facilitate such an implementation in the shorter term (Barney, 1986). The research will examine this assertion from a practical perspective based on evidence from the past nineteen years, and endeavour to offer some solutions to practitioners on some of the questions associated with implementing strategies in cases of low cultural fit. The research will further examine the pre-existing values within the organisation before the implementation of lean using Quinn's competing value model, exploring through this model any conditioning of the culture within the organisation prior to implementation.

1.6 Research Significance

The literatures of culture and lean are substantial in size with the origins of the cultural literature rooted in the depths of anthropology, and that of lean, albeit more recent in the history of the automotive industry. More recently the intersection of these literatures has begun to be considered providing an interesting insight into the potential for innovation and an opportunity for improvement (Bhasin, 2006). Much of the literature associated with lean focuses on the implementation of tools to improve supply chain management, productivity, and efficiency (Hernandez-Matias, 2020), and the research exploring readiness focuses on how far along the organisation is in implementing some of these tools (Garza-Reyes, 2018). The critical success factors of a lean implementation have been identified, however, there is much less emphasis on the cultural values that are desired, the measurement of movement in these values over time, and the pre-existing values of the organisation before the implementation of lean (Näslund, 2013).

There has been some consideration of these areas in research on advanced manufacturing technologies (AMTs), of which lean can be considered as one (Zammuto, 1992). This research uses Quinn's competing values model to evaluate the implementation of AMTs into organisations, however, the research only focuses on peer-reviewed published research which would have a bias towards successful implementations. Furthermore, whilst this research has the benefit of considering

multiple organisations, it lacks the benefit of having real information relative to the culture in the organisation before the implementation.

This research will consider and document the value structure within the organisation before the implementation of lean using Quinn's competing values model. This will provide evidence of the baseline values within the organisation before the implementation. The values of the organisation will then be tracked through the implementation of lean using O'Reilly's occupational cultural profile to determine the level of movement. The cultural evolution of the organisation will also to considered to ascertain the level of cultural conditioning, if any, prior to the implementation. The research will provide a previously unseen insight into the evolution of an organisation's cultural values prior to, during, and post the implementation of lean thereby providing guidance for further research and practice.

This thesis adds significantly to the literature on lean and the impact on organisational culture as the lean philosophy is implemented within an SME context. The evaluation is grounded within existing theoretical frameworks associated with organisational culture and adds to the understanding of lean philosophies and their impact on organisational culture as they are implemented. The thesis offers practical insights into how resistance to such an implementation may be minimised and the potential to accelerate the delivery of the benefits associated with such an implementation.

1.7 Risk of Bias

The risk of bias is real and significant in all research and there is evidence, even in the most objective of studies, that researchers can at the most critical of moments in analysis, drop the objective standards they wish to preserve (Reich, 2007). There is also evidence of serious error in providing alternative explanations for the observed relationships between measures (Podsakoff, 2003). In addition to this, and even in some of the most recognised research, weaknesses have been identified

post the research event. Even the renowned research of Gert Hofstede in IBM has not been without serious criticism over the years as further evaluation identifies the weakness of considering only one organisation (Mc Sweeney, 2002).

These specific risks of bias are very relevant to this piece of research. In the first instance, the research examines only one organisation. There is also a risk, particularly in examining culture, of there being interference from a strong specific organisational subculture, a sectoral subculture, and or a national subculture. These are very real considerations and should be taken into account in assessing the research; however, no overly influential or dominant element to the culture of the organisation was identified during the research.

The second element of bias that needs to be considered is the risk of seeking to find relationships between measures that do not exist. This is of particular concern in phase one of the research, the qualitative assessment of historic information. This risk is mitigated through considering research question number three in both phase one (qualitative) and phase two (quantitative) of the research. In considering answering the same question with two different data sets, the risk of bias in this area is significantly reduced.

Finally, there is a risk of unintended bias or influence by the researcher himself, given the role of the researcher in the organisation. There is a risk that respondents will be influenced either positively or negatively by virtue of the fact that the researcher is a senior manager in the organisation. Furthermore, there is a risk of the survey questions also being influenced by this fact. This risk was mitigated through developing a highly structured quantitative survey based on O'Reilly's OCP model, through submitting survey responses to the Occupational Health Nurse within the organisation, who is strictly required to maintain confidentiality, and through maintaining the results in excel format with binary outcomes allowing zero opportunity for misinterpretation.

Even with all of these risks assessed, mitigations applied, and a significant effort to apply a high standard of objectivity, there is a bias remaining. I have worked for the organisation for the past twenty-two years, I enjoy it, and this needs to be taken into account is reading this research. I have endeavoured to strictly limit my comments to chapter seven, the discussion chapter, in which I suggest that my experience in the organisation informs the narrative and adds value to the discussion.

1.8 The Structure of the Thesis

The structure of the thesis will follow the evolution of the organisation. In phase one of the research, a qualitative assessment of the value structure within the organisation and its evolution prior to the lean implementation project will be undertaken to consider the impact of the existing culture on the implementation. Phase one of the research will address questions three and four with phase two addressing questions one, two, and three. The overlap of question three will mean that both sets of data will be analysed from that perspective; this will serve to mitigate some of the risks of bias by the researcher.

The structure of this thesis will follow traditional models in form divided into eight chapters. The introduction will be followed by three literature chapters addressing separately the literatures of lean, organisational culture, and the intersection of both of these literatures in lean culture. One single literature chapter was considered, however, given the breadth of the literatures it would be challenging to do them justice whilst maintaining an understandable and readable thesis. For these reasons, the literature was divided into three chapters allowing the literatures of lean and culture to be first considered prior to examining the intersection of these two literatures in chapter four. Following on from this there will be the traditional methodology, analysis, discussion, and conclusion chapters. Chapter six also includes a short case study documenting the organisation's implementation

of lean; whilst this assessment of the implementation is not part of the formal research, it is required to confirm that lean was successfully implemented.

1.9 Chapter Summary

This first chapter has outlined how this master's research project will be delivered. It has been identified that this research will seek to identify the level of change in organisational culture, if any, as lean is implemented in an organisation. The research will use O'Reilly's OCP model to annually measure the culture profile of the organisation throughout the four-year implementation and seek to identify the level of change. Secondly, the research will seek to identify the level of cultural preconditioning, if any, that was carried out prior to the implementation of lean. This will be done through the application of Quinn's competing values model to examine the historic data from the organisation. The findings from these two questions will be used to inform the literature further and help future practitioners in deciding to implement lean and to carry out that implementation.

Chapter 2 – The Genesis of Lean

Chapter Overview

To fully explore the concept of a lean philosophy, it is necessary to understand the origins of the idea. Chapter two provides a narrative that explores the development of the core concepts of lean from Taylor's task-orientated scientific management principles, through Drucker's more overarching management by objectives, Deming, Juran, and Ishikawa's quality management theories, and right through to Ohno and Liker's Toyota Production System. In exploring the genesis of lean in this manner a greater understanding of the core principles can be developed and critical aspects of the philosophy can be identified and examined in detail.

2.1 Chapter Introduction

A scoping review of the lean and culture literatures presented the breadth and expanse of the existing research material for consideration. Whilst lean, a term coined more recently in history (Womack, 1990), has considerably less breath than that of culture with its genesis in anthropology, the combined literatures provided a significant volume of research for consideration.

The area of most significant consideration and applicability to this research is the intersection of these two literatures, however, to understand the intersection there needed to be consideration of them individually in the first instance.

Chapters two and three provide a narrative to the scoping review of the literatures endeavouring to inform the reader of the genesis of both literatures and the research to date. Chapter four provides an account of the systematic examination of the intersection of these literatures using the keywords of “lean culture”. The systematic examination considered all peer-reviewed published research relating to lean cultures documented to date. Whilst some of the more trade-orientated journals were excluded due to obvious bias all of the relevant academic journals were included. Given the relatively recent emergence of this area of research, there was no further need to limit the historic duration considered.

The concept of achieving more with less has been the holy grail of manufacturing since the nineteenth century, and lean, much like many contemporary concepts, has been developed from the basis of many of the early principles developed by others. To fully understand the concept of lean, its philosophy, and its application, it is crucial to understand the early development of the concepts on which lean is based.

There are two broad concepts on which lean is based: mass production, and quality management. Many of the early principles of both can still be seen to permeate through lean. From a practitioner’s

perspective, it is challenging if not impossible to develop a lean philosophy without first adopting a quality-driven approach (Dahlgaard, 2006; Singh, 2020). Lean has been described as the development of quality management, and many of the values required within an organisation for the successful implementation of a quality management process are similar to those required for lean. A strong culture of driving improvement, reducing waste, openness to improvement, and questioning how to do things better is critical to both lean and quality management.

Mass production was revolutionary in the early nineteen hundreds bringing efficiencies that were never considered possible through three core principles: division of labour, interchangeable parts, and mechanisation (Duguay, Landry et al. 1997). These core principles increased productivity beyond anything experienced prior to that period; however while there was standardisation of products which lead to efficiencies, there was also standardisation of wastes leading to inefficiencies. Quality management systems assisted in checking and control but it was not until lean came into existence that the removal of these inefficiencies came to the fore.

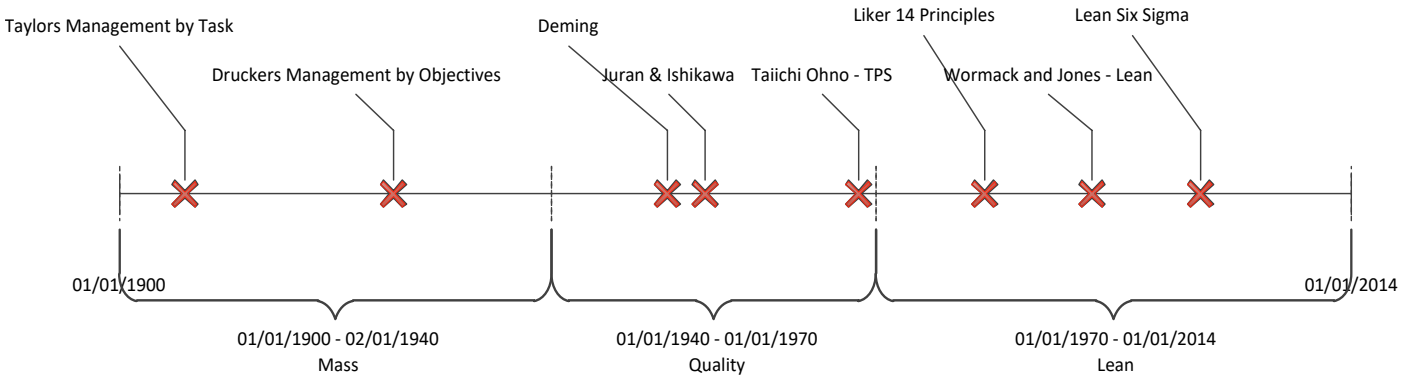


Figure 2.1 Lean Evolution Phases

The automotive industry has been one of the leading developers of some of the most advanced manufacturing processes over the past century (Braadbaart, 2007; Dorval, 2019). Organisations such as Ford, General Motors, Toyota, and most recently an organisation outside the automotive industry,

General Electric have endeavoured to develop and then apply the learning of their time within their respective businesses. Through the application of academic theory organisations such as Ford, GM, Toyota, and General Electric have been at the forefront of adopting these principles not only applying, but often further developing the basic concepts to further enhance and enrich the knowledge around these topics.

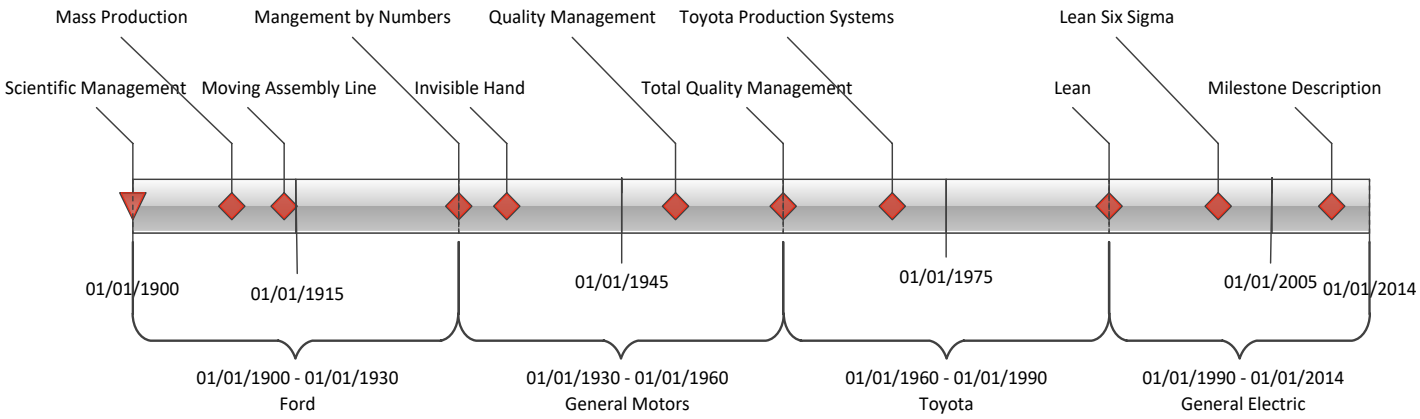


Figure 2.2 Lean Evolution in Organisations

By taking a closer look at some of these theorists and the organisations involved we will be able to understand the application of the basic principles, the development within the industry, and the drivers behind some of these changes.

2.2 Fredrick Taylor's Scientific Management

In more contemporary times it is not difficult to believe that the US would be one of the leading innovators and adopters of early manufacturing concepts that would ultimately change the face of manufacturing forever, however, towards the end of the nineteenth century with the traditional economies of Britain and Germany dominating the world stage this was a much greater leap for the imagination. This was the case, however, and by 1927 the US had not only adopted and implemented the early concepts of scientific management and mass production, but they had also overtaken those

traditional powerhouses to produce 45% of the words industrial output and 80% of the automotive industry output (Norcliffe 1997).

The concepts of scientific management developed by Taylor, one of the first industrial engineers, in the late eighteen and early nineteen hundreds were some of the earliest concepts of organised management adopted by US manufacturing, and his influence is still felt in every corner of business, industry, psychology, and education (Taylor 1972) .

Fredrick Taylor, born in Philadelphia, Pennsylvania in 1856, into a wealthy Quaker family had a relatively privileged and strictly structured upbringing by his Princeton educated father, and strong-minded mother who valued social justice and plain living (Blake and Moseley 2010). Originally intending to attend Harvard having been accepted, he was forced to withdraw from the offer as a result of failing eyesight. In 1874, Taylor was indentured as an apprentice pattern maker and often credited this early education as critical to his development over the subsequent decades. In 1878 Taylor began his career in Midvale Steel Company as a shop floor labourer and progressed early to becoming a gang boss within the organisation. He sought through experiment to understand how efficiencies could be delivered in the day-to-day delivery of operations. His controversial approach at that time could now be considered the genesis of lean (Iuga and Kifor 2013).

Taylor's initial interest in removing waste, measuring performance, and economical use of resources was first documented in his 1903 paper, Shop Management (Wren 2011). The paper, which was often referred to in his later writings as he addressed the; elimination of wasted motions; pay and performance; functional foremen; management by exception; worker selection and training; mutual accident insurance and restriction of output by workers ("soldiering"); and the mutual interests of the worker and the manufacturer.

2.2.1 Scientific Management

The principal objective of scientific management is to deliver maximum prosperity to the employer and thus to the employee (Taylor, 1911, p. 9), and indeed Taylor would make a novel argument for that time that both objectives do not need to be antagonistic. Traditional management theory of the time in the late eighteen and early nineteen hundreds would have been informed by the view that these objectives were mutually exclusive and could not be harmonised, however, Taylor went about demonstrating how these goals could be delivered in unison by adopting an integrated approach of scientific management.

Taylor's contribution to the field of management in the early nineteen hundreds cannot be denied, however, the originality of his scientific approach to the measurement of tasks has been questioned (Wrege and Hodgetts 2000). There are accounts of early work carried out by others including for example in Poland in the late eighteen-nineties by Karol Adamiecki developing workflow network diagrams to solve production problems (Wrege and Hodgetts 2000).

While Taylor's pig iron observations in 1899 in Bethlehem Iron are often cited as examples of how scientific management increased productivity and delivered efficiencies while allowing workers to prosper, there have been questions raised about the accuracy of the interpretation of some of the data associated with the experiments and how that interpretation has evolved over the years to suit a particular audience (Wrege, 2000).

2.2.2 Philosophy of Scientific Management

While it may be convenient for detractors of scientific management to take an overly simplistic interpretation of the concepts it should be remembered that Taylor was of the view that the principles

of scientific management were much more of philosophy that was required to transcend the organisation if the concepts were to be adopted successfully (Blake, 2010).

Time was identified as being a key requirement in the implementation of such a philosophy, and Taylor even went as far as to say that if managers sought to implement such change quickly or hastily they were doomed to fail (Blake 2010). Taylor's concepts of scientific management are seen as the early stages of human performance technology and described as a means of how to engineer human behaviour and improve efficiency through scientifically designed management methods, such as appropriate selection, incentives, and training (Chyung, 2005).

It is without argument that Taylor is one of the preeminent management theorists of the twentieth century and his legacy continues to add to the debate today, much as it did in the early nineteen hundreds. The principles of scientific management have been described as cold and impersonal, omitting the human factor required of management theory. The promotion of piece-rate compensation led to a highly competitive environment which only emphasised short term output with very little worker involvement. The scientific management of tasks, despite often being seen as the rationalising of work processes and increasing managerial control, has certainly added a dimension to management theory that has endured the test of time in one form or another over the last one hundred years (Govekar and Schwartz 2007).

2.2.3 Hawthorne Studies

Whilst not directly connected with Taylor, it has been suggested the Hawthorne studies conducted in the General Electric plant in Chicago in the nineteen twenties and thirties were strongly influenced by Taylor's principles of scientific management (Wickström, 2000). Elton Mayo, in his book The Human Problems of Industrial Civilisation, documented the controversial study of human productivity which endeavoured to establish a link between workplace illumination and worker productivity and later the

connection between rest periods and productivity (Mayo, 2014). Whilst the findings of the experiments have been challenged in more latter years, and the effects compared with the social phenomenon of a placebo, there can be little argument that this was a distinct period of intersection between the hard scientific engineering school of management theory and the more general psychological and deep-rooted value-driven school of management theory.

2.3 Peter Drucker's Management by Objectives

Taylor may be arguably described as the founder of management theory and the provider of the principles upon which much of the contemporary management views of the modern gurus are based, however in addition to this hard scientific approach as developed by Taylor and later by process orientated management theorists and practitioners such as Fayol, Gantt and Gilbreths, there was a softer more inclusive approach being developed by theorists such as Peter Drucker (Holmes 2013, P.16).

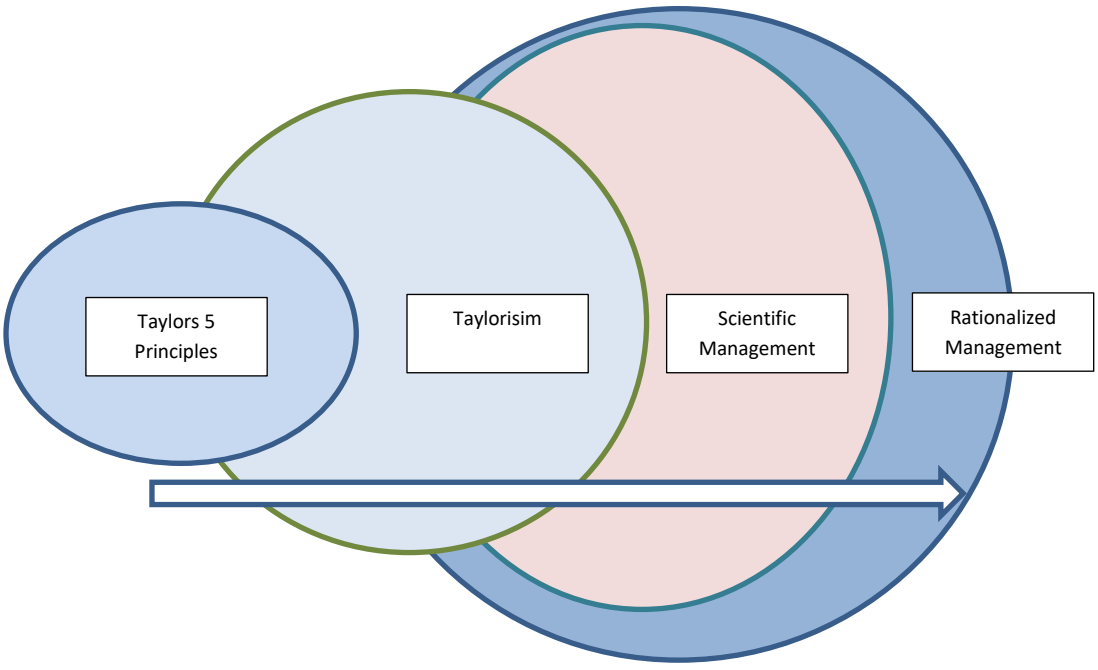


Figure 2.3 The Evolution of Taylor's Principles (Adapted from Holmes 2013, P 20)

During the nineteen forties and fifties it began to become apparent that the external motivation provided by employers under scientific management was ceasing to be as effective as it may have been in the early nineteen hundreds and an alternative means of increasing performance from the human resource input was required. Organisations were beginning to dramatically increase in size and number, and there was a greater need to understand how contemporary management of such an enterprise should be delivered (Bowman and Wittmer 2000). While the genesis of management theory could be credited to Fredric Taylor the development of the early concepts of the corporation and the definition of the manager could equally be credited to Peter Drucker (Cowan, Genoe McLaren et al. 2009).

Peter Ferdinand Drucker, born in 1909 in Vienna, a US economist, educator, writer, and professor of management, lived to see some major changes in changes in the world over his ninety-five years of life. He delivered two significantly influential texts on management theory, Concept of the Corporation (1946) and The Practice of Management (1954), providing two major contributions to management theory (Govekar and Schwartz 2007).

The primary function of the enterprise may be to create a profit from the activities it undertakes, to create wealth, and deliver value to the customer, however, the business is a human organisation, a social organisation, and a micro-society for the larger macro-society in which it operates (Kurzynski 2012). While there was a period of relative prosperity for the middle-class worker there was never the level of societal integration anticipated.

Drucker's nineteen fifty-five book, The Practice of Management, endeavours to put forward the concept of management by objectives (MBO) through a combination of dissemination of business management into four key parts and key experiential examples. During the mid-nineteen hundreds business owners and managers were becoming acutely aware of the need to manage one of the greatest and most costly inputs in the manufacturing process; human resources (Drucker 1955, P. 309). Scientific management had served to improve efficiencies in the way work was carried out but

with the implementation of greater automation, there was a need for more skilled and knowledgeable workers effectively going against the scientific management concept of low worker involvement.

2.3.1 Philosophy Management by Objectives

MBO was the alignment of goals across the entire business to improve the performance and profitability of the enterprise (Dinesh and Palmer 1998). It is based on the congruent setting of measurable goals with an emphasis on a philosophy of developing a collaborative approach by management and worker involvement.

To deliver this concept there needs to be an integrated approach to managing the business, managing managers, structuring management, managing the worker and work, understanding what it means to be a manager, and understanding the responsibilities of management. Drucker provided a framework for this in his concept in his book The Practice of Management.

It could be argued that a business or enterprise in itself is an inanimate object and only through the dynamic leadership and dedication of a manager or managers, is life provided to the enterprise (Drucker 1955, P13). The management of a business could be considered an organ of society charged with organising the resources or inputs in a business in such a manner as to deliver back to society something greater than the sum of the parts. The management of a business is something of a broad term with an even broader scope and function, the term ‘manager’ has its origins in the Italian word ‘maneggiare’ which is to domesticate, control, or train something wild.

2.3.2 Managing Managers

Developing and clearly defining the business strategy, the medium-term plan, and the annual business objectives are critical to setting the business on the correct path for success, however only through

the execution of tasks will the objectives for the business be achieved and only through managing the managers within the business will the requisite tasks be executed (Drucker 1955, P.139). Managing the managers within the business effectively and consistently is fundamental to delivering order, motivation, and leadership. This element of the human resource input will, without doubt, be the most expensive and it is critical that the maximum benefit for the business is derived from their contribution.

2.3.3 Management of the Worker

One of the largest resources that any business will have to input into the process will be that of the human resource and it is imperative that this resource, like any other input into the business, is managed efficiently and effectively (Drucker 1955, P. 309). As new technology develops and automation becomes more and more prevalent in both manufacturing and business in general there will be greater opportunities to increase efficiencies in how human resources are managed.

There can be little doubt of Drucker's contribution to the field of management theory, his contribution to defining the role of the manager, providing an in-depth understanding of the management of the modern corporation, developing the concept of management by objectives, and exploring the link between the good of the business and the macro societal needs has largely informed contemporary theory in the field of management (Cowan, Genoe McLaren et al. 2009).

2.4 Quality Management

Over the last century with the growth of industry and manufacturing through the industrial revolution, the introduction of mass production, and the breaking down of the barriers to trade all over the world, we have witnessed the necessary evolution of quality control (Juran and Gryna 1970, P. 20). From the

inception of the requirement for inspectors by Taylor in his principles of scientific management to the contributions by Deming in the form of his Fourteen Points and Seven Deadly Sins, Juran in his Pareto Analysis, and Ohno's Production System, the principles of quality control and total quality management have evolved to be an all-encompassing core requirement of any successful modern organisation. The genesis of the modern organisation evolved from the basic need to provide a service or a product that is fit for purpose to a consumer. The requirement for fitness for purpose can be traced back through the ages to early mankind in the basic task of hunting and gathering food for sustenance. Particular quality attributes associated with certain foods were identified in the foraging process allowing people to acquire the necessary nourishment from the surrounding environment to survive. Smell, taste, and texture all formed part of the quality characteristics necessary to identify and select the requisite plants and vegetation that were safe and provided the necessary nourishment to survive (Juran and Gryna 1970, P. 7).

With the onset of the industrial revolution came the establishment of mass production removing an element of the craft control and introducing the principles of mechanisation and automation. As machinery, controlled by unskilled workers, began to replace the craft worker, the quality of the product began to diminish. With mass production came mass consumption across much wider communities, and thus came the need for organisations to differentiate their offering by establishing a quality standard to offer the consumer.

2.4.1 Defining Quality

While having wide and varied definitions, quality can easiest be described as meeting or exceeding the customer's expectation (Goetsch and Davis 1994, P. 2). It can apply to products, services, people, processes and environments and continually evolves with time. The perception of quality will vary from location to location, person to person, and organisation to organisation, and the quality of a

product or service is known to be the most likely deciding factor in a purchase by everyone from an individual purchasing a household item to a government procuring a multi-million euro contract for services (Feigenbaum 1983, P. xi) . Increasingly organisations are now competing on matters of quality to differentiate their product or service offering from their competitors, reputations are built on the consistent offering of the organisation, and this is not down to chance, it is the result of a carefully planned and managed policy to deliver quality within the organisation.

With the realisation that quality was a core competency required of every aspiring organisation came the requirement to deliver this requirement in a repeatable form, a form of control in industrial parlance was required (Feigenbaum 1983, P. 10). Control in industrial terminology is the implementation of activities and processes that ensure a product or service is delivered in a predetermined manner and to a required specification. The responsibility associated with these processes and activities must then be delegated to ensure that quality is maintained at all times.

Quality control, initially the gambit of the inspector as defined by scientific management, has evolved to encompass all aspects of the modern organisation including marketing, engineering, purchasing, and after-sales. The terms total quality management (TQM) and total quality control were coined to describe this all-encompassing approach to driving quality, not only externally but internally within the organisation between interdependent departments to improve performance and deliver the requisite quality expectation to the consumer.

2.5 The Early Days of Quality Management

The evolution of total quality management can be traced back over the last century where its origins can be identified in the early organisations of the twentieth century (Feigenbaum 1983, P. 15). Quality control within these organisations was relatively simple to deliver given the fact that the entire product or service was delivered by a singular individual, often a craft or guild worker, which was

responsible for its production or delivery in its entirety. Quality was controlled by ensuring that this individual had the skills and resources necessary to deliver a consistent product. The challenges associated with this form of manufacture arose in the inconsistency of the skill of the individual delivering the product, and possibly more importantly the limited ability of the individual to deliver on increasing demand.

With the growth of the middle classes in the last century and greater spread of wealth across the population came the increased demand for manufactured goods, the processes of hand-craftsmanship so widely associated with manufacturing up to that point increasingly became incapable of satisfying the insatiable consumer demand of the prospering classes requiring organisations to rethink their manufacturing techniques (Juran and Gryna 1970, P. 20). With the advent of mass production came the increased ability to turn out large quantities of standardised products satisfying the increased demand but possibly at the expense of quality. As responsibilities associated with the production of products were divided in accordance with Taylor's principles of scientific management, and the structures of organisations such as that of the Ford Motor Company became more complex, the level of defects increased dramatically. While the mechanisation and automation of the production line and the standardisation of components allowed for the interchangeability of parts in the final assembly, the requirement for compliance with lower tolerances and higher quality became necessary.

2.6 Total Quality Management

And so total quality control was born, only when organisations began to review the levels of reworking that was been required with increased demand did it begin to become apparent that there was a more all-encompassing management solution required to effectively deliver quality control in the new more complex modern organisations of mid-nineteen hundreds (Feigenbaum 1983, P. 16). Organisations

were forced to review management practices and procedures in delivering products to include quality control at all stages. Engineering design, once the domain of specialised and well-established skill sets, was required to take into account the statistical findings of the quality inspectors in redesigning components and products. Assembly line design, again once very separate from quality inspections, was required to identify means by which defects could be reduced. At all points within the organisation quality needed to be addressed, and so total quality control became not only a management tool but a key aspect of the organisation's strategy.

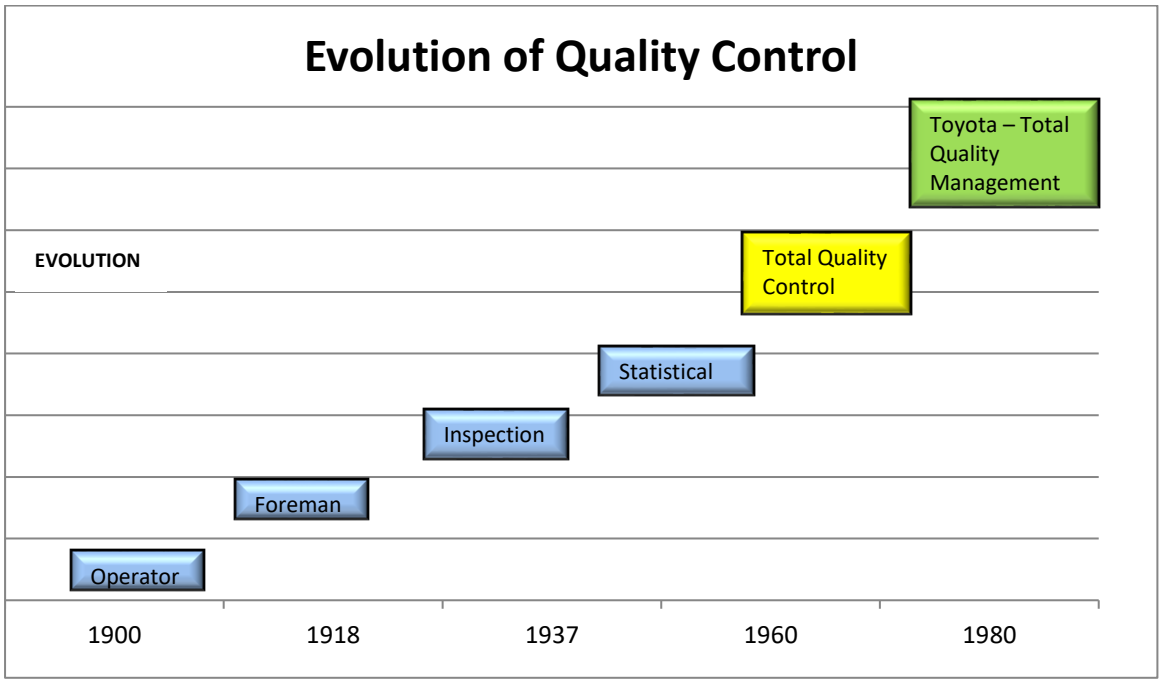


Figure 2.4 The Evolution of Quality Control (Feigenbaum 1983, P. 16)

2.7 Transition from Mass to Quality

Mass production, largely incorporating principles from Taylor's scientific management and Ford's assembly line, relied exclusively on inspection as a means of maintaining the quality of the end product. Taylor applied great detail in his application of a structured approach to the division of

responsibilities, separation of tasks and processes, and the removal of inefficiencies and waste (Taylor 1911, P. 11). The training was provided to operators to maintain productivity and demonstrate the most efficient means of delivering the product, workers were consulted in developing the standard approaches to delivering productivity, and experiences were shared to provide the best outcome for the organisation, however, despite documenting standard processes and approaches, organisations inherently struggled to achieve repeatability in providing a standard product. This often resulted in fractious relationships between management and workers within organisations, with the former often taking a cynical view of the latter's efforts to deliver optimal performance.

The efforts of Peter Drucker, through his principles of management by objectives as discussed earlier, went some way to developing these early principles provided by Taylor and addressing some of the human elements associated with the lack of repeatability and quality and providing a more all-encompassing strategy for the delivery of a quality product (Drucker 1955). The impacts were limited, however, and with increased demand associated with World War II organisations were struggling to get to grips with increasing demand, repeated product failures, and ever-increasing levels of rework associated with the onerous task of inspection.

Discussions on management theory often focus on contrasting and comparing alternate views, philosophies, and principles, identifying a correct and incorrect approach to the overall principles of management of organisations, however, it could be argued in the case of Taylor's principles of mass production versus Deming principles of quality, the major differences are as a result of their relative position on the historic timeline of management theory (Washbush 2002). While Deming's more contemporary principles could be considered to be at odds with some of Taylor's earlier concepts, given Taylor's deep-rooted views of a predictable mechanical universe, as opposed to Deming's systems, orientated approach, there are also many similarities such as scientific analysis and study, systemic decision making, employee selection and training and cooperation. This should not take away from the obvious contradictions between the principles such as Deming's rejection of the fact

that the traditional use of quantifiable objectives and goals will only lead to increases in quantity at the expense of quality (Carson and Carson 1993).

2.8 Deming's Principles

William Edward Deming, born into and reared in a farming community in rural Wyoming, studied engineering at the University of Wyoming and mathematics at the University of Colorado before completing his PhD in mathematical physics at the University of Yale (Witzel 2003, P. 58). Deming's earliest influences included his summer work at the noted Western Electric Company, the location of some of the earliest experiments on the effects of environmental conditions on productivity, the Hawthorne Experiments. While Deming denied any knowledge of these studies, he did recognise the pioneering work of Walter Shewhart in statistical quality control, work that was to go on and influence much of Deming's life's work. Walter Shewhart's early development of statistical quality control, sampling methods that could identify defects and variations in quality during the manufacturing process, would be continually referenced by Deming throughout his life's work. During the Second World War Deming took the opportunity, in the face of growing demand, to endeavour to develop and drive the concepts of statistical quality control, and for a time had some success in convincing traditional organisations to adopt these pioneering principles. As demand diminished during the post-war era so too did the interest in statistical quality control, Deming struggled to gain traction with the traditional industrial behemoths that were convinced that US dominance would continue irrespective of the increasing forces of competing world markets(Witzel 2003, P. 59).

Deming found a much more receptive audience in the most unlikely of places. With the annihilation of the Japanese manufacturing industry post World War II came the challenge to rebuild an economy from tatters. The Japan Union of Scientists and Engineers (JUSE) had been researching competitive strategies to rebuild their devastated economy and in 1947 had already begun to embrace the

concepts of statistical quality control (Witzel 2003, P. 59). Deming accepted an invitation from JUSE with his colleague Joseph Juran, to assist in the reconstruction of the Japanese manufacturing industry and would go on to spend much of the next decade working alongside management, engineers, and scientists in adapting a quality-driven approach to manufacturing.

Deming's philosophy included the provision of 14 principles to overcome seven deadly sins and a further list of obstacles that impede the effective and efficient operation of a business by removing variation, delivering continuous improvement, and ultimately achieving organisational quality (Rungtusanatham, Ogden et al. 2003).

The four principles of the concept of profound knowledge are designed to complement each other and provide an environment to allow the development of Deming's more prescriptive fourteen principles (Rungtusanatham, Ogden et al. 2003). Deming would argue that the absence of this knowledge within the organisation would prevent the attainment of a quality organisation. In their efforts to describe and explain Deming's management theory, Anderson et al provided fourteen axioms to develop the four principles of profound knowledge(Anderson, Rungtusanatham et al. 1994).

2.9 The Early Toyota Production Model

Lean, a generic term popularised by its major proponents the international motor vehicle association researchers from of the Massachusetts Institute of Technology has its origins in the automotive industry (Cusumano, 2021). This was primarily developed in Japan but subsequently in the US, and most recently across the rest of the world, introducing an approach of eliminating waste while driving continuous improvement (Papadopoulou and Özbayrak 2005). The early concepts of lean manufacturing and lean production developed by Taichi Ohno in Toyota, which have subsequently developed into a philosophy adopted by both the manufacturing and service industries, have been well documented in the literature, however, it is argued that the evolution of the philosophy

associated with lean has not been tracked in as active a manner. We will endeavour in this chapter to trace the origins of lean and track the evolution of management practices and philosophies through the last century to eventually arrive at an understanding of the present position of lean in management theory.

The roots of lean can be traced back through the automotive industry and therefore it is difficult to appreciate or define without first understanding the evolution path of the industry in which Taiichi Ohno develops his Toyota Production System, and on which ultimately lean is derived (Iuga, 2013; Hernandez-Matias, 2020). It is argued that lean has its origins in scientific management as developed by Taylor at the turn of the twentieth century. Taylor's scientific management principles, albeit unpopular at that time, certainly provided a firm grounding on which to build the concepts such as quality and lean that would ultimately change manufacturing and service delivery over the following one hundred years. Over the last century, industry passed through several distinct phases of development before ultimately arriving at the concept of lean.

In the late eighteen hundreds and early nineteen hundreds one of the first industrial engineers, Fredrick Taylor, began his study of analysing workers individually, their job methods, and management's role in providing an efficient workplace (Iuga and Kifor 2013). Mass production as developed by Henry Ford in the Ford Motor Company and more laterally developed by Alfred Sloan in General Motors provided the application of many of Taylor's concepts incorporated with the moving assembly line, and new manufacturing strategies of General Motors. The limitations of mass production became apparent in the late nineteen twenties and early thirties as increased demand and variation in product line resulted in greater levels of waste and rework in manufacturing, reducing efficiencies, and overall increasing overall cost of production (Womack 2006).

And so we pass into the second phase of the evolution of the automotive industry namely the focus on quality. The concepts developed by Drucker, Deming, Juran, and Ishikawa were instrumental in the development of the automotive industry (Martínez-Lorente, Dewhurst et al. 1998). Concepts such as

Deming's focus on the customer, Drucker's attention to the organisation, Juran's drive to improve the process, and Ishikawa's consideration of how to drive further improvement was instrumental in developing the automotive industry in the middle of the twentieth century.

The fledgling Japanese automotive industry was a willing and eager early adopter of many of these early quality concepts providing the seeds of what would ultimately come to be the Toyota Production System. The Toyota Production System developed by Taichi Ohno on instruction from Eiji Toyoda, which is the basis of lean (Womack 1990), is the third and present phase of development of the automotive industry over the past century. The lean concepts of reducing waste or muda, removing variability, continually driving improvement all through providing a culture of inclusiveness and continual feedback from the shop floor could be described as an integrated approach to many of the early quality concepts (Dahlgaard and Dahlgaard-Park 2006).

2.10 Chapter Summary

It could be argued that lean is the ultimate intersection of the two schools of management theory, the early engineering and scientific perspective and the more contemporary psychological and value-driven approach to management. The idea of bringing the best of science and psychology together to deliver work most efficiently by removing waste and non-value adding activities and all of the time educating the worker in the process could be argued as a reasonable compromise to the opposing views of the management.

The principles of lean include the removal of variation in the delivery of work or the manufacture of goods; this is not a contemporary adoption of Taylor's principles of scientific management. Lean focuses on the measurement of key performance indicators, setting realistic and achievable targets, and educating the worker on the means of delivering the desired target; again is this not akin to a modern version of management by objectives. Possibly closest of all is the relationship between lean

and quality management. Lean proponents would suggest that the control and delivery of standardised services and products in the most effective manner, with the least defects a key aspect of the philosophy. This definition is closely aligned to that of a quality approach. These arguments make the philosophy no less credible, and could even be argued as providing the ultimate legitimacy; either way to develop and understand the principles of lean there is a critical need to understand the earlier concepts upon which the philosophy is based.

Chapter 3 – Organisational Culture

Chapter Overview

The concept of organisational culture is complex and multifaceted. Much has been documented on the principles of the concept and it is unlikely that one chapter will do justice to the enormity of the concept. Chapter three will not endeavour to brush lightly across such an abundance of information but rather focus on the core principles associated with cultural patterns in organisations, how they influence the path of organisations and the adoption of strategies. Through exploring the influences of society, history, and technology on organisational culture the chapter will inform the research on introducing a concept such as lean.

3.1 Chapter Introduction

Much contemporary commentary seeks to attribute both the successes and woes of modern organisations to the culture within. Simplistic views and contemporary general discourse on the structure of organisations and the impact of culture often over emphasise, and wrongfully attribute the impact of what is a complex and multifaceted concept. This is far from a new phenomenon. The proliferation of the culture literature to support wide and varied views was lamented by anthropologists over half a century ago, arguing the need to "narrow the concept of culture so that it includes less and reveals more" (Keesing 1974).

Even further back in the annals of history, this tendency towards generality in the examination of culture was identified as a significant risk in the examination of the concept. Benedict (1934), in the opening paragraph of her seminal book, Patterns in Culture, warns of the risks associated with considering culture based on incomplete examination of evidence torn out of its natural environment at a specific time in history.

Academics and practitioners alike have endeavoured over the years to define the causal role of culture in the actions of society and organisations (Allaire and Firsirotu 1984). Traditionally, culture was thought to shape action by providing values that directed action, and thus values were considered to be the central causal element associated with culture. Culture can be considered as the personality of a group (Hofstede 1980); however, there are challenges associated with such a simplistic view of a complex and multifaceted concept. To appreciate the concept fully it is necessary to examine the notion of culture, not only from a values, myths, and assumptions perspective, but to reach back into the origins of the concept, to examine the genesis of the notion in its anthropological setting, and from there apply the learnings over time to bring a more contemporary and fully informed appreciation to light.

Within this chapter, we will examine the concept of organisational or corporate culture, as in the culture within a commercial organisation that is involved in the manufacturing of products or the delivery of services. The complex construct that is culture exists on multiple levels. On a macro level, we have national cultures pertaining to ethnic and geographical aspects of the construct, whilst on a micro level, we have organisational and professional cultures pertaining to the traits, behaviours, and values of smaller groups within an industry or sector (Smircich 1983). To examine the concept of organisational culture we need to consider both the macro and micro-cultures as they exist together in society and within the institution.

We can trace the origins of the concept of culture to the study of anthropology, or the study of society (Benedict 1934, P. 1). The social science of anthropology considers, compares, and contrasts the alternative cultures in existence around the globe, how they have evolved, and the underlying reasoning for this evolution. The observable indicators of the underlying patterns which dictate the reaction of groups to specific environmental conditions are often confused with culture itself. Culture is a patterning of the mind whilst these observable actions and reactions are simply indicators of the structure of these patterns. It has been noted that, within organisations where there is a lack of similarity between the prevailing culture within the organisation and that of the personality of the individual, tension will result often resulting in the individual failing to 'fit' into the organisation (O'Reilly, Chatman et al. 1991). Managing the softer side of the organisation can be tough, and it is critical for the leadership of the organisation to succeed, that these concepts are understood (Waterman, Peters et al. 1985).

3.2 Defining the Concept of Culture

In relatively simple terms the concept of culture can be defined as a pattern of shared basic assumptions learned by a group as it has solved problems (Schein 2010, P. 19). Successes shared by

the group will be remembered and the reasons for such successes in resolving a problem will be passed on within the group as an agreed and validated means of dealing with such a problem in the future. In the event of new techniques or solutions being offered, there may be conflict as the group will strive for stability to satisfy our human need for consistency. From this process, an agreed set of rules, or a pattern, will become established resulting in the formation of a culture (Louis 1980).

Within the established literature there is almost universal agreement that culture in its most basic sense can be defined as a term to describe the orderliness and patterning of a society or group, however, that is largely the extent of agreement within the literature (Benedict 1934). There is little agreement within the anthropological literature on the concept, and possibly less from that of the organisational literature. The root of this disagreement may lie in the fact that both the concept of culture and that of the organisation have been explored from numerous positions of enquiry seeking to answer varying questions across multiple sections of literature (Smircich 1983). The concept of culture itself with its origins in anthropology has had significant diversity in its conceptions over the years, and similarly, the breath of research in examining the organisation has resulted in diverse and varying literature. The examination of these literatures together results in multiple themes of the concept of organisational culture arising and to examine the concept fully there needs to be some order applied. Some of the more contemporary and trade orientated literature has verged on ignoring some of the more complex elements of the concept to explain simply and develop practical and easily applicable cause and effect models and tools. To do this devalues the origins of the concept and prevents a full understanding of the impact of culture.

One accepted means of examining the varying concepts and the intersection of the literatures has been to link the themes in both base literatures (Smircich 1983). By defining and examining the concept of culture from an anthropological perspective, and the organisation from an organisational theory perspective, the concept of organisational or corporate culture can begin to be fully appreciated.

The concept of culture from an anthropological perspective can be considered from five main perspectives; as an instrument serving human needs; as an adaptive regulatory mechanism for humans; a shared system of cognitions; a shared system of symbols and meanings; and a project of the mind's unconscious infrastructure (Smircich 1983). The organisation on the other hand, when examined through the lens of organisational theory can also be considered from five perspectives; as social instruments for task accomplishment; adaptive organisms for the delivery of work; shared systems of knowledge; patterns of symbolic discourse; and manifestations of unconscious processes.

These five definitions of culture and the organisation form the basis of how five of the different themes in organisational culture have been examined in the literature. Whilst the thesis of such enquiries vary greatly, each bringing their nuanced understanding of the concept, many complement each other and result largely in the formation of two broad schools of thought in the area; firstly, culture is a product of the organisation and exists within the organisation; and secondly, the organisation is a culture in itself by virtue of the rules and patterns established in the delivery of work.

The themes of comparative management and corporate culture have some similarities suggesting that organisational culture is an independent or dependent variable influencing or being influenced by the organisation (Smircich 1983). Comparative management considers organisational culture as a background factor synchronous with that of the geographical culture of the region and imported into the organisation by its membership. The theme of corporate culture on the other hand would suggest that the organisation produces a culture as a by-product of the task delivery process. This culture is distinctive and has been argued by many as unique to the organisation that produces it (Martin, Feldman et al. 1983). This culture produced within the organisation will provide a higher order of commitment required by successful organisations to deliver change and adapt to changing environments (Louis 1980). Distinctive cultural artefacts, rituals, and ceremonies are created by the members of the organisation and provide the members with a common set of rules and guidelines to provide orderliness within the group. Organisational culture can be considered to provide the

members with a sense of identity, commitment to something greater than the self, a stable social system, and a sense-making device for behaviours within the organisation (Smircich 1983).

3.3 Levels of Culture

We have explored the many and varied definitions of the concept that is the organisational culture which has resulted from the multiple themes of examination in the literature, however, one area in common throughout these multiple themes of examination is that of the manifestations or degrees to which culture is apparent within the organisation. There is almost universal agreement across the literature that culture exists on multiple levels from that which is overtly visible to that which is deep within the unconscious mind (Erthal, 2021). As culture is a construct and not directly observable, its existence can only be inferred from visible manifestations within the organisation (Hofestede 2001).

Culture has been identified as existing on multiple distinct levels of visibility described by some as; artefacts visible on the surface; espoused beliefs and values existing on the deeper level than that of artefacts; and basic underlying assumptions which are deep-rooted accepted unconscious rules and in society (Schein 2010).

Artefacts can be considered as the most obvious to the observer, a collection of visible products such as myths, behaviours, language, rituals, and ceremonies (Schein 1984). Whilst often the most visible to the observer, on their own and regarded in isolation they may not make sense and offer little in that way of understanding the culture.

Espoused values can be considered as the way things ought to be as opposed to the way things are within an organisation (Schein 2010, P. 25). In the early stages of an organisation's evolution, there may be little in the way of established norms or proven means of delivering successes. The leader of an organisation may put forward beliefs or assumptions that may or may not become the basis of

successes that are delivered by the team. If these beliefs are validated by the delivery of success through the joint action of the team they will become accepted as the way things are done within the organisation. If this course of action continues to reliably deliver successes they will develop into shared beliefs and values within the organisation. However, if these beliefs fail to deliver reliable and repeatable successes this may give rise to a conflict between the desired or espoused values of the organisation and the actual behaviours within the organisation.

As espoused values deliver repeatable successes they become the accepted norms within the organisation (Schein 2010, P. 27). What was once the belief of a manager or leader within the organisation becomes a proven means of delivering continued success by the group. As this is reinforced through the delivery of continued success by the group it becomes engrained as a fundamental belief of the organisation. The third and most engrained level on which culture exists is associated with these underlying unconscious assumptions which are fundamental to the functioning of the organisation. The human mind craves stability in mental patterning and any challenges to this accepted underlying patterning will lead to conflict. This accepted patterning will be largely influenced by the macro culture in existence in the social surroundings of the organisation. Group members are unlikely to alter their underlying assumptions predicated on their social surroundings, education, and formative learning based on the joining of a new organisational group. It is much more likely that any individual failing to share these basic underlying assumptions with that of the group will struggle to perform, participate, and ultimately function within the group.

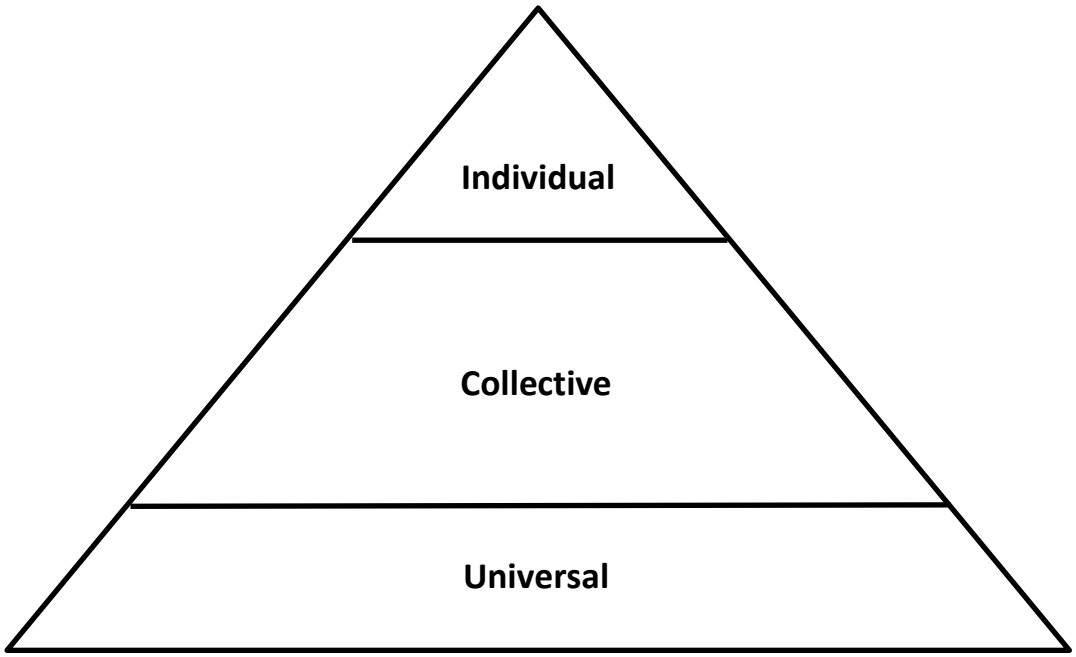


Figure 3.1 Three levels of uniqueness in human mental programming (Hofstede 1980)

The most basic of these patterns will be universal which are our basic underlying assumptions and will apply to almost all mankind and part of our genetic make-up as human beings (Hofstede 1980). They include the patterns passed from generation to generation and are accepted as the basic way in which we behave on a day to day basis. Any deviation from these behaviours will be met with instant and absolute resistance by any group.

3.4 Culture Patterns

If we consider the societal norms associated within any group as the accepted pattern or hierarchy of values then we can also consider the origins of these values and the consequences of such values. Whilst the outside influences of nature and man will impact the origins of mental patterning, it is the origins themselves that will have the greatest ongoing impact on societal norms of a group. The impact and evolution of education, technology, geography, and history will all influence the shared values or

societal norms of the group leading to a functioning structure for the group. As these ecological factors evolve so too will the shared values of the group allowing the culture to be maintained and developed through a continuous loop of development and reinforcement.

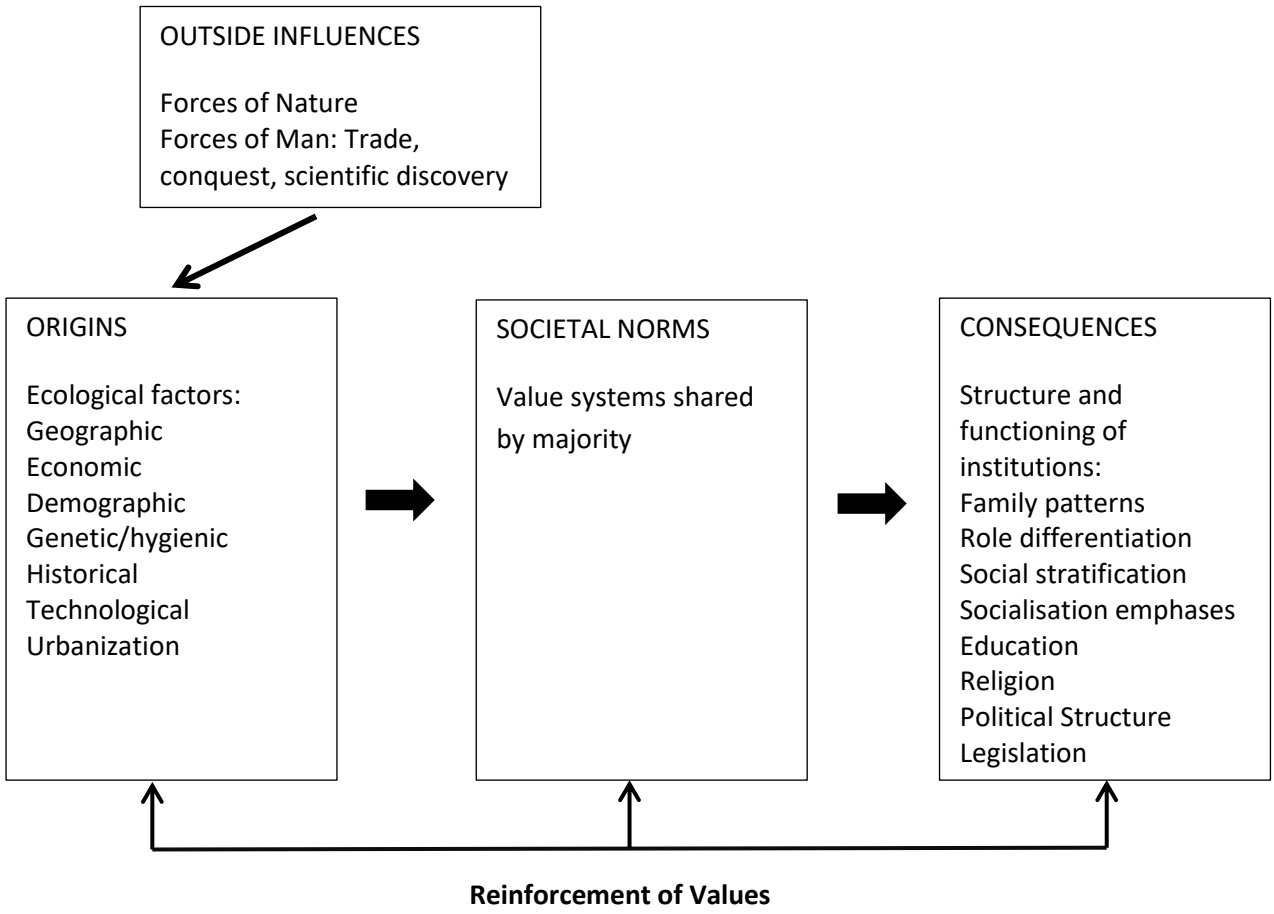


Figure 3.2 The Stabilising of Culture Patterns (Hofstede 1980)

If we consider both Schein and Hofstede's models alongside each other we can begin to identify some of the areas of agreement in their thesis. Whilst Hofstede examines the concept of organisational culture as a subculture existing within a larger geographical or national culture as opposed to Schein who considers organisational culture as a culture in itself, both agree that the concept will exist on multiple levels within the group or organisation. Both models identify basic mental patterning or the underlying unconscious beliefs as the basis of developing a value structure and hierarchy of values. There is agreement that this value structure will also be influenced by external actions such as

education or life experience. Finally, both models also consider visual manifestations of the value structure as consequences or artefacts. Both are in effect the visual output of the value structure within the group.

3.5 Cultural Dynamics

Both Schein and Hofstede's models offer a relatively straightforward means of examining quite a complex construct and developing a greater understanding of the levels of organisational culture that exist. In this, however, some criticism has been directed at the models as over simplifying, and or ignoring elements of the concept such as the ever-changing nature of the phenomena (Hatch 1993). It could be argued that by introducing the element of symbols and focusing on the link between artefacts, values, and assumptions as opposed to the individual elements themselves a greater appreciation of how culture exists within a group can be considered. The advantage of this model is to move the examination of the concept from that of a static consideration to that of dynamic examination taking into account the link between the origins and values of the organisation and how the surface manifestations develop from the value structure within the group.

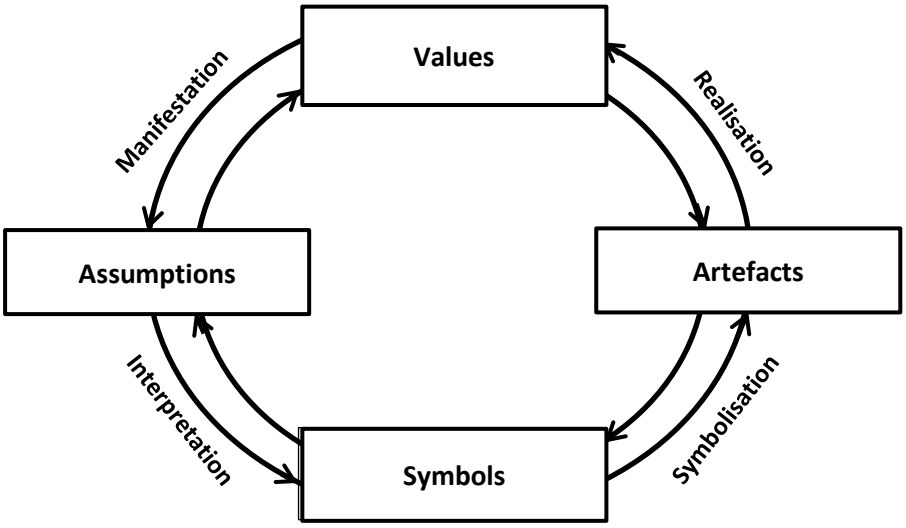


Figure 3.3 Cultural Dynamics Model (Hatch 1993)

The cultural dynamics model does not seek to undermine Schein's model of artefacts, assumptions and values but rather extend the understanding of the links between such elements and how they are related and interdependent (Hatch 1993). Many of the traditional models suggest a more linear development of organisational culture, however, by considering the impacts of manifestation, symbolisation, interpretation and realisation we can begin to understand how cultures are established and evolve within communities in both stable and changing environments.

3.5.1 The Manifestation Process

The manifestation process can be considered as the means by which values or assumptions are translated employing cognition, emotion, and perceptions (Hatch 1993). It has been accepted that assumptions will influence the values of a community or group through the manifestation process of translating intangible assumptions into tangible values (Schein 1984). However, the dynamic model would also suggest that values will influence the assumptions of a group employing retroactive alteration. It has been argued that by implementing alternative values within the organisation by the senior leader which lead to successes being delivered the values of the organisation can be altered.

3.5.2 The Realisation Process

In general terms, realisation is considered as the act of becoming fully aware of something or bringing tangibility to a scenario (Hatch 1993). It has been argued that artefacts are the most tangible of all cultural elements in the hierarchy of aspects associated with culture and are realised from the accepted value system within the group (Schein 1984). The realisation process follows that of

manifestation when expectations and values result in tangible outcomes of activity such as reports, newsletters, and social functions otherwise known as artefacts within an organisation (Hatch 1993).

3.5.3 The Symbolisation Process

Within the area of symbolic-interpretative research, it is argued that every artefact is considered to have symbolic significance and therefore all artefacts are symbols (Hatch 1993). In some cases, cultural models seek to consider both artefacts and symbols as the same without exploring the significance of the difference between both elements (Schein 2010). Others have argued that not all artefacts can automatically be considered as symbols within the organisational realm and to do so ignores the process of symbolisation (Pondy and Mitroff 1979). A symbol can be defined as something that represents, either consciously or unconsciously, an artefact with some wider meaning (Morgan 1980).

3.5.4 The Process of Interpretation

The dynamic culture model considers the interpretation process as the retrospective examination of both the literal and surplus meaning of symbols and basic assumptions at a point in time (Hatch 1993). Interpretation could be considered as a re-examination of the symbolisation process as it is also the establishment of meaning from artefacts, however, interpretation will also take into consideration established basic assumptions when forming a view of the symbols at any point in time. This process of interpretation will move the group from examining the symbols with the cultural significance within the organisation to that which is already known and accepted as basic assumptions. If there is harmony between the interpretation of the literal and surplus meaning of the symbols and the basic assumptions of the organisation there will a reinforcement process will evolve.

3.6 Settled Versus Unsettled Cultures

An insightful view of culture from the early sociology and anthropology literature worth considering examines culture in two independent states, that of a settled period, and that of an unsettled period (Swidler 1986). Culture is considered as a toolkit of symbols, myths, rituals and world views from which a group select configurations to solve problems and direct action.

Traditionally, human beings were considered to be motivated by ideal and material interests in life, and these material interests drive the action needed, and the destination chosen. The social setting within which the individual was located was considered as the influencing factor in both the selection of the life goal and the course of action through which this was achieved. The theory of cultural values was therefore thought to shape the course of action through defining what people want to achieve.

If we consider the culture of poverty, are we to believe that an individual within this social setting is less likely to select a goal to achieve greatness and prosperity than that of their peer surrounded with affluence and wealth? It would seem unlikely (Swidler 1986). Therefore alternatives to the traditional view of cultures influence on society should be considered.

In the case of immigrants in foreign lands, cultural predilections have often been attributed as the causal factor preventing assimilation into new society (Swidler 1986). Alternative end values are often considered as the influencing factors preventing integration with the indigenous community of the new world. It is possible that the value tool kit of the immigrant community is just not equipped for such integration and the alternative chosen is isolation. As society has evolved in more contemporary times, these traditional views of culture have been found wanting, leaving much to be explained. One such explanation considers two different models for assessing the influence of culture. One model considers the impact of culture in “settled lives” whilst a separate model is put forward in the case of “unsettled lives”.

Organisational culture can be considered as the system of collectively accepted means operating at a given time for a specific group (Pettigrew 1979). To understand the evolution of these patterns in any social setting there needs to be careful consideration of culture in its entirety using a complex and technical understanding of all the dimensions of culture as opposed to an 'a la carte' approach to selecting particular aspects of the literature to support sensationalist views.

With the lack of consensus on the definition of culture and the multiple perspectives on the structure and functioning of the organisation, it comes as little surprise that there is a variety of thesis on the concept of organisational culture itself. Both the concept of culture in anthropology and organisation in management theory, require societies of people to function, it was almost inevitable that these concepts would intersect (Smircich 1983). Whilst many of these theories build upon each other to form an insightful and interpretive window into the functioning of society within the organisation, there can too often be conflicting and misleading views through incomplete consideration of the concept. This has sometimes occurred due to the failure to consider the perspective from which the concept is being examined.

Linda Smircich endeavoured to shine a light on the intersection points of the anthropological literature and that of management and organisational theory to illuminate the conversation and draw a distinction between the perspectives on this critical concept.

Smircich identified five overarching perspectives through which the concept of culture is examined in anthropology; Malinowski's Functionalism – culture is an instrument serving human needs; Radcliffe-Brown's Structural Functionalism culture is an adaptive mechanism that serves people in satisfying their needs; Goodenough's – the human mind creates culture through a set of unconscious rules; Geertz Symbolism – Culture is a shared set of symbols and meanings, and Levi-Strauss Structuralism – culture is a projection of the mind (Smircich 1983).

To examine the concept of organisational culture fully, the definition of the organisation and the literature associated with its structure and purpose must be explored. The organisation can be defined from a biomorphic perspective as having a purpose, being subject to life cycles, and suffering from ill-health (Allaire and Firsirotu 1984). From a metaphoric perspective, the organisation has been compared to a living organism and a 'well-oiled machine' that has multiple complex and intermeshed parts that need to operate seamlessly to achieve the necessary task accomplishment requirement set out by the objective of the organisation.

From an anthromorphic perspective, the organisation can be considered to have personality, character, and cognitive processes similar to ourselves as human beings. However, the most prevalent metaphor associated with the organisation seeks to represent it as a society in itself with social norms and structures comparable with any other structured society. Therefore, if an organisation is a microcosm of society, it would be fair to say it will be subject to distinct cultural traits as we would expect to find in any other structured society.

3.7 Cultural Systems

The first and most important distinction in cultural theory is to separate the views of culture as being part of the social system, and the idea of culture being separate and distinct from the social system and a system in itself albeit interrelated (Allaire and Firsirotu 1984). Whilst first examined more from a functionalist perspective considering how society interacts with the values and beliefs of cultural systems, there has been a move towards an interpretative examination considering the values societies derive from interactions on a day to day basis (Geertz 1973, Geertz 1975). The view of culture as being part of the social system determining behaviour can be considered as the sociocultural perspective with the latter view considered as the ideational view (Allaire and Firsirotu 1984).

The sociocultural view can be largely divided into four schools of thought depending on their perspective on time. The functional and the functional–structuralist views examine culture at a particular point in time and space (synchronic), whilst the historical–diffusionist and the ecological-adaptationist examine the processes involved in developing a culture over a period of time (diachronic).

Concepts of Culture and Major Theorists

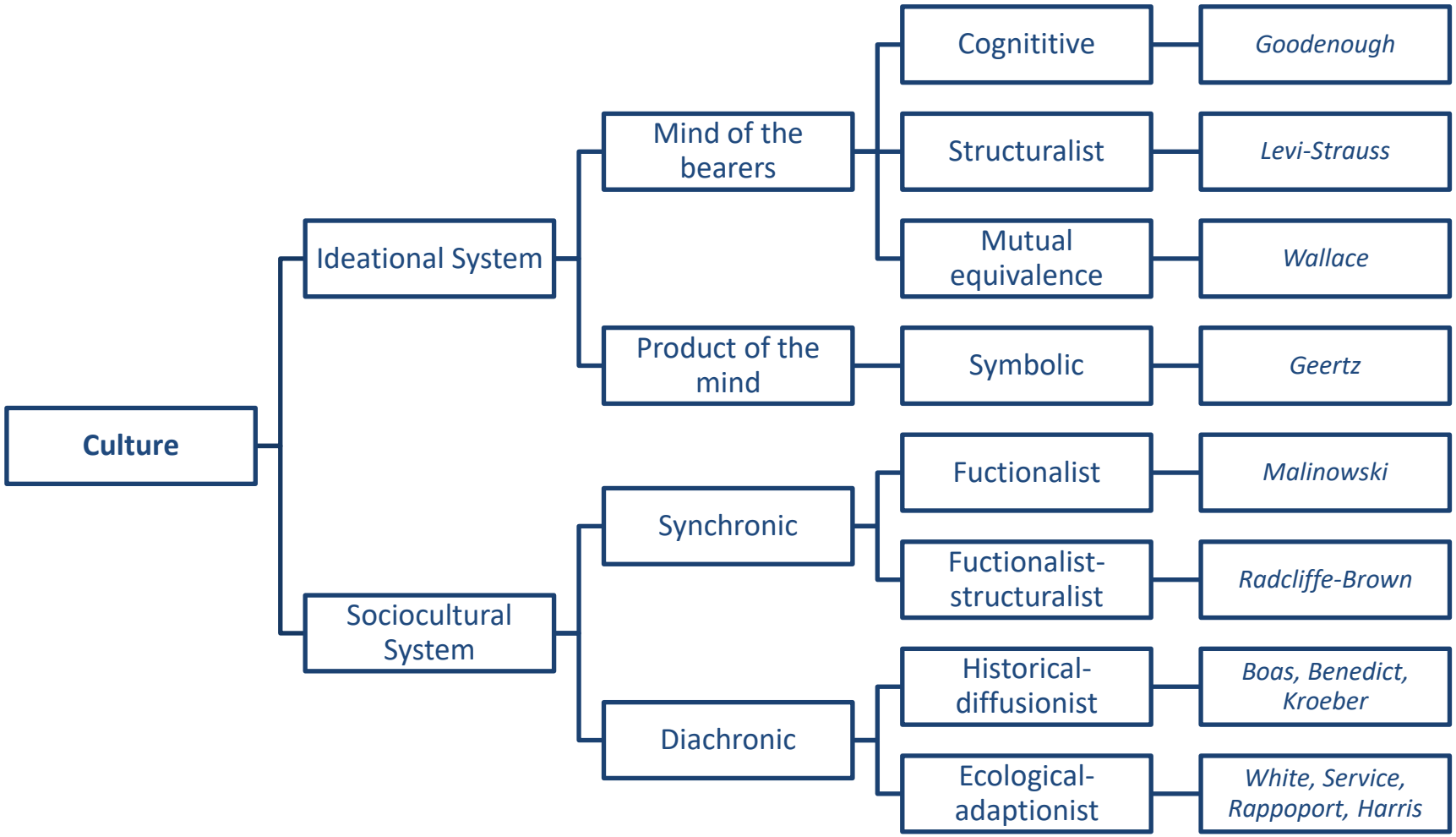


Figure 3.4 A Typology of the Concepts of Culture (Allaire and Firsirotu 1984)

Now that that culture from an anthropological perspective has been considered, albeit briefly, the examination of the management and organisational literature can be reviewed to position its concepts of organisational culture from this same perspective (Allaire and Firsirotu 1984).

3.8 Sociocultural Systems

A significant proportion of the management and organisation literature considers the organisation solely from a sociocultural perspective with the ideational views intertwined within the concept of the organisation as a whole. There is little consideration of the possibility of incongruence between the sociocultural elements of the organisation or the consideration from a separate ideational perspective. However to understand and put order around these schools of thought and their connection to the organisation literature. Sociocultural systems can be considered as the social enactments of ideational views in a particular environment (Keesing 1974). To fully consider the system it is necessary to first consider each view argued in the literature separately with its comparative from an organisational perspective. Within the functionalist school of thought, the social institution will ultimately serve society or disappear. There is a human need that requires satisfaction for the cultural pattern to evolve and ultimately survive.

In human relations tradition this school of thought is closely echoed. Organisations as sociocultural systems in themselves need to reflect the needs of the members. Organisations are theatres for the members to play out their own inherent need for satisfaction. The structure, policies and processes of the organisation need to adapt to the people in place within the organisation to function and in the event, this failing so too will the organisation (Allaire, 1984). An organisation itself cannot be considered in isolation from its environment and therefore the environment within which the organisation functions will impact the effectiveness and efficiency. The goals and purpose of the organisation will need to consider the impact of

the environment in which it operates and therefore the systems cannot be separated in their entirety from the ambient culture of society. The systems within the organisation are therefore in one form or another subject to the greater cultural patterns of society. Organisations will be permeated by the values of national culture. The ecological-adaptationist view of culture would suggest that society will alter its systems and patterns to reflect the ecological surroundings within which it exists. Behaviours and patterns will evolve to take into account the environment, political influences, and social needs of society to develop and survive. The historical-diffusionist view would suggest that societies systems and patterns are predicated on historical factors as opposed to adaption processes due to outside influencers. Cultures evolve and change due to the influence of other cultures and values are adopted as more dominant systems are introduced to society.

3.9 Ideational System

As we examine organisational culture from an ideational perspective there is a significant shift in view. From a sociocultural perspective we are examining organisations systems from a societal perspective and how they might differ, be influenced, or be affected by their surroundings (Allaire, 1984). In examining the organisation from an ideational perspective we are enquiring as to whether an organisations culture can exist and evolve separately to that of society's influence as a result of internal or external pressures. However, there is a risk in examining culture from an ideational perspective in isolation that we are prevented from understanding how change and adaption of cultures occurs. Culture can be considered from a cogitative perspective as a system of knowledge that allows a person to behave in a manner that is acceptable to the group. The structuralist view of culture considers a universal system that stems from the unconscious mind of the individuals within the group. These universal structures and processes of the mind are thought to produce varied manifestations which are indicators of this universal structure within the unconscious mind. In breaking from the norm, the mutual-equivalence view of culture considers a system of mutually predicative behaviours that allows members to deliver organisational cooperation to produce

a set of outputs despite very different individual motivations. The symbolic school of thought considers culture as a set of shared meanings, symbols, and values that are products of the individual mind. There is a wide body of organisational literature that shares this view of culture within man-made institutions to create a predetermined output.

3.10 Overall Perspective of Organisational Culture

Whilst views of culture within the organisation are numerous and vary significantly in their perspectives on the forces influencing their creation and evolution and their systemic structure when examined from an anthropological perspective a certain level of order can be asserted on these lines of enquiry.

However, despite the vast body of organisational literature one of three contributing influences can be considered as the dominant factor in giving prominence to such systems:

1. The ambient society's values and characteristics - structural-functionalists
2. The organisation's history and past leadership – historical-diffusionist
3. Contingency factors such as technology – ecological-adaptationist

However, in practice it may be that all three have a level of influence in creating and maintaining the organisation's cultural systems and Allaire and Firsirotu's conceptual framework (1984) provides such a lens through which to explore this complex and often contradictory literature.

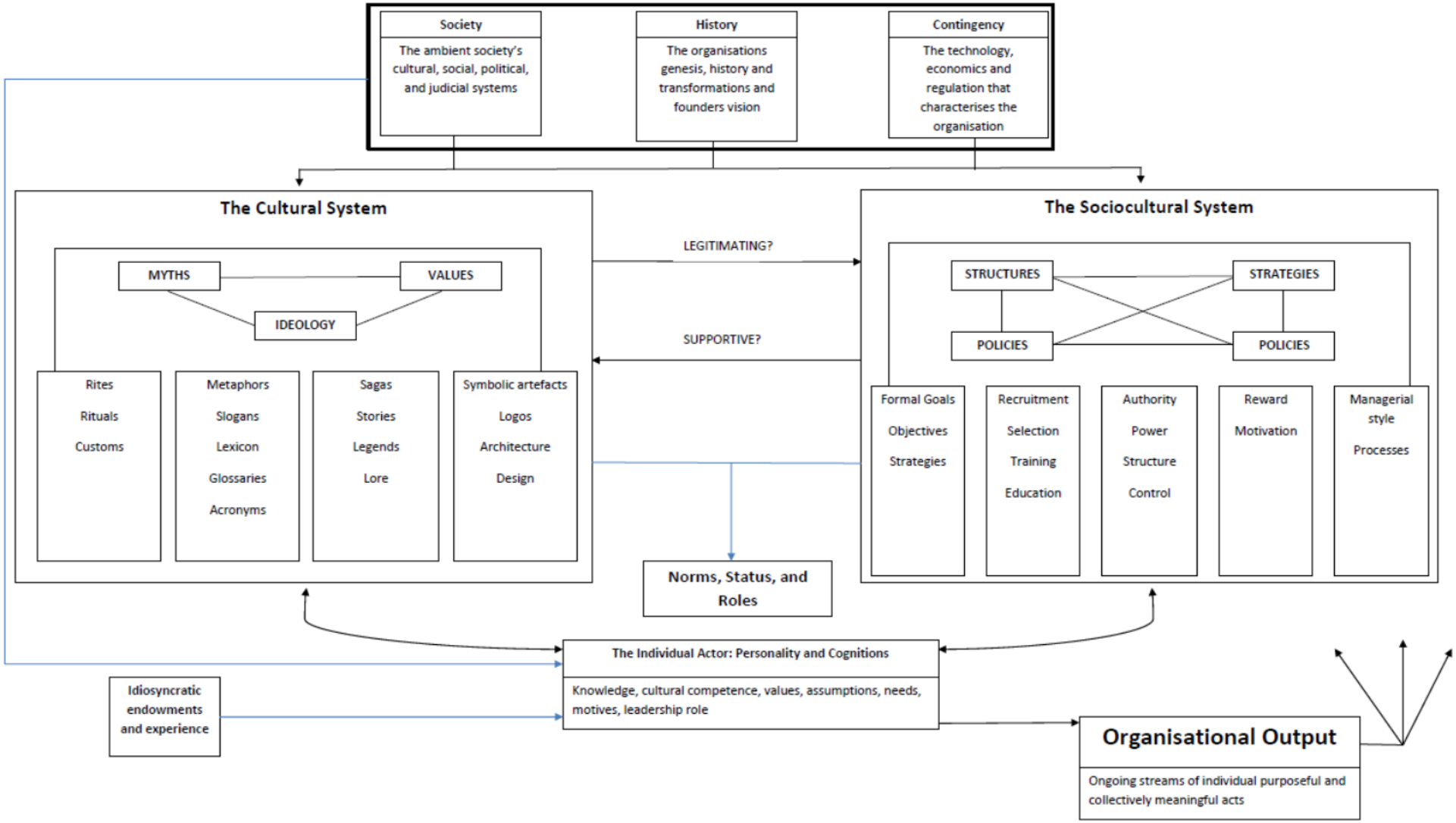
3.11 Chapter Summary

There is a wide variation in views relating to organisational culture, and indeed the broad and even contradictory nature of some views lead to confusion and the fragmented discourse outlined earlier. When examined together under the lens of cultural anthropology, some order can be applied to the examination

of these concepts. Rather than selectively applying elements that support particular arguments a whole sense of the concept of culture in an organisation can be considered. Culture needs to be considered both from an ideational and a social perspective. Dismissing one or another to varying degrees is to limit a complex and technical discussion on what can be an insightful and informative debate.

Such a framework is provided by Allaire and Firsirotu (1984) and is arguably one of the most encompassing of the views discussed to date. The framework allows the practitioner to consider change, its impact on the organisation and the consequences of that change on one or more influencing factors. In considering these relationships and interplays, effectiveness and efficiency can be protected.

Figure 3.5 A Conceptual Framework for Organisational Culture (Allaire and Firsirotu 1984)



Chapter 4 - Culture of Lean Organisations

Chapter Overview

Proponents of lean would argue that the philosophy will influence the cultural orientation of the organisation if successfully adopted. Senior figures within the cultural literature would argue the value system of an organisation is influenced by history, society, and lastly technology. Therefore, the intersection of these two literatures provides an interesting lens through which the implementation of such a technology can be examined. Chapter four explores the values that might be introduced into an organisation through the implementation of lean, some of the models through which they might be observed, and the potential impact of such an implementation. In addition, some challenges such an implementation might encounter are considered.

4.1 Chapter Introduction

This research is seeking to determine if there was a lean culture within the organisation prior to the formal implementation of lean. It also considers whether or not the pre-existing culture influenced the selection of the strategy and if the formal implementation delivered further change in the values of the organisation. To be able to do that we need to understand what is a lean culture, what are the dominant values in the culture, and how will lean influences the organisational culture. It has been argued that the success or failure of the implementation and the range of benefits associated with a successful implementation is directly influenced by the pre-existing culture within the organisation (Bessant, 1993). Lean has been shown to deliver improvement at a project or production level (Barth, 2021), however, the picture is less clear at an organisational or cultural level.

4.2 Quinn's Competing Values Framework

Culture, a hypothetical construct, a means of organising a set of beliefs or experiences within an organisation, is created as a result of its management systems, the values reinforced by the organisation, and the experiences of that organisation (Mann 2010). The foundation upon which the organisation is founded often has a strong influence on the prevailing values within the organisation (Child 1987). The strategic focus of the organisation in addition to structures chosen to deliver the tasks of the organisation is established at this point and this continues to influence the prevailing culture within the organisation long after the original conception. A set of values and norms are established at this point that goes on to provide the core influence on the organisation's design going forward. To understand the impact of this set of values that underlies the culture of the organisation on the implementation of a technology such as lean and the benefits the organisation is likely to realise it is necessary to first understand the orientation of these values prior to such an implementation. Secondly, in order to establish the success or failure of such an implementation, it is necessary to determine the order of movement within that set of values.

One established means of examining such a set of core values is Quinn's competing values model (Quinn, 1983). The model, originally designed to determine organisational effectiveness through the examination of three value dimensions, control/flexibility, internal/external, means/end, was designed employing a two-stage study examining the criteria that a selected panel of experts used to evaluate the effectiveness of organisations.

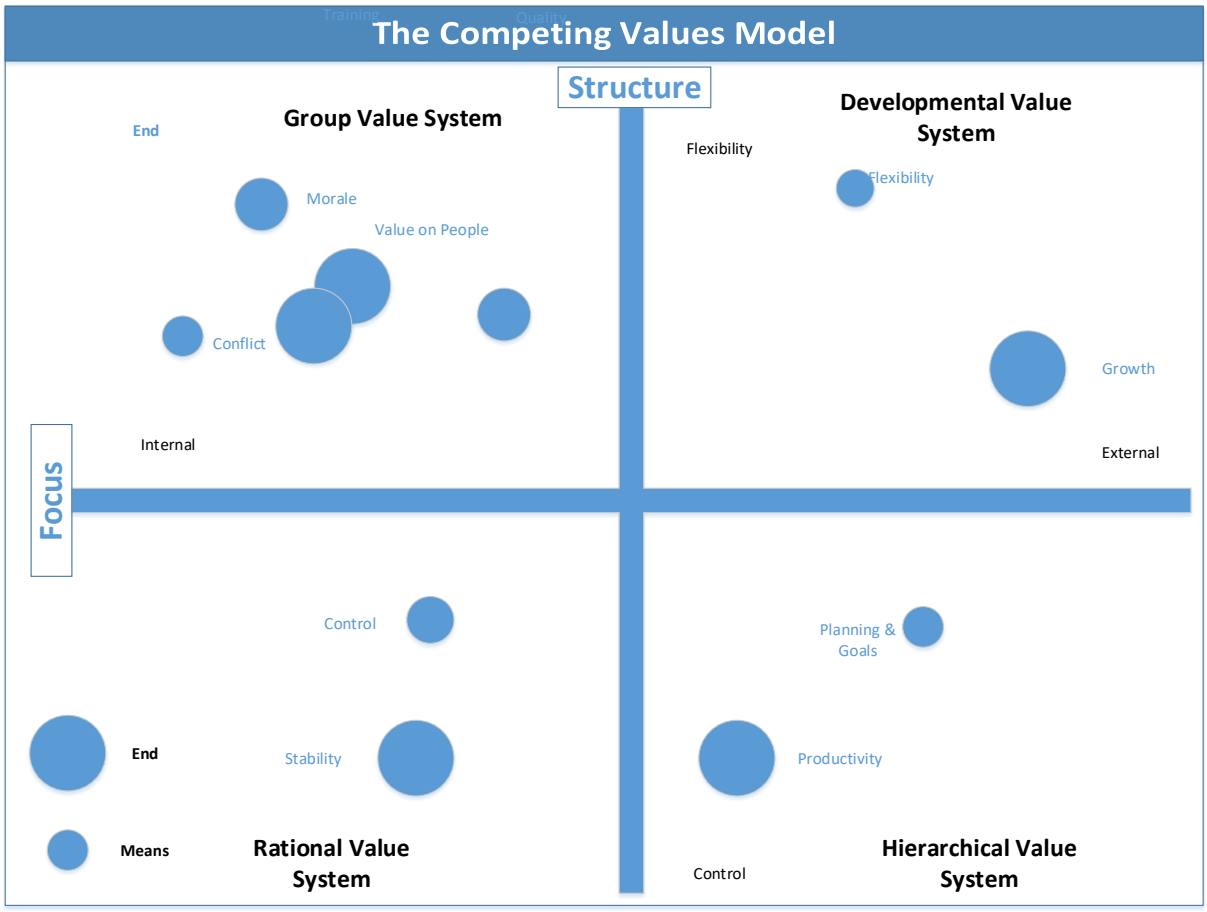


Figure 4.1 Quinn's Competing Values Model (Quinn, 1983)

It was later argued that Quinn's model could be used to examine the core values of an organisation that influenced the prevailing culture (Zammuto and O'Connor 1992). Quinn's model is in general consensus with the established culture literature identifying a number of competing value systems leading to the creation of an overall prevailing culture within the organisation. Quinn identifies four value systems:

1. The **group value system** with core values of tradition, trust, and long-term commitment to the organisation leading to a focus on the development of human resources and participative decision making by all staff.
2. The **developmental value system** has a strong ideological focus on the task being undertaken by the organisation and a strong emphasis on the growth of the business.
3. The **hierarchical value system** has a strong focus on bureaucracy with the role of a fixed job description, internal procedures, and regulations largely influencing the culture of the organisation.
4. The **rational value system** has a strong focus on the core values of achievement and reward for performance leading to the delivery of the organisation's goals and objectives.

An extensive survey-based examination of the competing value systems within 332 colleges demonstrated that the flexibility-control dimension of the model was correlated with aspects of the organisation's control and coordination (Zammuto and O'Connor 1992).

Group and developmental value scores were negatively correlated with:

1. Long term planning
2. Formalisation
3. Aspects of hierarchical coordination
4. Control systems

Hierarchical and rational value scores were positively correlated with:

1. Formalisation
2. Long term planning
3. Centralisation

In addition to these aspects, it was also established that larger organisations were more likely to be focused on control and planning reducing flexibility across the organisation. With centralisation in multi-location

organisations come narrower job roles and reduced flexibility within such roles leading to less opportunity for implementation of the necessary flexibility for the implementation of technologies such as lean.

To establish evaluating criteria for his competing values model Quinn applied a number of rules to previously identified criteria used in the evaluation of effectiveness and culture. Only criteria that were on an organisational level of analysis, singular in form as opposed to composite criteria, a particular operationalisation as opposed to a construct and criteria of effectiveness as opposed to performance were used. When the participant's assessment of the criteria was evaluated using a form of factor analysis three dimensions of control-flexibility, internal-eternal, and means-end emerged which are graphically represented in Figure 4.2 below.

In the simplified model provided in Figure 4.2 below the division between the values related to control and those related to flexibility now become clear allowing us to consider their presence within an organisation proposing to implement a change initiative. Whilst internal versus external considerations are worth considering in the assessment of the organisation to understand the degree of leanness in the organisational culture with an external focus being more associated with lean, there is less benefit in the assessment of Ends and Means. Whilst planning may be a means and efficiency may be an end, the propensity to plan is in itself a value and a drive to deliver efficiency is also a value, therefore for this assessment, there is little advantage in considering means versus ends.

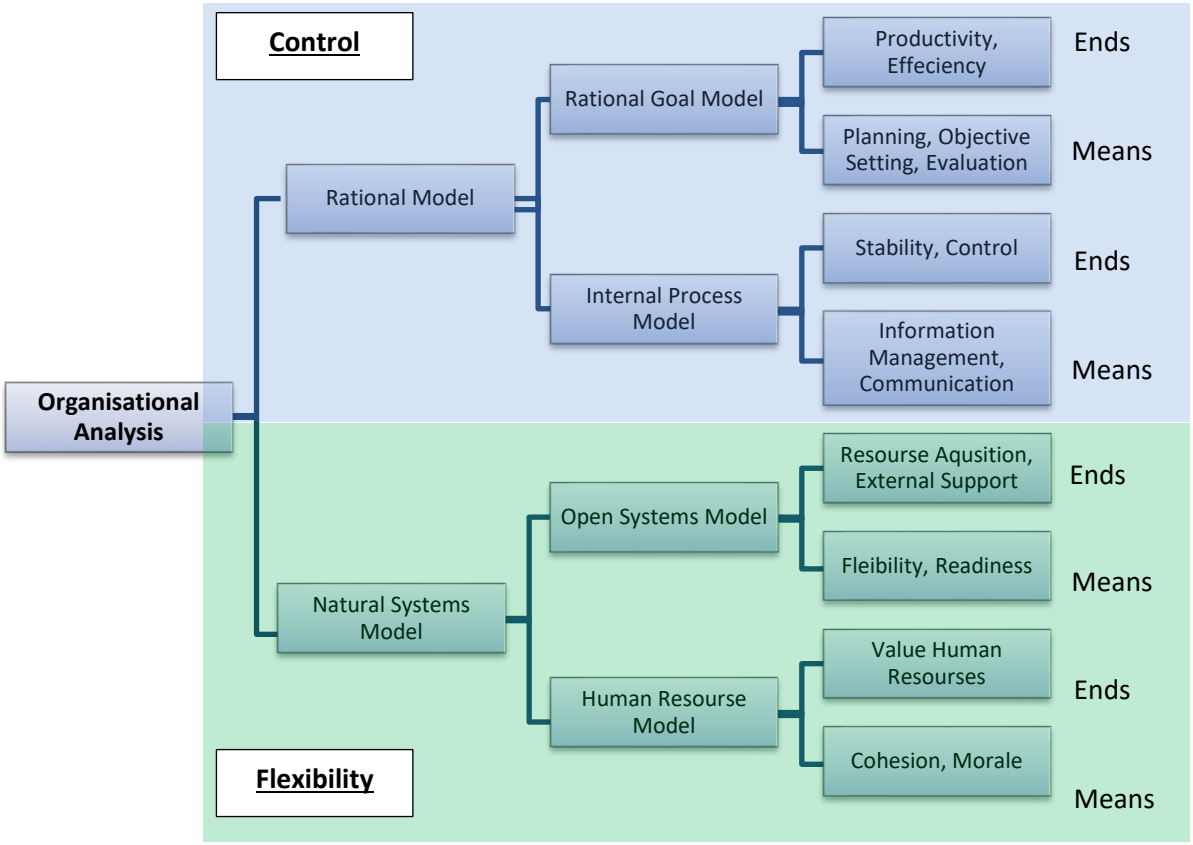


Figure 4.2 Simplified Model of Control versus Flexibility (Quinn et al,. 1983)

Organisations with control orientated value systems and mechanistic structures are likely to experience significant resistance in the implementation of a flexible orientated strategy such as lean and other advanced manufacturing technologies (AMT) (Zammuto et al., 1992). Organisations with flexible orientated value systems and organic structures are more likely to benefit from the full range of benefits associated with the implementation of the AMT at the earliest point in the implementation. Raymond Zammuto and Edward O'Connor hypothesized in their 1992 paper reviewing existing literature on the outcomes experienced by organisations that adopted AMTs that the more control orientated the organisation's value system was, the more likely the implementation initiative would fail.

In the event of low levels of congruence between the existing values within the organisation and that of the proposed strategy, the practicality of altering the core values of the organisation to achieve greater congruence will be challenging. The core values of the organisation, those engrained within the people that

have been part of the organisation since the time of foundation, and those that have been continually reinforced over time by the leadership of the organisation are difficult to alter in advance of an implementation process. The time, effort, and resources involved in such a change process and the practicality of delivering such a change in core values in advance of an implementation phase for a major new strategy are challenging. However, should there be a congruent value structure pre-existing, then the benefits may be significant.

4.3 Culture, Structure, and Lean

The challenge of implementing a technology to deliver both productivity and flexibility begins to become apparent in the analysis of the core competing values within an organisation and ironically it may also be argued that a stronger unitary culture may be an impeding factor in the implementation of such (Canato and Ravasi 2013).

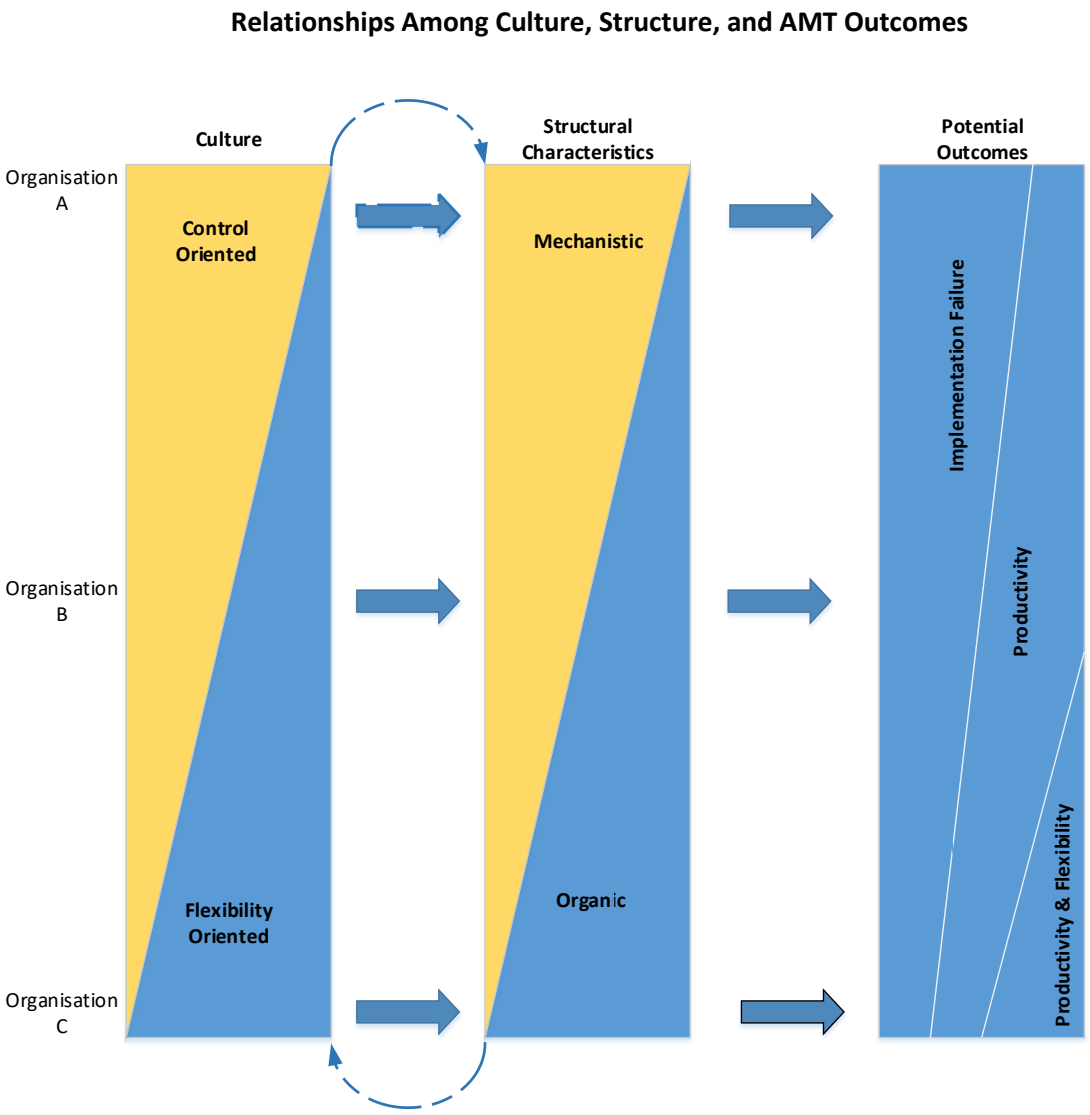


Figure 4.2 Predicted outcomes of AMT implementations for three organisations (Zammuto and O'Connor 1992)

The established model would predict that an organisation with a strong unitary control-oriented culture employing a mechanistic structure will struggle to gain traction in the implementation of an advanced manufacturing technology seeking to deliver both productivity and flexibility with the most likely outcome to be a failure. In the event of success, the control orientation will prevent the realisation of the flexibility benefits of the technology and the organisation is only likely to realise some productivity gains at best.

As the competing values within the organisation become less unitary and the influence of a flexible orientation begins to become more dominant the likelihood of a successful implementation becomes more probable (Quinn, 1983). Productivity gains will be delivered in over 50% of the cases and the possibility of realising some flexibility as a result of the implementation becomes a realistic possibility. The organic structures within the organisation, while coexisting with some of the more mechanistic elements enable the delivery of the implementation delivery both productivity and some flexibility.

Lean has been adopted and abandoned by organisations across the world with successful implementations rates running at a dismal ten per cent (Bhasin and Burcher 2006). Questions are continually raised on the applicability of lean outside the Japanese culture in which it has evolved (Kadri 2010). Often seen as a panacea to deliver short term gains and bottom-line savings, many implementations are doomed to failure before they get off the ground (Soriano-Meier and Forrester 2002). While lean can strategically be quite a formidable weapon if applied as intended on a strong base or philosophy of driving out waste and delivering customer value if only applied as a set of tools or competencies it will fizzle out much like the rest of the 90% failing to achieve a sustainable implementation.

While many of the seminal texts relating to lean such as Ohno's The Toyota Production System, Womack and Jones's Lean Thinking, and The Machine That Changed The World fail to specifically reference the criticality of establishing a positive culture in which to establish lean. All do focus on the criticality of complete buy-in by the organisation, the importance of establishing core values as well as core competencies, and the significance of strong effective leadership, otherwise known as the "philosophy" of lean. Today the sustained success of some of the leading organisations in the world is more based on the internal values within that organisation than the market forces impacting the organisation (Cameron and Quinn 2006). It is less to do with the competitive advantage of the organisation described by Porter and more to do with the personal beliefs of the leadership. The vision and philosophy of the organisation as outlined and created by its senior managers are becoming more and more important to the sustained performance of the organisation.

While the strong unitary culture associated with Toyota could well have impeded the establishment of an adaptive evolving and ever-changing continuous improvement process, it would seem that this strong culture of focusing on improvement has facilitated the implementation and sustainability of the model (Badurdeen, Wijekoon et al. 2011). The origins of the Toyota culture to drive improvement, develop people, and equality within the workforce along with a focus on empowering people is deeply rooted in Japanese philosophies and work practices.

4.4 Evolution of Quality Culture

Lean is a set of management and manufacturing philosophies and concepts that have the same origin as total quality management (Dahlgaard and Dahlgaard-Park 2006). The principles, concepts, and tools of lean should not be seen as alternatives to TQM but rather as a collection of concepts and tools which support the overall principles and aims of TQM.

TQM is aimed at changing corporate culture from passive and defensive to pro-active and open, where basic principles of increased customer satisfaction, continuous improvement, and everybody's participation are applied everywhere in the organisation (Dahlgaard and Dahlgaard-Park 2006). It has been seen to have a positive influence on the performance of the host organisation leading to increased value to the customer, reduced defects, and greater profitability for the organisation (Prajogo and McDermott 2005). One of the key leading determinants in the successful adoption of TQM is the organisational culture within which it is applied.

There are two broad competing schools of thought to the most appropriate organisational culture on which to base a successful implementation of TQM (Prajogo and McDermott 2005). The first view would be that the successful implementation of TQM should be based on a singular unitary homogenous culture which can facilitate the implementation organisation-wide through a singular set of practices that promote the

concepts of TQM across the organisation. A culture of flexibility and people-orientation would be the most conducive to such an implementation. This view would also consider TQM as a unidimensional set of practices that require to be implemented as a whole and would benefit from the unitary culture within an organisation.

The second school of thought, the pluralist view, would consider the existence of numerous subcultures as the antecedent to the successful implementation of a sustainable TQM model (Dahlgaard and Dahlgaard-Park 2006). The combination of various cultural dimensions including people-orientation and flexibility, but also proposing control and standardisation will allow the adoption of TQM across the organisation in a more effective manner depending on the subculture of the department or area of the business. TQM practices within a pharmaceutical enterprise may differ very significantly in the research and development department as opposed to the manufacturing department.

External factors such as the type of market sector in which the organisation operates will have a bearing on the tendency towards control and standardisation as opposed to the more dynamic approach (Prajogo and McDermott 2005). Much like lean, however, there is less agreement as to whether organisational culture is an antecedent to the implementation of TQM, or indeed that TQM in itself is a vehicle that can promote organisational change including the cultural element.

4.5 Lean Philosophy

There is relative agreement across the literature that lean manufacturing is a philosophy or a culture as opposed to a set of tools to deliver efficiencies. It can only be adopted if there is a complete commitment from the board room to the shop floor in delivering the concepts of lean (Bhasin and Burcher 2006). These concepts would include; Continuous improvement/kaizen; Cellular manufacturing; Kanban; Single-piece flow needs to be in operation; Process mapping exercise is required; Single minute exchange of dies (SMED);

Step change/kaikaku; Supplier development; Supplier base reduction; Five S and general visual management; Total productive maintenance (TPM); Value and the seven wastes.

While many of the core competencies associated with the concepts above can be delivered through a number of days or weeks of training, only through providing this training and involvement throughout the organisation can there be any hope of implementing the lean philosophy in a sustainable manner (Dahlgaard and Dahlgaard-Park 2006). A lean philosophy not only involves providing the people within the organisation with the competencies to deliver these concepts, but it is also critical to involve the entire organisation, ask everyone involved in the delivery of the business for their views, and take these views into account when planning the next stages in the process.

Early concepts of lean focused on achieving more output with the same or fewer inputs and looking at the most economical way of delivering a process (Dahlgaard and Dahlgaard-Park 2006). This largely involved the removal of waste or “muda” as it was known in Japan. In the early nineteen fifties, Toyota adopted six sigma as a statistical means of reducing variance, improving quality, and removing waste, all promoting the concepts of removing “muda” from the process. While Eiji Toyoda had spent time in the US observing mass manufacturing, he was of the view that Japan was much too poor to allow the endless waste associated with the processes being an employer in the US to go unaddressed. He went about addressing these inefficiencies in the mass manufacturing process by assembling teams of workers to remove the waste within the business, the roles and responsibilities of these teams soon increased to take on other roles including the delivery of 5S projects and housekeeping roles.

Another key concept of the lean philosophy is Kanban or just in time manufacturing (Dahlgaard and Dahlgaard-Park 2006). By organising the workflow through the process there is a reduced need to hold large stocks of inventory to allow the process to operate efficiently. By smoothing out the workflow patterns the throughput and efficiency of manufacturing can be levelled out and improved. There is a much less requirement to store and hold large inventories taking up space and generating waste.

Initially, these concepts of teamwork, removing waste, and just in time manufacturing were unpopular in Toyota. The philosophy struggled to gain a foothold in a market dominated by mass production. However, towards the end of the nineteen fifties as Toyota's production ramped up there was a significant decline in quality, and when coupled with the forced relaxation in trade agreements by the Japanese government this spelt significant problems for the leading Japanese car manufacturer.

Toyota described its founding iteration of this manufacturing philosophy as the Toyota Production System (TPS), a total management system not unlike the total quality management (TQM) system (Noronha 2002). It was built on the foundations of a pre-existing quality-focused culture within the organisation and the reason many organisations are unable to replicate the successes of Toyota is that many are only focused on the tools associated with quality, lean, and six sigma, as opposed to the culture of being customer, focused and eliminating non-value-adding activities across the business (Liker 2004). Much later, in the nineteen nighties as the TPS had developed into a complete and detailed philosophy addressing all aspects of manufacturing and management of the Toyota organisation the term 'lean' was coined by Womack and Jones in their book The Machine that Changed the World describing the Toyota philosophy (James P. Womack 1990).

4.6 Toyota Culture

Despite its current size the Toyota culture is still significantly influenced by the Toyoda family (Liker 2004). The challenges that the organisation has faced over the years is part of the culture associated with continually seeking out ways of improving processes. The evolution of the Toyota production system has occurred over decades of trial and error but always learning from those errors.

There is clear unitary strength in the Toyota culture with a concise and transparent value system in the organisation (Liker 2004). There is a clear and consistent sense of purpose focusing on the customer and

his needs. This is continually communicated to everyone within the organisation. The people that work for Toyota have a sense that the work that is been carried out is more than just about the pay check, it is about creating a sustainable future for the organisation so that it can continue to do what it is doing. To create a sustainable future for the organisation it is understood by the people within the organisation that the correct thing will need to be consistently delivered to the customer. Understanding and delivering to the customer is key to the success of the organisation.

This success can only be delivered if the proposition of the organisation is clearly understood by people who need to deliver it. The 4 P model of problem-solving, people, and process are all built on a base of philosophy. There are two significant risks associated with not addressing the cultural aspect of a lean or quality implementation within an organisation; by avoiding addressing the culture within the organisation the opportunity to harness the positive influence being generated by such is missed; in failing to address the cultural aspects the negative influence of the culture becomes a barrier to the successful implementation (Bhasin 2013).

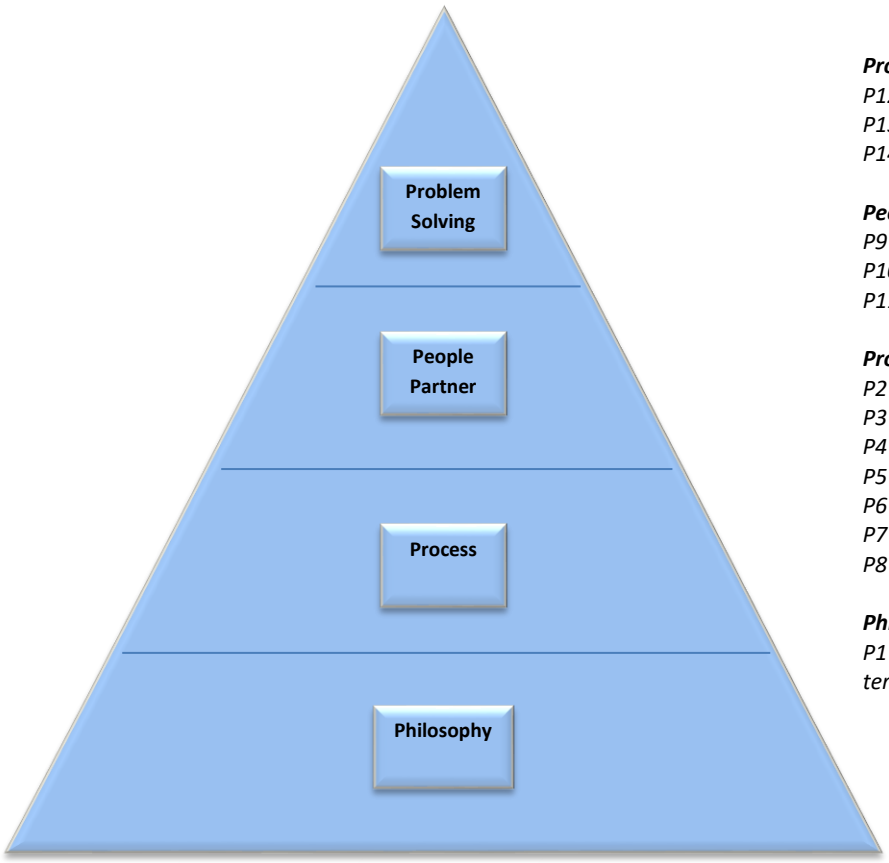


Figure 4.3 4P Model of the Toyota Way (Liker, 2004)

This philosophy of attacking waste, driving quality, and ensuring customer satisfaction can only be delivered if the corporate culture within the organisation is aligned with the lean principles described above in the 4P model (Bhasin and Burcher 2006). The cultural factors within the organisation that need to be addressed would be:

- Make decisions at the lowest level assessed by the number of organisational levels.
- Have a definite clarity of vision; an indication of what the organisation believes it will look like once the transformation is complete.
- Ensure that there is a strategy of change whereby the organisation communicates how the goals will be achieved.
- Assign responsibilities within the pilot programme initially and ultimately within the whole organisation whereby it is also evident who is championing the programme.

- Develop supplier relationships based on mutual trust and commitment; this
- Nurture a learning environment for which indices such as, training hours/employee, can provide an approximate barometer.
- Systematically and continuously focus on the customer;
- Promote lean leadership at all levels observed by the number of lean metrics at all levels.
- Maintain the challenge of existing processes through, e.g. number of repeat problems and customer assistance to suppliers.
- Make a conscientious effort to maximise stability in a changing environment whereby an attempt is made to reduce costs
- Assess the fraction of an organisation's employees operating under lean conditions.
- Observe the proportion of an organisation's departments pursuing lean.
- Lean requires a long-term commitment. A medium-sized company would need a minimum of three to five years to start pursuing the lean philosophy.

(Bhasin and Burcher 2006)

4.7 Culture in SMEs

Organisational culture, traditionally identified as something of a corporate construct, is mostly concerned within much of the existing literature, on the existence of culture and subcultures within large organisations. Studies such as that of Hofestede's (2001) reviewed earlier, discusses the organisational culture within IBM, across 66 countries, and 88,000 people. A review of journal articles on a major online database between 1995 and 1998 revealed 200 articles related to corporate culture and not one single reference to "SME" within any of those articles (Choueke 2000).

There are two major challenges associated with establishing and discussing the culture of organisations within the SME sector; the lack of an agreed international definition of an SME; and the wide range between smaller organisations that may have as few as nine employees and larger SMEs that may have up to two hundred and fifty (Choueke 2000).

Within Ireland, the statutory organisation representing SMEs, Enterprise Ireland, define SMEs as organisations with up to two hundred and forty-nine people employed and a turnover of fewer than fifty million euros (www.enterprise-ireland.com). In the UK, the Companies Act of 1985 dictates that an SME must be an organisation that has less than two hundred and fifty employees and a turnover of fewer than eleven million pounds (www.nationalarchives.gov.uk). The EU definition differs further in terms of turnover at less than forty million euros (www.ec.europa.eu).

The definitions of organisational culture discussed in the literature and explored in previous chapters are numerous and wide-ranging. The basic principles, however, of a shared set of values or beliefs (Ulrich, Allen et al. 2009) or “the way things are done around here” (Mann 2010), are common across all theories. Therefore the existence of a prevailing culture within any organisation, independent of its size, is equally valid. Furthermore, the shared values and beliefs within an organisation, again independent of its size, are equally important to the long term effectiveness of that organisation (Kyriakidou and Gore 2005).

SMEs operate in every country across a wide spectrum of sectors. The climate or sector in which the SME operates may have an influence on the culture or shared values that exist within the organisation, however, there is little agreement on the environmental contingences that directly impact culture (Kyriakidou and Gore 2005).

Whilst there is limited peer-reviewed literature relating to a prevailing culture in SMEs published to date, there has been some interesting research benchmarking some of the top-performing SMEs in the UK (Kyriakidou and Gore 2005). This research considered small and medium-sized businesses in the leisure and hospitality sector including hotels, restaurants, pubs, and visitor attractions.

As part of a Government-led focus on the competitiveness of SMEs in the hospitality sector in the UK, the impact of 'human capital' on the performance of these businesses was accessed. There was an effort to establish a benchmark that could be transferred across the sector to aid competitiveness. The research takes cognisance of the fact that an organisations culture is something of a specific paradigm made up of a unique collection of values and beliefs that cannot be easily transferred to other organisations. It also considers, however, that by benchmarking some of the top-performing organisations, understanding any commonalties across the organisations, that some of the learning or best practices could be established and transferred to others. The overall purpose of the research was to establish qualitatively the relationship between culture and performance of the sample SMEs.

A total of 94 SME organisations were considered in the research by selecting top-performing, information-rich, and cooperative organisations. 89 of these organisations agreed to participate in the research. The sample organisations employed between 20 and 200 people, and a semi-structured interview was used as the basis of the culture assessment. Each organisation was individually visited and interviews were conducted with owners, directors, and staff.

There were cultural commonalities in terms of shared values and beliefs established across the sample. The prevailing culture identified included a commitment to support employee involvement in achieving the organisation's objectives and planning for the future, promotion of both individual and organisational learning, and commitment to sharing information across all levels within the organisation.

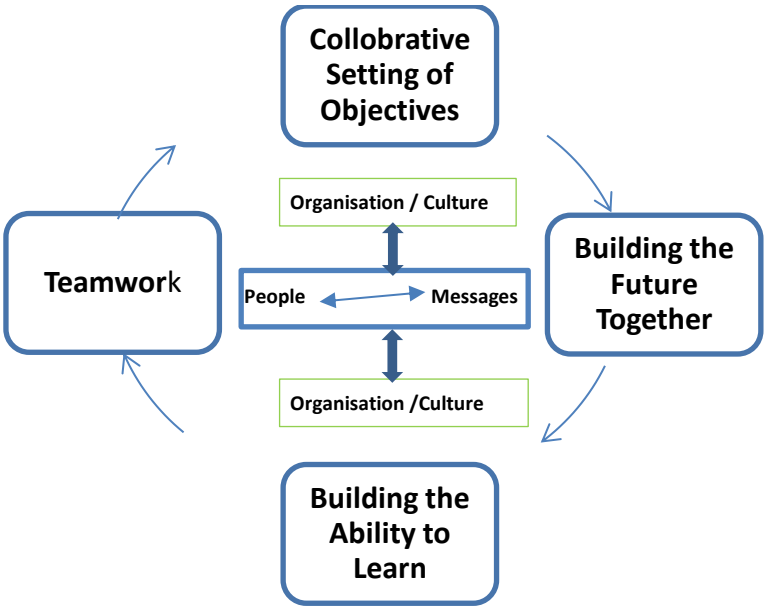


Figure 4.5. Prevailing SME Culture (Kyriakidou and Gore 2005)

The presence of open communications between staff and management was established across the top performers. Interaction between the entire team and a collaborative approach on the set of strategies, measuring performance, and providing feedback on objectives set resulted in a positive culture being established. The relative absence of complex hierarchical structures may have aided this open communication.

The ability of successful SME's to communicate the 'bigger picture' and link the individual development with the organisation's development was also identified as a prevailing commonality. By clearly linking the individual's development with the performance of the organisation there was a clear and singular objective that benefited both parties.

While there has been relatively little research relating to the prevailing culture in SMEs, there has been somewhat less on the impact of lean implementation on that culture. Much of the research to date has focused on the implementation of lean in large organisations such as Toyota, General Electric, and many other large but lesser-known examples.

Corporate culture in large multinational organisations has been classified into three main perspectives (Meyerson, 1987):

1. **The Integration Perspective**: consistency across the organisation, everyone understands and there is consensus on all aspects of the organisation's values, beliefs and behaviours
2. **The Differentiation Perspective:** many subcultures are co-existing in harmony across the organisation holding a shared and singular overall set of values
3. **The Fragmentation Perspective:** there is only a random culture existing based on issue-specific events.

Based on the research to date relating to the prevailing culture within SMEs, it would seem that it would largely fall into the first of the three perspective groupings espoused by authors such as; Schein, 1991; Barley, 1983; Deal and Kennedy, 1982; Peters and Waterman, 1982.

Theories that would form part of the Integration Perspective group would take the view that there should be a singularly strong and desirable culture across the organisation, with consistent formal and informal practices, beliefs, norms and attitudes across the organisation. The members of the organisation would share the same values promoting a shared sense of loyalty and commitment, and any deviation from these values would be seen as weak or negative behaviour (Choueke 2000).

This would link quite closely that the prevailing culture in SMEs has been identified as having a strong singular vision, with clear bottom-up and top-down communication, a clear commitment to a shared future, and a drive to deliver customer satisfaction through building an ability to learn (Kyriakidou and Gore 2005).

This cultural classification of the SME aligns closely with some of the earlier discussions concerning the implementation of lean in large organisations we can start to identify some of the changes we might anticipate in the prevailing culture with the delivery of lean. Liker identified the 4 P Model of classifying the philosophy required to deliver a lean organisation in the form of the Toyota Way. The 4 P Model grouped

the 14 values, tasks, and actions associated with lean in four simple groups; problem-solving, people, process, and philosophy.

As we compare the prevailing culture in successful SMEs across the UK, and Fig. 2 which identifies the philosophy or culture anticipated with the implementation of lean, similarities and links can be established.

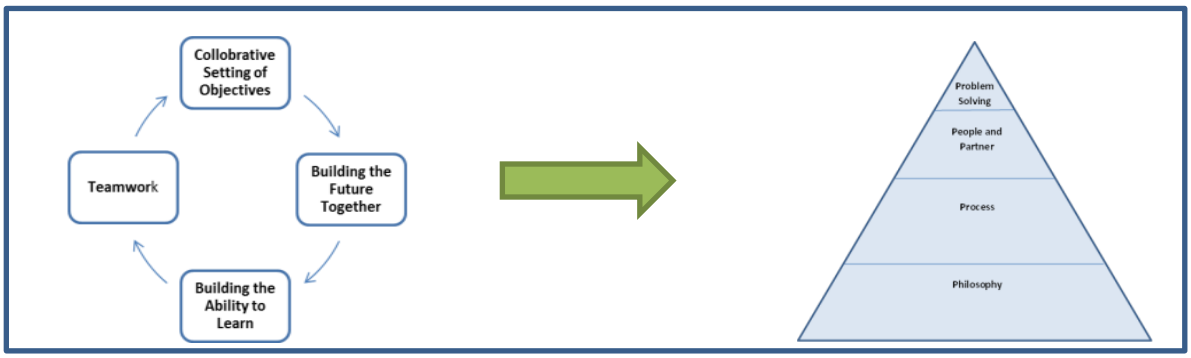


Figure 4.6 Traditional SME Culture versus The Toyota Way Philosophy (Achanga et al. 2006)

SME Culture		Lean Culture
Collaborative Setting of Objectives	→	**Process**
Teamwork	→	**People and Partner**
Building Ability to Learn	→	**Problem Solving**
Building the Future Together	→	**Philosophy**

Unfortunately, the adoption of lean across the SME sector has been sporadic at best, and therefore the research related to the influence of the implementation of lean on the culture within SME organisations is limited (Achanga, Shehab et al. 2006). One such study went about reviewing the implementation of lean across ten SMEs in the UK, and endeavouring to identify the critical success factors associated with the implementation. Organisational culture in addition to leadership, skills, and finance were identified as the main critical success factors. Factors such as innovation, respect for people, attention to detail, team

orientation should increase whilst factors such as stability, results orientation, and aggressiveness should be seen to decrease.

A supportive organisational culture with a proactive improvement policy of driving efficiencies was identified as critical for the successful implementation of lean with clear effective communication channels. The organisation needs to be focused on the longer-term success of the organisation, with a willingness to adopt change and deliver what is required by the customer.

4.8 Lean Culture in SME's

It could therefore be considered that the prevailing culture within successful SMEs of a collaborative, focus on teamwork, and clear communication, is strikingly similar to that identified as the culture synonymous with the successful implementation of lean in SMEs.

It could also be considered that the existing prevailing culture in effective SME organisations largely holds all of the required constituent parts for the successful implementation of lean already. This may not be all that surprising as larger organisations are somewhat trying to recreate the small organisation idea of a fully integrated 'front of house' and 'back office' service, to provide the customer with the requisite product without any of the bureaucracy or waste. Therefore the implementation of lean in SMEs that have an effective established positive culture need not focus on changing the prevailing culture but enhancing and strengthening what already exists and reinforcing the areas synonymous with lean.

The established model would predict that an organisation with a strong unitary control-oriented culture employing a mechanistic structure will struggle to gain traction in the implementation of an advanced manufacturing technology seeking to deliver both productivity and flexibility with the most likely outcome to be a failure. In the event of success, the control orientation will prevent the realisation of the flexibility benefits of the technology and the organisation is only likely to realise some productivity gains at best.

As the competing values within the organisation become less unitary and the influence of a flexible orientation begins to become more dominant the likelihood of a successful implementation becomes more probable. Productivity gains will be delivered in over 50% of the cases and the possibility of realising some flexibility as a result of the implementation becomes a realistic possibility. The organic structures within the organisation, while coexisting with some of the more mechanistic elements enable the delivery of the

In cases of determined implementation of a poorly fitting strategy, such as that of lean management systems into an organisation with a control-oriented culture, the tension between the competing value systems can only coexist for a definitive time (Canato and Ravasi 2013). The result of such a determined implementation can only be an adaption of the new strategy and an altering of the core values of the organisation or a failure of the implementation and a return to the pe-existing state. As the predictive model indicates above, the likely outcome will be that of failure of the implementation. However, in some instances, cases of adaption of the core values of the organisation to that of the proposed strategy have been realised through such a determined implementation deriving much if not all of the benefits associated with the strategy. This adoption of the proposed strategy often differs from that of a traditional implementation in its fidelity to the originally proposed strategy. While the implementation results in an altering of the core values of the organisation, the dominant pre-existing values within the organisation will result in the altering of the proposed strategy to one that fits within the organisation, often moving away from the traditional templates of the strategy.

The relative level of change from the traditional template of the strategy will be determined by the level of acceptance of the adapter and its congruence with existing core values (Ansari, Fiss et al. 2010). The implementation itself, in addition to the template for the strategy, may be altered to make the acceptance more palatable by the adapter leading to a diffusion of the strategy creating a local context.

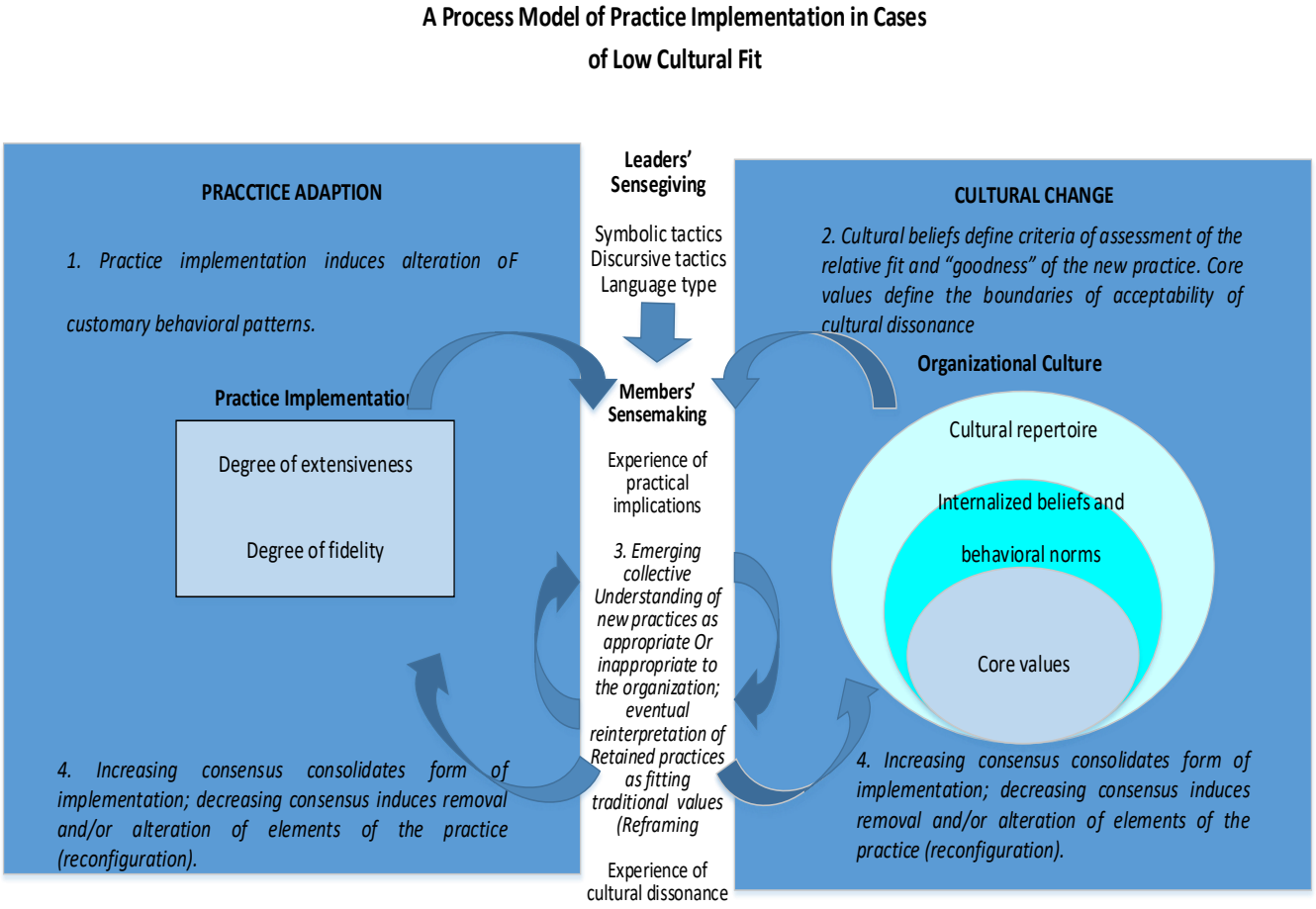


Figure 4.7 A Process Model of Practice Implementation in Cases of Low Cultural Fit (Canato and Ravasi 2013)

4.9 Chapter Summary

A lean culture will have a strong focus on factors such as innovation, respect for people, attention to detail, team orientation whilst factors such as stability, results orientation, and aggressiveness should be less prevalent. Some of the more contemporary research on organisational culture would argue that while there may be a hierarchy of values within a repertoire that creates a specific organisational culture, there are elements or specific values within that repertoire that will be less accepted by the general population of the organisation than others (Canato and Ravasi 2013). Individuals may accept elements of the combined culture of the organisation without having deeply engrained or emotion-laden beliefs that will motivate a strong reaction.

The adoption of a new strategy may require the altering of this system of core values to realise new work practices, deliver change, and create more flexibility. This may provoke conflict with an element of the existing culture (Canato and Ravasi 2013). The management and leaders of an organisation can influence this change; however, there may be elements of the population within the organisation that will respond by altering their approaches ceremonially only, as opposed to embracing the strategy in its entirety. The outcome of this tension between the pre-existing culture of the organisation and the level of change that is realised by virtue of the implementation of lean will be a real measure of the success of the adoption.

Chapter 5 - Research Methodology

Chapter Overview

Chapter five explores the basis of the proposed methodologies adopted to examine the implementation of the lean philosophy. The research is conducted in two phases, the first being the evolution of the culture within the organisation as it moved slowly towards the adoption of lean, and secondly, the value structure in the organisation as lean was implemented. A combination of qualitative and quantitative methods combines Quinn's competing values model and O'Reilly's organisational culture profile model. This allows the researcher to delve into the history of the organisation, providing a fuller picture of how it evolved, and ultimately documenting how the implementation of the philosophy impacted the value structure within the organisation.

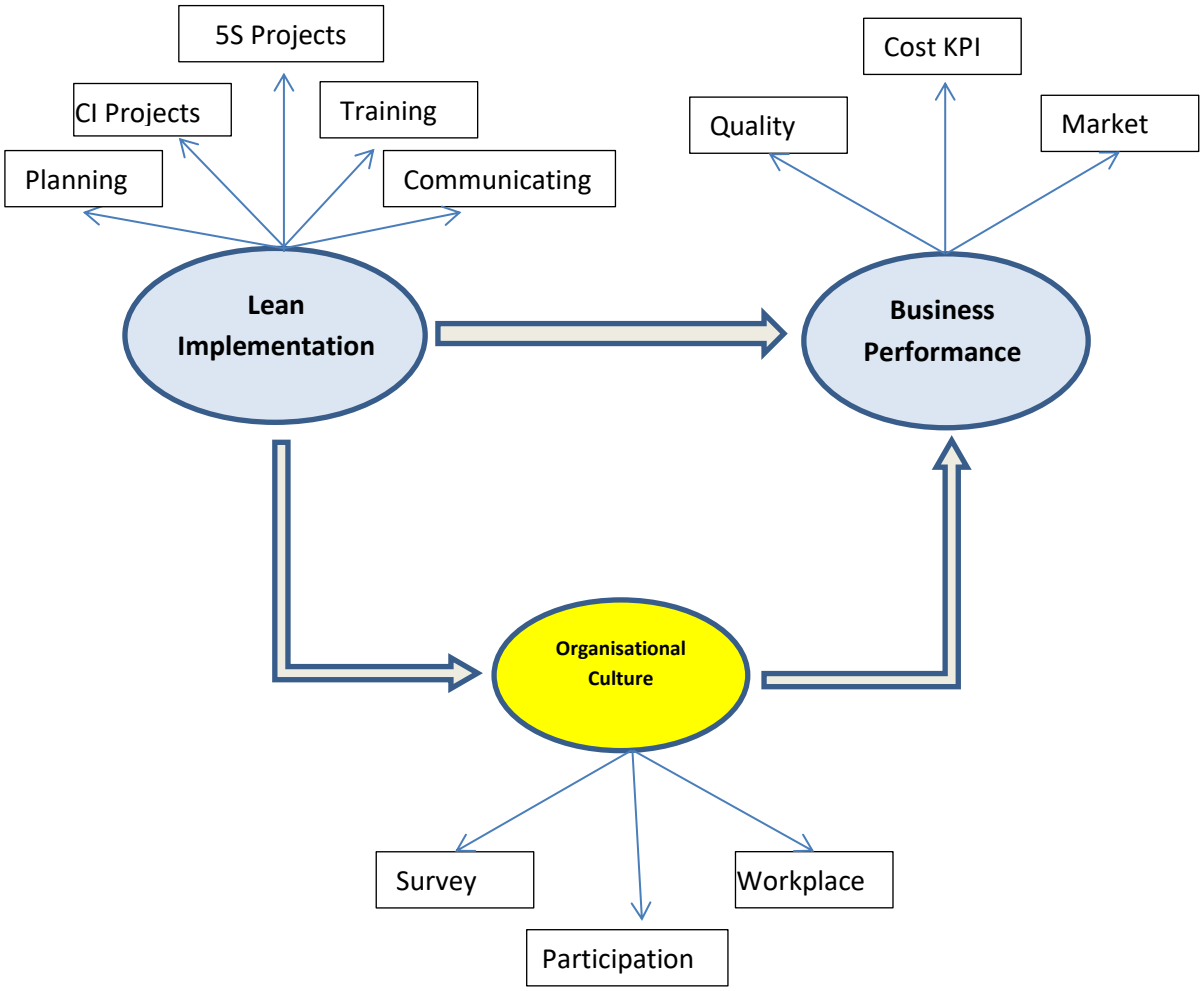
5.1 Chapter Introduction

The research will effectively use a combination of three methodologies to explore the data and propositions put forward to address the research questions. A simple case study will examine the implementation of lean and determine if lean has been successfully introduced into the organisation. Without this preliminary assessment, further assessment of the cultural change would be pointless. Phase one of the research will then qualitatively assess historic organisational data using Quinn's competing values model whilst phase two will quantitatively assess survey data from the lean implementation using O'Reilly's occupational culture profile model.

5.2 Research Structure

To fully understand the research design it is first necessary to understand the lean implementation programme to be delivered in the organisation. The organisation sought to adopt Kaplan's Balanced scorecard to bring order around how lean would be introduced into the organisation (Robert S. Kaplan, 1996). The measurement of multiple factors in evaluating the performance of an organisation has provided the opportunity to evaluate performance on a more holistic basis. Both short term and longer-term indicators are taken into account to provide a balanced view of the direction of the business. Kaplan and Norton would suggest that there is a combination of financial and non-financial, long term and short term, and leading and lagging indicators required to evaluate the performance on an ongoing basis. It is suggested that indicators should consider four perspectives within the business; financial, customer, internal and innovation and learning perspectives. These perspectives should be aligned with the vision and strategy of the organisation.

The measurement of the lean implementation is critical to the success and the ultimate delivery of the desired lean state. Lean is a desired state that may never be fully realised, it is, therefore, critical to have the appropriate indicators necessary to guide on the path to that destination. Indicators may not necessarily be absolute values but rather directions in which we are endeavouring to proceed.



The performance of lean can be seen as the attainment, or part attainment of the principles above, delivering cost reductions, cross-functional teams, elimination of waste, and zero defects. The determinants are the steps taken to achieve this performance such as the training, communicating, putting in place communication systems (Karlsson and Åhlström 1996). The idea of delivering a lean implementation program without understanding the impacts of each step is similar to flying an aeroplane

on one instrument. These KPIs were monitored by the organisation and demonstrated acceptable levels of increases to determine that lean was indeed successfully implemented from an operational perspective. A summary of these performance indicators will be presented as a case study in chapter six. This allows us to consider the impact of the lean implementation on the culture of the organisation and the research objectives.

5.3 Research Design

To explore, add to the existing body of research, and offer practitioners meaningful learning we have to be able to understand and explain beliefs about the nature of reality, what can be known about it and how we go about attaining this knowledge. This is the research paradigm or framework of beliefs with assumptions about, ontology, epistemology, methodology and methods (Abdul Rehman, 2016).

Research in the social sciences has traditionally been of a positivist epistemology with an associated quantitative methodology which originated in the natural sciences and focused on things that could be observed and measured (Mittwede, 2012). During the nineteen eighties there was extensive discussion and debate concerning the strengths and weaknesses of both qualitative and quantitative methodologies with purists from both sides arguing the merits of each. This argument continues today with researchers, academics, and practitioners learning from each other as the social sciences change and the environment within which they exist rapidly evolve (Benton and Craib, 2001, P. 1).

Researchers that adopt this positivist approach are guided by a realist ontology assuming an objective reality based on measurable and observable facts (Guba, 1994, P. 106). In positivism, research theory is based on reason and is deduced from observing measurable facts (Benton and Craib, 2001, P. 14). Critics of positivist epistemology have argued that there is a need to interpret the facts and consider the environment within which the facts are gathered. Interpretivism has been considered as a response to these gaps in the positivist approach and considers it necessary to acknowledge and encourage the researcher's knowledge

in the interpretation of the facts (Grix, 2010 P 82). Qualitative methods can often time provide meaning and insight into the deductions from the quantitative measurable analysis (Guba, 1994).

For these reasons the philosophical approach adopted in this research is that of postpositivism (Guba, 1994 p. 110) with an ontology of critical realism and using the hard quantitative data that will be derived from using the competing values (Quinn, 1983) and culture profile (O'Reilly, 1991) tools but adding to this overall picture through the use of a case study considering the overall journey of the organisation. Postpositivism uses the situational information surrounding the research to inform the larger and more dominating quantitative data that is used to test the hypothesis (Guba, 1994 P. 114). The adoption of this philosophy provides the most stable and reliable data with hypothesises tested and considered not only from an impartial quantifiable perspective but also taking into account the evolution of the organisation and the interpretation of events and milestones in the recent past.

5.4 Research Questions and Propositions

Within this section, the research questions will be outlined and propositions for testing documented. The basis upon which the questions are derived will be documented in light of the existing literature in the areas of lean and organisational culture and the gaps identified to be examined.

Question number one will examine the culture in the organisation post the implementation of lean. After four years of lean implementation the research would suggest there will be high levels of innovation, respect for people, attention to detail, and decisiveness and low levels of stability, results orientation, and aggressiveness (Achanga, 2006; Näslund, 2013).

The second question will focus on the level of change within the value structure throughout the four-year lean implementation project. The implementation programme should result in increasing levels of innovation, respect for people, attention to detail, and decisiveness whilst the levels of stability, results orientation, and aggressiveness will decrease (Achanga, 2006; Näslund, 2013).

The third question will examine the value structure in the organisation prior to the formal implementation programme. The congruence literature would suggest there will be traces of a lean culture prior to the formal adoption of lean which influenced the selection of the chosen philosophy (Canato, 2013; Zammuto, 1992).

The fourth and final question will query the evolution of the value structure in the organisation prior to the formal adoption of lean. Experience and knowledge of the organisation would suggest there was an evolution in the value structure within the organisation prior to the formal implementation of lean from one that was control orientated and inwardly focused towards one that was more flexible and outward-focused (Canato, 2013; Zammuto, 1992) .

Table 5.1 Research Questions and Propositions

Question 1	*How are the values in the organisation now structured post the formal implementation of lean?*	***Phase 2 Research***
Proposition No 1	**Post the formal implementation of lean there will be high levels of innovation, respect for people, attention to detail, and decisiveness and lower levels of stability, results orientation, and aggressiveness**	
Question 2	*How did the value structure change in the organisation over the course of the formal implementation of lean?*	***Phase 2 Research***
Proposition No 2	**Over the course of the lean implementation programme the levels of innovation, respect for people, attention to detail, and decisiveness will increase whilst the levels of stability, results orientation, and aggressiveness will decrease.**	
Question 3	*How were the values in the organisation structured prior to the implementation of lean?*	

Proposition No 3	**Prior to the implementation of lean the factors of innovation, respect for people, attention to detail, and decisiveness will have the most prominence whilst the factors of stability, results orientation, and aggressiveness will have the least.**	***Phase 1 & 2 Research***
Question 4	*Was there a change in the value structure within the organisation prior to the implementation of lean?*	***Phase 1 Research***
Proposition No 4	**In the years prior to the implementation of lean the organisation moved from a control orientated structure towards a more flexibly orientated organisation**	

5.4 Research Design

The research is divided into two distinct phases, phase one is a retrospective review of historic information to track the evolution of the organisation over a period prior to the formal implementation of lean. The second phase of research will track the value structure of the organisation as lean is formally implemented into the organisation. Two separate models will be used, Quinn's competing values model (Quinn et al., 1983) will be used as the means of identifying the historic value structure within the organisation, tracking the evolution of that value structure or culture of the organisation, and identifying any changes to that culture over the period prior to the formal implementation. Quinn's competing value model is particularly suitable for retrospectively examining the organisation and considering its positioning at any time in the past. Consideration of external versus internal, flexibility versus control, and means versus ends focus can be considered based on the actions and the past data of the organisation to plot a chart of where the organisation is positioned.

O'Reilly's organisational culture profile (OCP) instrument is suited for analysis in the present and considering the values of each individual to accurately form an overall value structure for the organisation

as a collective. This model will then be used to carry out the longitudinal examination of the value structure within the organisation over the course of the four-year formal implementation programme.

O'Reilly's OCP instrument will allow for the testing of propositions one, two and three, whilst Quinn's competing values model will allow for the retrospective examination of value structure within the organisation prior to the formal implementation of lean and the testing of propositions number four.

5.5 Phase 1 - Retrospective Examination of Value Structure

To address the fourth research question an extensive longitudinal examination of the background of the organisation over fifteen years from the time of foundation in 1998 up to the point at which the formal implementation of a major lean philosophy commenced in 2013 was carried out. Rather than using a coarse-grained longitudinal time series and event history method the detail has been explored using a number of techniques including narrative and visual mapping strategies and causal maps to examine the process data in an accurate impartial manner to address the questions set out (Langley, 1999). The most pertinent information to assess the evolution of the structure of the organisation is documents, policies, procedures, emails, meeting minutes, and various other pieces of information. While often challenging to differentiate between events, activities, and decisions given the crossover between terms, the evidence has been structured using background information from people within the organisation where a lack of concrete evidence is available to provide an exact picture and timeframe of the activities involved (Langley, 1999). Whist the visual mapping process provides great detail in building up a picture of the evolution of the organisation, given the fact that initiatives and activities often cross timeline boundaries a simplified linear model fitting them into the most appropriate phase was used. Significant events, defined as something outside the control of the organisation, have also been identified in the chronological timeline of the evolution of the organisation to provide a clearer picture of the macro issues that impacted the organisation throughout the review.

In carrying out the research, relevant information in an accessible and searchable format given the extended longitudinal nature of the study was used. There was a large volume of relevant information available electronically within the organisations dedicated servers extending back to the foundation of the organisation including correspondence, procedures, meeting records, and performance reports. The data largely documented all of the decisions, activities, and events that influenced the evolution of the organisation's structure. Whilst the organisation is relatively young, the extent of the data available electronically as opposed to hard copy material which would have been much more difficult to data-mine, already suggested a culture and willingness to adopt new processes within the organisation.

Over two terabytes of electronic source material in the form of emails between senior managers at that time, meeting minutes, project reports, policies adopted during that time, presentations to senior management, daily, monthly, and annual reports for the period, company newsletters, internal procedures developed and adopted during the period, and notes from conferences attended were examined to provide an account of the evolution of the value system within the organisation.

5.6 Phase 2 - Longitudinal Organisational Culture Profile

O'Reilly (1991) developed the Organisational Culture Profile (OCP) instrument as a means of measuring the cultural fit between organisations and individuals. While we are less concerned in this research about this aspect, the instrument developed provides an acceptable means of quantitatively defining the existing culture within an organisation for the basis of a comparative longitudinal study.

Caldwell and O'Reilly used a set of 54 value statements as a means of determining through a Q sort survey the most and least characteristic beliefs and values of both the organisation and the individuals surveyed.

Lee (2004) used the OCP as a means of charting the relationship between the prevailing culture and performance of that organisation in his 2004 research. Lee identified two distinct advantages to using the

OCP as opposed to more qualitative approaches; the forced distribution associated with the Q Sort analysis allows for each of the 54 value statements to allocate a distinct level of importance enabling comparison between values, furthermore, it prevents the tendency to bulk values at either end of the scale. Secondly, the prescriptive nature of the OCP prevents the researcher from unduly influencing the interpretation of the survey.

This research uses the basis of this methodology provided by Caldwell and O'Reilly to form a framework around establishing, measuring and monitoring the cultural change in the sample Organisation as the Lean Implementation Project proceeds.

A baseline culture will be established before the introduction of the Implementation Project with annual surveys throughout the Implementation Project. A further and final survey will be conducted in the final year of the Research Project to establish a conclusion to the "Key Considerations" raised.

The entire population of the organisation was sampled using the survey at regular 12-month intervals over the four years to provide the most accurate account of the movement in cultural values. The survey was conducted in September/October each year to coincide with the commencement of the lean programme.

There were a number of issues that needed to be addressed when considering the type and format of the survey:

- It is considered that given the researcher's position in the organisation it would be unrealistic to expect unbiased, honest, and open feedback from a qualitative analysis process.
- Given the fact that the cultural impact on an SME organisation is being considered the size of the sample is restricted. The survey will be conducted across the entire organisation. A one hundred per cent return on the survey would represent 80 responses and given the relatively small sample size the return rate must be maximised.

- Given the position of the Researcher in the organisation, it could be considered that there could be undue influence from the position of authority and it could impact the responses from respondents.
- Given the varied nature of the demographics of the sample involved, cognisance will need to be given to the ability of the respondents to participate in an online survey. There is a wide variation in terms of computer literacy with some highly technical engineering competencies alongside manual labours that would have limited experience with computers.
- Similarly, long and complicated questions will lead to erroneous and misleading results. The primary function of the surveys is less about establishing the actual culture within the organisation but more about tracking any change that occurs through the implementation project.
- The rate of return on similar surveys across the organisation has been poor to date with return rates around 60%

Taking these points into consideration, it was decided that a 'drag and drop' format would be used on a Microsoft Excel platform as presented in figure 5.4. The availability of Microsoft Excel throughout the sample organisation allows easy access to everyone. O'Reilly's values were organised and fixed on an excel template with only the values movable. The respondent could click on the value and move it over to the organised scale thereby giving the value a score. Each value could only be dragged to one position thereby removing any potential for error in the survey.

The survey will be delivered to everyone individually electronically along with instructions to complete the survey. The completed survey will then be emailed back to the Occupational Health and Safety Nurse (OHAS Nurse) who can assure employees that specific information on respondents names will not be forwarded to the management of the organisation.

Culture Survey

Important values may be expressed in the form of norms or shared expectations about what's **important about how to behave or what attitudes are appropriate within CAW**.

Please sort the 54 values within the Green Value Boxes into a row of nine categories placing at one end of the row those Green Value Boxes that you consider to be the most characteristic aspects of the culture of CAW, and at the other end those Green Value Boxes that you believe to be the least characteristic of CAW.

This can be done electronically by simply clicking and dragging the boxes to the chosen Blue Grid Box position

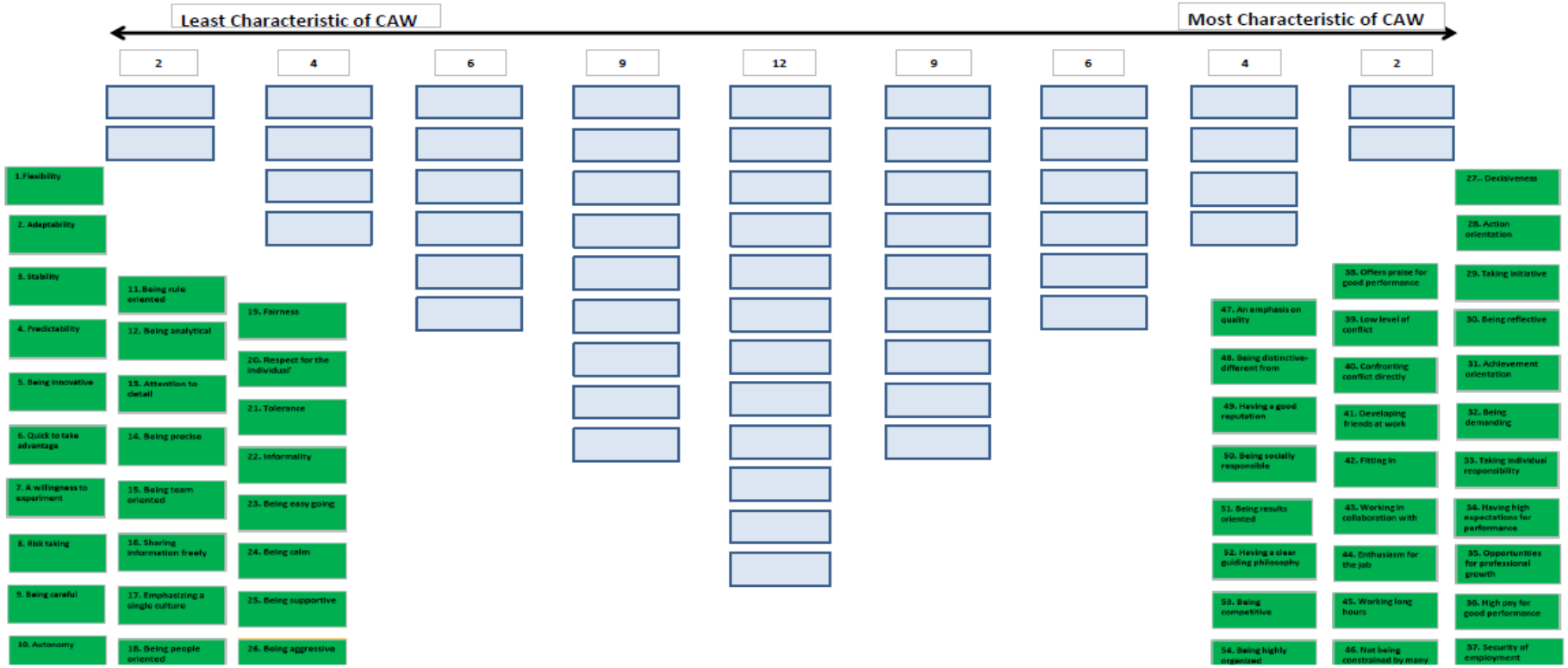


Figure 5.4 – Bespoke Culture Survey

In year one of the research, there was an option to carry out the survey in hard copy and return it directly to the OHAS Nurse. The OHAS Nurse tracked the respondents against a list and provided the researcher with the list two weeks post-commencement, the researcher then approached the line managers of the non-respondents and offer some assistance alongside an offer to complete the survey in hard copy.

For any individual within the sample that was uncomfortable with returning the survey online, there will be a hard copy survey provided. This will consist of the same survey however rather than 'drag and drop' the corresponding number in the box to be 'dragged' will be placed in the location in which it is intended to be 'dropped'. A blank envelope will be provided with the survey with a sealed return box will be provided. Local line managers will be provided with instructions on how the survey can be completed and returned.

The values were defined within the survey so that there would be limited misinterpretation. This provided the organisation with a more accurate and consistent definition of each value, for each team member, across the four years of analysis. Figure 5.5 provides the definitions of the values as included in the survey.

Definition of the 54 Value Boxes

The list of 54 values below describe what's important about how to behave or what attitudes are appropriate within CAW

Value	Description	Value	Description
1. Flexibility	CAW expect flexibility in peoples attitude to work	28. Action orientation	CAW expect action to be taken when an issue arises
2. Adaptability	CAW values peoples ability to adapt to different situations	29. Taking initiative	CAW value people that take an initiative to resolving an issue
3. Stability	CAW recognises the value of a stable work environment	30. Being reflective	CAW promotes reflective behaviour in delivering the business
4. Predictability	CAW tries to ensure there is a predictability about its operation	31. Achievement orientation	CAW is focused on achieving objectives
5. Being innovative	CAW values innovation and new ideas	32. Being demanding	CAW demand a lot from its staff
6. Quick to take advantage of opportunities	CAW are quick to take advantage of an opportunity	33. Taking individual responsibility	CAW expect people to take individual responsibility
7. A willingness to experiment	CAW are willing to explore new ideas and experiment	34. Having high expectations for performance	CAW expect high levels of performance from its staff
8. Risk taking	CAW are willing to take risks with new ideas	35. Opportunities for professional growth	CAW provide opportunities for professional development
9. Being careful	CAW are always careful in the operation of the business	36. High pay for good performance	CAW reward good performance with high pay
10. Autonomy	CAW value the autonomy of people in the business	37. Security of employment	CAW provides and values security of employment
11. Being rule oriented	CAW are rule orientated	38. Offers praise for good performance	CAW promotes praise for good performance
12. Being analytical	CAW take an analytical approach to the business	39. Low level of conflict	CAW values a low level of conflict
13. Paying attention to detail	CAW pay attention to detail in the delivery of the business	40. Confronting conflict directly	CAW addresses conflict directly
14. Being precise	CAW are precise in the way they deliver their business	41. Developing friends at work	CAW promotes developing friend's at work
15. Being team oriented	CAW expect people to work as part of a team	42. Fitting in	CAW expects staff to fit into existing teams
16. Sharing information freely	CAW expect people within the organisation to share information	43. Working in collaboration with others	CAW recognises the value of working in collaboration
17. Emphasizing a single culture throughout CAW	CAW emphasise the culture within the organisation	44. Enthusiasm for the job	CAW expects staff to approach their role with enthusiasm
18. Being people oriented	CAW value the people that work within the organisation	45. Working long hours	CAW expects staff to work long hours
19. Fairness	CAW tries to ensure that a level of fairness is applied to situations	46. Not being constrained by many rules	CAW does not constrain people with rules and procedures
20. Respect for the individual's right	CAW respects an individuals right to have an opinion	47. An emphasis on quality	CAW promotes a culture of quality within the business
21. Tolerance	CAW has a tolerance for differing opinions	48. Being distinctive-different from others	CAW values people that have distinctive opinions
22. Informality	CAW operates in an informal way	49. Having a good reputation	CAW values their own reputation and the reputation of their peop
23. Being easy going	CAW adopts an easy going approach to the business	50. Being socially responsible	CAW promotes a culture of social responsibility
24. Being calm	CAW expects a calm approach to delivering the business needs	51. Being results oriented	CAW are focused on results
25. Being supportive	CAW supports and assists staff	52. Having a clear guiding philosophy	CAW emphasise a guiding set of principles
26. Being aggressive	CAW are aggressive in their approach to business	53. Being competitive	CAW are focused on being competitive
27. Decisiveness	CAW are decisive in when an issue arises	54. Being highly organized	CAW are organised in their approach to delivering their business

Figure 5.5 Values Defined

5.7 Developing the Survey Template

In developing the survey template the primary object was to keep it simple to use for the individuals within the organisation given the highly varying demographics and competencies of the people. It needed to be concise, understandable and incorporate a clean clutter-free format. It was critical that the excel format was delivered in such a way that the format of the survey could not be compromised by interference with the template and yet allow the respondent to 'drag and drop' the necessary values to the requisite positions on the matrix.

The key element of the template is to lock or protect all aspects of the survey except for the 'value boxes' that need to be dragged to a preferred position on the matrix by the respondent. Another significant consideration was that this format needed to be compatible with returning in hard copy.

A matrix of fifty-four boxes of the same size was placed in nine rows along a scale that went from "Least Characteristic of" to "Most Characteristic of" to deliver a forced distribution of the values. They were distributed in the nine rows with two boxes in the outer most positions on either end of the scale, four boxes in the next rows on both ends of the scale, six in the next rows, nine in the next rows, and one row of twelve boxes in the centre scale. This matrix and scale were then locked to prevent interference by respondents during the completion of the survey.

The fifty-four' value boxes' to be dragged and dropped into the matrix by the respondent were developed by creating text boxes, inserting each of the fifty-four values in the individual boxes, and then converting each box into a picture format so that each box could be dragged individually without interfering with the text within the box. The value boxes were then placed alongside the matrix

Instructions on how the survey was to be completed were developed based on 'Reilly's OCP Instrument (1991) and inserted with the spread sheet, again this element of the survey was locked to prevent editing by the respondent.

By using Microsoft Excel Developer Macros Option Buttons were inserted to provide respondents with the ability to provide basic individual information such as years of service within the organisation, gender, and position with the organisation. Again this element of the spread sheet was locked to prevent interference.

Lastly, the appearance of the spread sheet was altered to remove as many elements of the basic spread sheet appearance and provide a clean format that avoided intimidating respondents and allowed for easy completion of the survey.

An email instruction for the survey was crafted and both the email and the survey were distributed to the middle management of the organisation for feedback. The feedback received was generally positive with one significant suggestion. It was suggested that there should be an explanation of the values included within the survey as they could be construed in a number of ways and may impact the consistency and accuracy of the returns. This was included and the survey was distributed across the organisation.

A list of the staff within the organisation was provided to the OHAS Nurse so that she could record respondents and two emails were sent to line managers to encourage their teams to return the survey.

The respondents ranked the 54 values in order of least characteristic to most characteristic of the organisation on a scale of 1 to 9. A forced distribution model based on O'Reilly's factors was used through using a bespoke electronic excel version of the original survey. Length of service, position in the organisation, and sex were also included in the anonymous survey.

Given the limited population in the group due to the size of the business exploratory factor analysis was not advised and confirmatory factor analysis using O'Reilly's proposed factors and values. These factors were confirmed to be statistically significant using a Cronbach analysis of the data set. The Cronbach's for the data set were as follows:

- **Factor 1 Innovation** (Innovative, Opportunities, Experiment Risk, Careful, Rules) has a Cronbach of .412 using O'Reilly's Factors when I invert Rules and Careful this increases to **.615**

- **Factor 2 Stability** (Stability, Predictability, Constrained, Security, Rules,) has a Cronbach of .493 using O'Reilly's Factors when I invert Rules again this increases to .**734**, this may suggest a problem with the Rule variable
- **Factor 3 Respect for People** (Respect, Fairness, Tolerance) has a Cronbach of **.823** using O'Reilly's Factors
- **Factor 4 Results Orientation** (Achievement, Action, Performance, Results) has a Cronbach of **.928** using O'Reilly's Factors
- **Factor 5 Attention to Detail** (Precise, Analytical, Detail) has a Cronbach of **.718** using O'Reilly's Factors
- **Factor 6 Team Orientation** (Team, Collaboration, People) has a Cronbach of **.689** using O'Reilly's Factors
- **Factor 7 Aggressiveness** (Aggressive, Competitive, Socially) has a Cronbach of **.912** using O'Reilly's Factors
- **Factor 8 Decisiveness** (Predictability Decisiveness Conflict) has a Cronbach of **.472** using O'Reilly's Factors, when I remove Predictability from the factor this increases to .826, again suggesting a possible misinterpretation of Predictability.

5.8 Reliability and Validity of Data

The purpose of establishing reliability and validity in research is to ensure that data is accurate and replicable (Kimberlin, 2009). The validity and reliability are prerequisites to assure the integrity and quality of a measurement instrument. Each method of data collection has its inherent weakness, however, the use of combined methodologies serves to strengthen the validity and reliability of any study (Abowitz, 2010). The use of both quantitative and qualitative approaches in research design and data collection should be considered where ever possible to strengthen the research and make the enquiry more expansive. This approach was adopted in this research to allow consideration of the data both from a purely positivist and postpositivist perspective.

In addition to the mixed methodologies adopted to ensure validity and reliability of the data, the collection systems were designed to ensure simplicity, reduce interference, and provide assistance where required. The Nurse within the organisation took charge of following up on survey returns to ensure there was no

coercion or interference from management. A number of members of staff within each team in the organisation were provided with personalised training on how to fill in the survey and these members of staff were then nominated to assist others in the return of the surveys.

The data was regularly uploaded by an independent administrative assistant within the organisation to an excel data base which allowed for regular testing and consideration to avoid any errors developing in the data set.

Anomalies within the data were considered using simple excel tools to ensure the data file was not developing errors. Each value could only be rated one time and each respondent thought the forced nature of the survey. The excel database allowed for segmentation and consideration of maximum, minimum, mean, and variability of the data to be considered.

The validity and reliability of the data set were ultimately tested given the nature of the construct this research was considering. Organisational culture is not a highly variable construct and whilst values will change throughout the four-year implementation and the period before the implementation, the culture of the organisation should remain stable. This was ultimately the case, whilst there was movement in the culture throughout the period examined, it was small and consistent. The surveys demonstrated reliability, validity and most importantly repeatability in returning consistent results over the years examined.

The risk of personal bias by the researcher who is also a member of the organisation has also been removed through the use of independent people to collect the data and import it into the excel database. This risk of bias was further mitigated by using accepted and published values, factors, and survey templates. The adoption and transfer to the electronic format serve to strengthen the validity of the data. The records of the data and the surveys remain available for further consideration at any time.

5.9 Chapter Summary

To test the propositions proposed the research was required to span over nineteen years including both a real-time longitudinal evaluation whilst the desired philosophy was implemented into the organisation and a retrospective evaluation of the culture in the years before the formal implementation. This scope required two very different designs to accurately test the proposed propositions.

In the first instance and to test for proposition number one and two O'Reilly's OCP instrument was selected as the most appropriate to examine the culture within the organisation as lean was formally implemented. The quantitative nature of the instrument allowed for a simple yet effective bespoke tool to be developed on a widely available excel platform providing for almost zero errors in responses.

Secondly, to retrospectively examine the culture in the organisation prior to the formal implementation of lean Quinn's competing values model was selected. This model provided for using historic documentation from within the organisation to investigate and consider the value structure in the organisation over fifteen years prior to the implementation programme.

The combination of methodologies provides a fascinating insight into the cultural evolution of the organisation over an extended period of years informing the research in ways that would not have been possible had the scope of the investigation been limited to that of the formal implementation alone. The results will go on to inform future applications of such philosophies in years to come.

Chapter 6 - Analysis and Results

Chapter Overview

The literature would suggest that the implementation of lean will introduce a more flexibly orientated organisational culture over time as the philosophy is adopted. Chapter six documents the findings of how the culture in the organisation evolved in phase one of the research towards a more flexible orientation and how these values were reinforced and evolved further as lean was formally adopted. The movement over time was slow and at times counter to the literature. However, the overarching movement was towards greater flexibility and increased focus on people. The level of movement and significance associated with this movement provides an interesting account of the journey the organisation charted over the nineteen years of analysis.

6.1 Chapter Introduction

The implementation of lean has delivered performance improvement within the organisation. The profitability of the business has been improved and areas focused upon have improved through the introduction of lean principles. The four years of training, communications, teamwork, and focus on lean principles has delivered improvements in optimising processes across the operations of the business, removing waste and delivering efficiencies in many areas of the operations. These results will be examined in the short case study of the focal organisation given below.

The desired change in value structure within the organisation will now be considered in light of the research findings. The literature would suggest the implementation of lean will deliver a more flexible, outward-focused, and team orientated value structure. This chapter will outline how the data was analysed to consider the proposed propositions. There are two components to the research as outlined in the methodology and therefore there are two corresponding components to the analysis and results.

Descriptive analysis was used to consider the reliability of the quantitative data set. Tools such as means and standard deviations were used to test the reliability of the data. The data set was interrogated erratic movements which would be unreflective of a culture change and more likely to be as a result of the issue at that point and time. There were no significant erratic results in the data set.

The deviation in responses was also considered to identify if there was evidence of strong subcultures within the organisation, again there was no significant evidence of such. The intersection of the data sets in 2013 was also considered to identify if both data sets indicated a similar open, team-oriented, and flexible culture. This was the case and will be explored fully in considering proposition number three.

Average Analysis				
	2014	2015	2016	2017
Factor 1 Innovation (Innovative, Opportunities, Experiment Risk, Careful, Rules)	4.9183	4.8625	4.7814	4.6775
Factor 2 Stability (Stability, Predictability, Constrained, Security, Rules,)	5.2830	5.1375	5.1353	5.1969
Factor 3 Respect for People (Respect, Fairness, Tolerance)	5.2784	5.0417	5.1622	5.2533
Factor 4 Results Orientation (Achievement, Action, Performance, Results)	5.8594	5.8633	5.8002	5.7834
Factor 5 Attention to Detail (Precise, Analytical, Detail)	5.0002	5.0260	5.1253	4.6954
Factor 6 Team Orientation (Team, Collaboration, People)	5.1980	5.1458	4.9956	4.8933
Factor 7 Aggressiveness (Aggressive, Competitive, Socially)	4.4026	4.3958	4.8539	4.7535
Factor 8 Decisiveness (Predictability Decisiveness Conflict)	5.0728	5.1406	5.1937	5.1762

Figure 6.0 Initial Average Analysis

The data collected using O'Reilly's modified OCP instrument was interrogated to test propositions one, two and three. The data collected over the four years of the formal lean implementation programme was analysed using descriptive statistical analysis techniques to determine the level of movement in the structure of the values of the organisation throughout the implementation.

Secondly, and to address proposition four, the data collected from historic sources within the organisation was analysed using narrative and visual mapping strategies and causal maps to examine the data. Finally, the results of both analyses processes will be presented for more detailed discussion in the following chapters.

6.2 Case Study: *Assessment of Lean Implementation in a utility organisation*

The organisation prides itself in delivering solutions in the most efficient and environmentally friendly way possible. The expertise within the organisation encompasses advanced digestion, CHP, energy management, facility services, utility management, water metering services, asset maintenance and MEICA design and construction. The Team includes highly qualified PhDs, engineers, scientists, and technicians consistently delivering innovative solutions that provide long term value to customers.

The lean journey began in 2011 for the organisation with a six sigma green belt project delivered by an operations manager. This project examined wasteful variation in the quantity of gas that was required to thermally dry sludge on-site and sought to reduce this variation through the lean methodology. The project was a success, reducing specific gas consumption per ton of solids by 25%. The second lean project with a scope focused on process improvement reduced variation in a pre-dewatering conditioning process by 18%.

The organisation formalised its change into a lean business through the adoption of the Improve, Adapt, and Learn programme in 2014. This programme incorporated a lean approach to the company vision, company mission, and setting objectives and targets, and putting in place the infrastructure to deliver this from the outset. Lean objectives were to be delivered across 5 strategic pillars: engineering, procurement, operations, business development and health and safety. For each pillar, a success factor KPI was put in place to measure the effectiveness of the programme, for example, a 10% annual reduction in cost areas identified in procurement, a 5% reduction of operational costs through the elimination of non-value-added waste in Operations, and a 15% reduction in accidents in Health and Safety.

To deliver the programme objectives, the key senior management staff were selected as ‘champions’ for each organisational pillar. These individuals received formal champion training in six sigma and lean methodologies tailored to the company requirements. Senior managers understood front-line workers would be critical to the success of the Continuous Improvement programme. These staff employees were

brought together for a number of 'Town Hall' meetings led by the programme champions. These town hall meetings were critical to successfully facilitating engagement across all of the teams from the outset, developing mutual trust between all staff and management.

These meetings allowed the senior management team to convey the vision of transforming the organisation to lean. This vision was presented against a climate of uncertainty (and opportunity) for the utility sector and this created to some extent a suitable 'burning platform' to illustrate the need for change. The outline of the programme, including lean values, the new company objectives, and training requirements was shared. Following the town hall meetings were a series of continuous improvement workshops for all company staff. At the workshops areas of the business where improvements could be delivered and non-value added wastes eliminated were identified by all employees. The feasible outputs of the brainstorm were subsequently assessed and ranked according to deliverability as 'just do its' and more significant projects as either 'green belts' or 'black belts' which would be completed with a formal DMAIC (Define, Measure, Analyse, Improve and Control) approach. The town hall meetings subsequently became an annual event, funnelling upward the raw materials to feed continuous improvement project hopper.

The trust showed by management that frontline staff would have a better understanding and knowledge of issues on the floor led to the development of further channels through which continuous improvement suggestions could be shared. A CI discussion is now part of every scheduled training day for staff, and a Smartsheet web form is also available to all staff through which to make suggestions.

To fully enable the transformation into a lean organisation a comprehensive training programme was developed to ensure that our employees were taught the lean analytical tools to deliver improvement projects. Included in the program were green-belt and black belt training, yellow belt training, root cause analysis training and 5S training. The training emphasised a cohesive lean/six sigma culture allowing a universal approach to data-based analysis and problem solving to emerge in the organisation.

In the four years since 2014 two black belts, 16 green belts, multiple 5S projects, and numerous 'just do its' have been delivered across the company. These projects have been delivered primarily by front line Operations and Maintenance staff but also by Senior Managers and Team Leaders. Project teams have been diverse in their make-up. The projects have delivered significant efficiencies and process improvements which have been sustained, delivering value and quality to our Clients. These have greatly increased the efficiency of the assets in operation, by increasing operational capacities and reducing process variation. Most importantly, team participation has led to the continued and structured growth in the use of lean tools to solve problems and a change in mindset in our approach to quality throughout the entire team. Moreover, there has been a cultural change toward lean thinking, which has made the workplaces more efficient, safer and ultimately more stimulating and enjoyable for our teams.

The team has presented details of significant process improvements in sludge treatment and energy management at international conferences. These improvements were delivered through the Improve, Adapt and Learn CI programme. In addition, staff produced novel research findings as part of MSc projects which are ongoing. The cultural change brought about by lean has been real and measurable, with annual assessments on all deliverables against targets, including an annual cultural questionnaire that measures the evolving cultural change attributable to lean.

Three notable green-belt projects were delivered at one site examining sludge stream variability, the outcomes delivered and sustained were as follows:

- A 30% reduction in a polyelectrolyte chemical used to condition the sludge before digestion
- A 13% increase in biogas yield from improved digestion, reducing the quantity of Class A Cake removed from the site at a cost
- A 40% increase in specific solids throughput in thermal drying.

All of the above were achieved through a methodical approach to identifying causes of variation in the relevant processes, improving the processes to reduce variation and putting mechanisms in place to 'mistake proof' the savings.

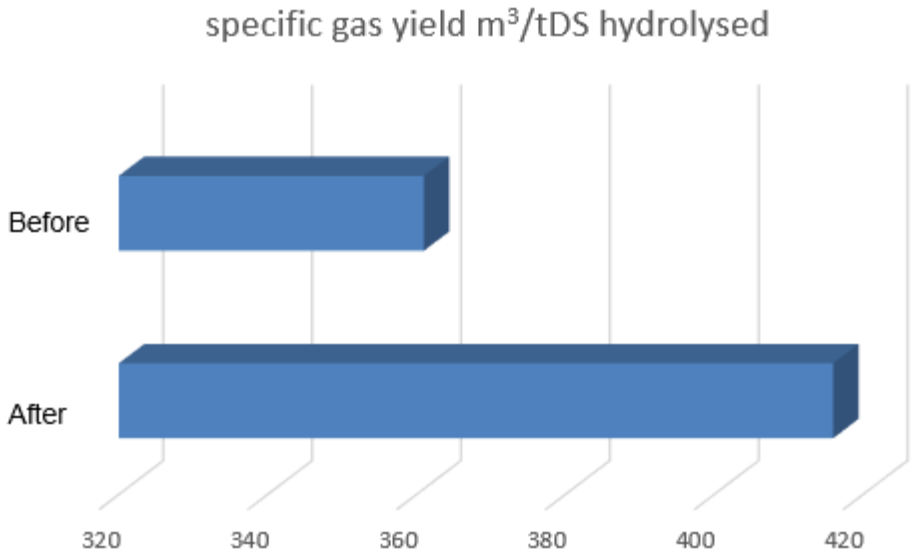


Figure 6.1 Increased gas yield at Ringsend following Green-belt project improvements

Learnings from leaner operations and the elimination of variation and waste have allowed for more competitive and accurate pricing for new business tenders. The business secured a number of high-value engineering projects post the implementation process.

The most visual change has been through the delivery of 5S programmes which have transformed a number of workplaces including workshops, control rooms, canteens, process buildings, and admin buildings. All workplaces were subjected to red-tag events, lighting improvements, and more efficient organisation according to 5S principles. Changes were sustained through check-lists, Kanban exercises, regular training and installation of electronic noticeboards for up to date visual communication celebrating the change. The pictures below give a selection of 5S managed workplaces on operated sites.

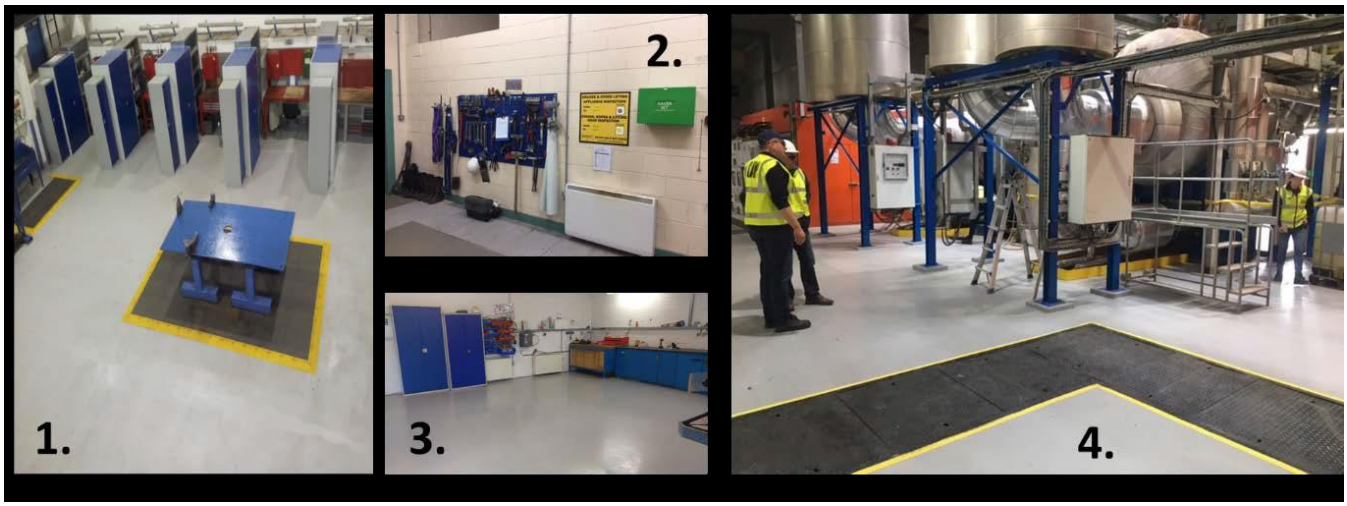


Figure 6.2 5S Workplaces: 1 Mechanical Workshop, 2. Electrical Workshop, 3 Regional Workshop, 4 Process Building

5S projects remain live with continuous improvement ongoing. Suggestions for further improvements are made through Smartsheet forms by any staff member and worthwhile suggestions are acted upon. 5S refresher training is received by all staff on an annual basis.

Celebrating the success of previous projects has become a key part of promoting and sustaining the culture. Internal 'lean awards' are held within the company each year. At the awards, those who have delivered lean projects get to share the outcomes with senior management and Board representatives. All participants receive prizes and an overall prize is awarded to the best project of the previous 12 months.

Two academic projects have recently assessed cultural change. This research project is tracking organisational change through an annual questionnaire measuring the change in cultural value structure within the organisation through the course of the implementation. Furthermore, an MSc project was delivered which assessed the success factors of previous projects, revisiting the metrics with further team interviews. This has allowed previous achievements to be improved upon and reinforced the message that improvements are continuous.

The Organisation is increasingly applying lean thinking to new business development opportunities and in the tendering process. Thus far lean has driven the most change through the operational side of the

business, the application of multiple learnings from the operational programme will lead to leaner tendering process, improved quality of tenders and a competitive edge based upon confidence of understanding the value the organisation can bring to clients through lean operation. An ambitious business development programme for the coming years is now aligned with lean thinking and objectives.

Summary of Implementation KPIs

Lean Implementation				
	2014	2015	2016	2017
Black Belt Training	1	0	1	0
Green Belt Training	4	4	4	4
MSC's Delivered	0	1	1	0
Planning	Annual CI Plan Delivered			
Communicating	Detailed Town Hall Meetings			
5 S Projects	5S Projects Delivered Across all Sites			

Figure 6.3 - Lean Implementation KPIs

Business Performance				
	2014	2015	2016	2017
Quality	18 Major Black and Green Belt Projects delivered improving areas such as maintenance, process control, waste recycling, power consumption.			
Cost	There was an over all 11.2% decrease in operating costs over the course of the four year implementation when compared on a like for like basis			
Market	The Implementation helped in securing a number of high value contracts over the four years of implementation			

Figure 6.4 - Business Performance KPIs

Organisational Culture				
	2014	2015	2016	2017
Survey Returns (Engagement)	78%	92%	91%	94%
Workplace Improvements Delivered	2	2	3	2
People participating in one or more Lean events	96%	92%	93%	93%

Figure 6.5 - Culture Indicators

6.3 Analysis Phase 1 - Retrospective Examination of Value Structure

This section of the thesis describes the analysis and presents the results of the retrospective examination of the organisational values before the formal implementation of lean. This retrospective examination of the value structure in the organisation using Quinn's competing values frameworks will seek to explore the cultural path of the organisation over time. Through this analysis the potential for preconditioning of the cultural values within the organisation can be considered to that of values more congruent with the proposed ultimate strategy; critical points in the evolution of the organisational culture can be considered, and a narrative describing this evolution based on empirical evidence can be considered over a longer horizon than just the four years of formal surveys.

6.3.1 Quinn's Competing Value Preliminary Data Analysis

A list of 49 groups of documents as listed below in figure 6.6 were selected as the most relevant and critical source material identifying the underlying core values of the organisation describing events, activities, and decisions made during the period in question.

Date	Initiative	Source Material
2002	ISO 9001 Implementation	Action Plan for Implementation
2005	ISO Accreditation ISO 9001, ISO 14001, OHAS 18001	ISO Certificates
2006	THP Action Plan – First Improvement Project	THP Action Plan 2006
2006	KPI Reporting Implementation	Email Report
2006	Set High Level Goals & Objectives	Company Objectives for 2006
2006	Measurement of Power begins	Email on Power Project
2006	First Research Intern recruited	Contract of Employment for Intern
2006	Project 1 Assessment of SBR performance under different process conditions focusing on nitrification and denitrification	Project Report
2007	Project 2 Detailed analysis of Ringsend WwTW final effluent consent limits failures and plant performance at the time of the fail	Project Report
2007	Project 3 Optimisation of Ringsend WwTW pumping regime	Project Report
2008	Restructure of Organisation	Presentation to Senior Management Team
2008	Management Improvement Meetings	Meeting Minutes
2008	Cross functional teams introduced	minutes of meetings
2008	KPI Performance Measurement	Daily Report
2008	Specific Energy Teams	Meeting Minutes
2008	Increasing Communications	CAW News Letters
2008	Brainstorming events Driers	Meeting Minutes
2008	Increased Secondary Treatment Efficiency installation of DO Probes	Project Report
2008	Increased Treatment Capacity	Project Report
2008	Improved Effluent Compliance	Project Report
2008	Increased Power Generation	Project Report
2008	Reduction in Chemicals Used	Project Report
2008	Implemented performance related bonus	Communications Memo to staff
2008	More structured training	Training Records
2009	Licence to Operate Implementation	Training Records
2009	Project Management Training for Technologist	Email Confirmation
2009	Works Committee renewed	Meeting Minutes
2009	Develop a corporate social responsibility policy	CAW CSR Policy
2010	Operations Reviews	Annual Reports
2010	First CAW HR Audit	Audit Findings
2010	CAW family Day	Email Notice of family day
2010	Implementation of Energy Management System	ISO Certificates
2010	Recruitment of Site Engineer to deliver continuous improvement projects	Contract of Employment
2011	First CAW Employee does a six sigma green belt course	Project Report
2011	Procurement Six Sigma Project	Project Report
2011	Lean Six Sigma conference	Email on conference
2012	CAW SWOT Analysis	Meeting Minutes
2012	CAW's First Black Belt	Project Report
	Other Documentation Reviewed	
1998 - 2012	Emails over the period to the Operations Director	~
1998 - 2012	Measures Company Profitability	~
1998 - 2012	Measures of Efficiencies	~
1998 - 2012	Measures of Contract Compliance	~
1998 - 2012	Measures of Productivity	~
1998 - 2012	Team Meeting Minutes	~
1998 - 2012	Maintenance Team Meetings	~
1998 - 2012	Management Improvement Meetings	~
1998 - 2012	CAW Strategy Papers	~
1998 - 2012	CAW News Letters	~

Figure 6.6 - Data Categories

The complexity of the data often resulted in challenges in grouping the activities, decisions, and events in a simple neat linear process model as decisions are often made over a period of time, the implementation of a decision can take time, and the outcomes may not always be apparent for some time post the decision-making process (Langley, 1999). As a result of this complexity, a narrative strategy using the raw data was selected initially to carry out a preliminary examination of the evolution of the organisation focusing on areas pertinent to the structure of the organisation. Whilst there is an accepted trade-off between accuracy, simplicity, and generality associated with qualitative research methodologies the high degree of accuracy associated with the narrative strategy allows us to begin to understand the evolution of the organisation over the period in question (Langley, 1999).

Secondly, a visual mapping technique has been used to enable us to examine a large amount of data that often exists in multiple phases and within multiple timelines and seek to use this technique to position initiatives and activities in a more orderly linear format for further analysis.

Finally, this more ordered structure is used to examine the presence of Quinn's values within the phases of evolution and identify the point at which these values became apparent within the organisation thereby allowing us to interpret the analysis in our findings.

6.3.2 Narrative Analysis of the Organisation

The organisation operates water and waste water assets on behalf of public bodies under long term service level agreements. The organisation directly employs between 80 and 100 staff of a technical, engineering, scientific, and administrative nature. The organisation, founded by two large institutional shareholders also operating in the water and renewable energy sector, initially adopted many of its shareholder's management systems. The company initially implemented a highly controlled and internally focused strategy to deliver the requisite services as required by the highly regulated water sector largely mirroring

the approach taken by the founding shareholders. Roles, responsibilities, management policies, and procedures were highly prescriptive limiting levels of innovation and experimentation with opportunities to deliver improvement during the initial years of operation often restricted. Over time as the organisation became more independent the opportunity to adopt distinctive strategies to those of the shareholders became possible. The management team within the organisation were provided with the autonomy to guide the organisation on a path that best suited its size and the environment in which it operated. Over the fifteen years examined, the organisational strategy evolved from one of a highly controlled orientation to one delivering flexibility and innovation in the provision of services to its customers. Initiatives such as the adoption of cross-functional teams to deliver major improvement projects, restructuring of the organisation, and using techniques such as lean six sigma to remove waste, improve quality, and implement a level of flexibility have promoted values of information sharing and improved communication delivering innovation and improvement in service delivery.

The culture of an organisation, particularly a medium-sized organisation, will also be strongly influenced by the founding members of the organisation and this case is no exception. The management team, who in this case take the place of the founding members of the organisation, have largely been in place since the foundation of the organisation and have had a significant influence on the culture of the organisation. Whilst initially focused on control and stability within the organisation during the early years, the focus over more latter years has been on the value of the human resources. Training, reward both intrinsic and extrinsic, and morale have all been a focus of the organisation over the past number of years to increase the effectiveness of the organisation and promote a culture of flexibility thereby ensuring the effectiveness and growth of the organisation.

During 2008 and 2009 it became apparent that there was going to be significant change within the water sector in Ireland with the establishment of one national water utility taking charge of all water assets from the existing 34 local authorities. This in effect would result in one large customer, vastly increasing the power of that customer over the organisation. It became critical to anticipate the needs of a national utility

even before its formation and develop a strategy that would protect and enhance the business through delivering increased value to the customer.

As the formation of the new national utility came into being it became obvious that there would be pressure on the new entity to reduce waste, drive efficiencies, and increase the demonstration of value throughout the supply chain. As one of the utilities largest suppliers, the organisation needed to be in a position to deliver these changes or risk losing business.

The earlier pilot test of lean six sigma had delivered dividends almost immediately in removing variability and waste from the processes that adopted it and the 'fit' with the existing value system within the organisation was well aligned. A data-driven decision-making strategy within a scientific and engineering environment aligned well. However, the focus over previous years within the organisation on increasing interaction across the team, valuing and encouraging the human resources within the organisation, and promoting training and development began to deliver further value to the organisation when coupled with the secondary and more strategic objective of lean six sigma, that of delivering structural flexibility to respond to a changing environment.

Within two years of commencing the implementation of a major change initiative, the adoption of lean six sigma increased value to the customer by reducing waste and thereby reducing the cost to the customer by over 5% per year. Furthermore, innovative means of delivering an additional revenue stream to the customer were identified to deliver a significant contribution to lowering the cost of operating the assets over future years.

6.3.3 Visual Mapping Analysis

Having carried out a preliminary examination of the data through the use of a narrative a series of visual maps was selected as the most appropriate means of examining our data set in some greater detail. Visual

maps have the advantage of allowing the examination of interdependent dimensions within a single format using large quantities of information later leading to a means of verifying theoretical theories (Langley, 1999). They also have the advantage of allowing individual events, activities, and decisions to exist in multiple time phases as is often the case in complex organisation models. This initial visual mapping process begins to put some structure on the large quantities of pertinent information available, however, the boundaries of the phases remain blurred and external events that need to be taken into consideration remain absent.

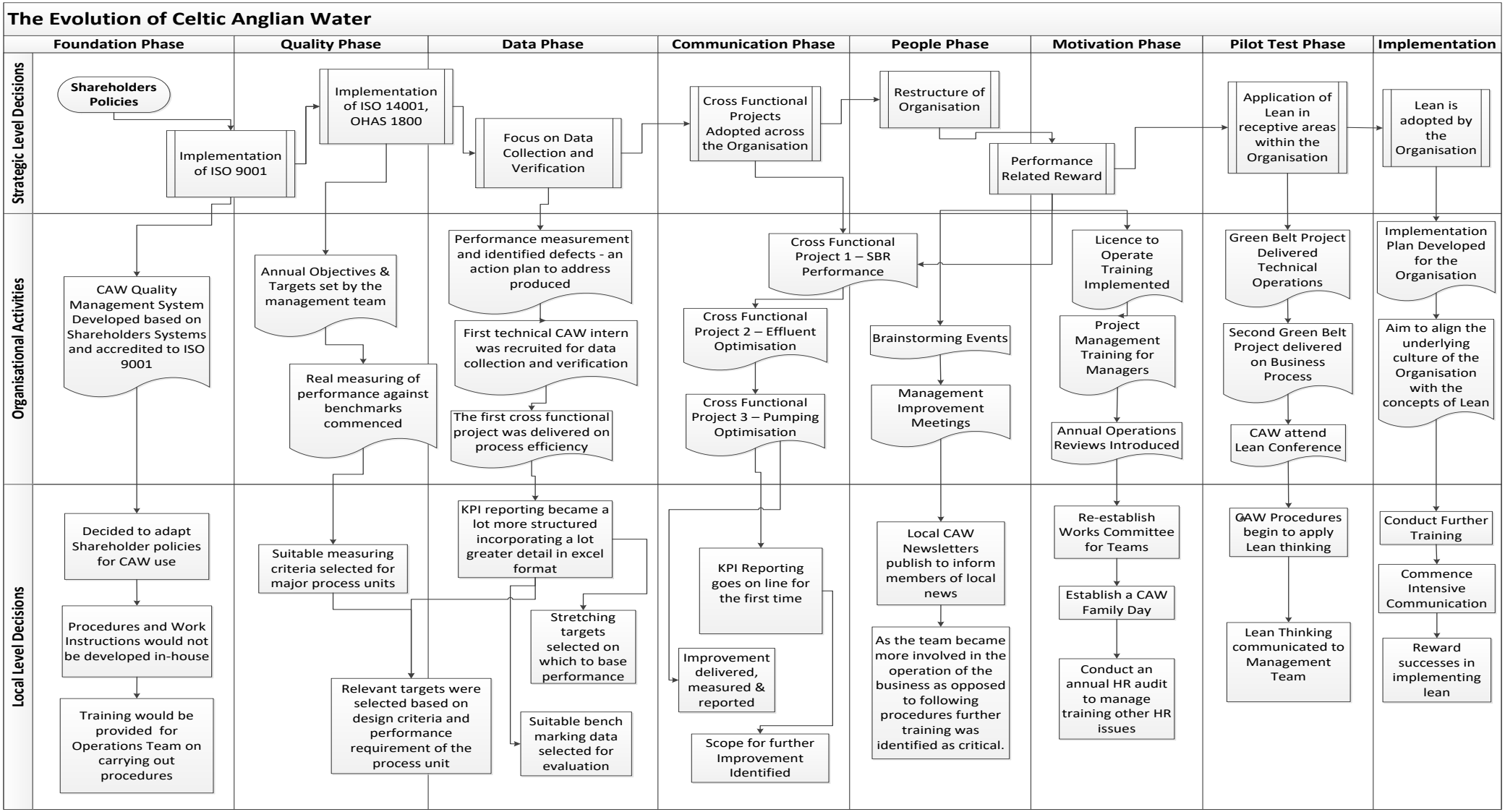


Figure 6.7 Visual Map of the Organisation's Evolution

Through discussion with the organisation's management team at that time, a simpler visual map of the timeline became evident. Through a greater understanding of the background to the decisions and activities, it was possible to move activities and decisions into phases that more accurately described the evolution of the organisation's structure. In addition, significant external events that were absent from the data and impacted the organisation were identified in a much simpler linear progression of the evolution.

Phases and Events in the Evolution of the Organisation

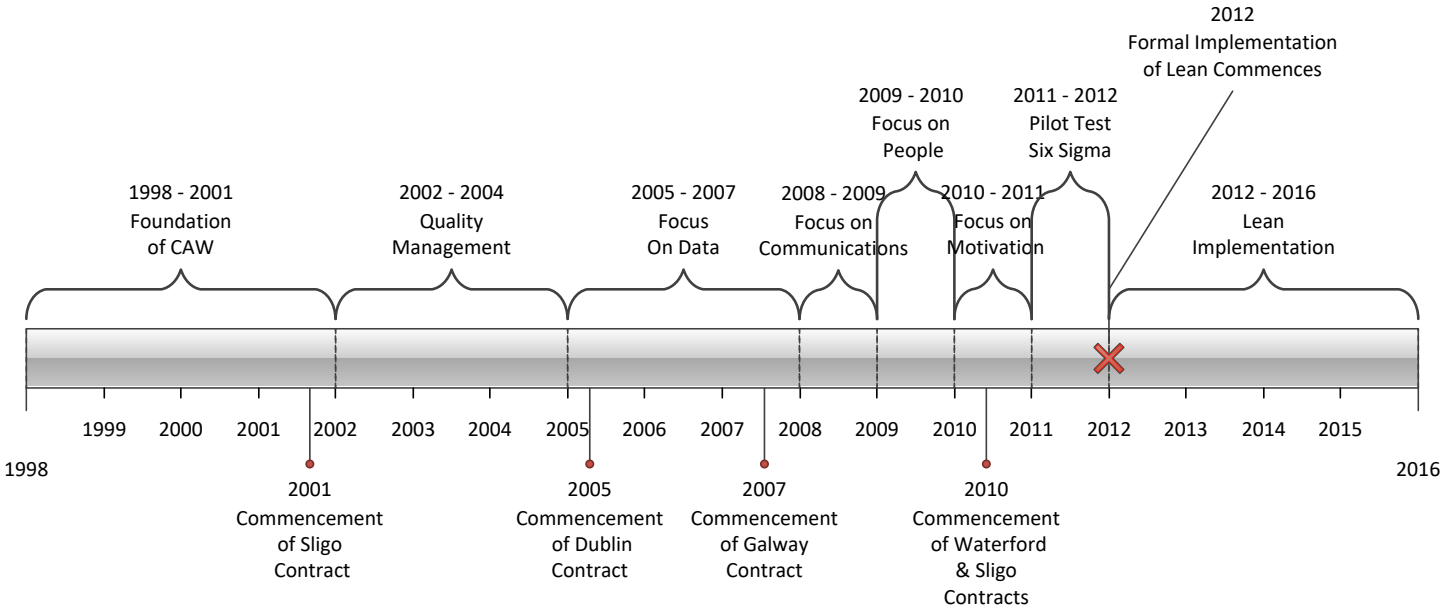


Figure 6.8 Linear Progression of the Evolution of the Organisation

As the theory-building process begins the data from the organisation is examined in light of existing accepted concepts and theory, and recursive instances of phenomena are identified that are based on a variety of data sources (Eisenhardt et al., 2007). In this instance, the data from the organisation was examined to identify Quinn's competing values. Through initially examining the data using a narrative strategy, subsequently carrying out a detailed visual mapping process of the evolution of the organisation (Figure 3), and lastly producing a simplified linear progression of the phases of evolution (Figure 4) eight individual phases of evolution have been identified. Each of these phases is distinct and individual in their

characteristics and promote a unique facet of the culture of the organisation resulting in the organisation changing and evolving.

To understand this evolution of the organisation the value or values that are most apparent from the data for the phase are examined. In each phase of development, the critical work streams that impact are identified in the structure of the organisation. The initiatives associated with the work stream are described and the impact of those initiatives on the structure of the organisation. Lastly, the data sources are examined to identify the presence, or lack thereof, of each of Quinn's values.

Quinn's 16 Competing Values

Productivity	Efficiency	Planning
Objective Setting	Evaluation	Control
Stability	Information Management	Communication
Resources acquisition	External Support	Flexibility
Readiness	Value of HR	Cohesion
Morale		

The output of this examination is the table below identifying the presence of specific values within the data; these often reoccur on multiple occasions within a single-phase thereby reinforcing the presence of the value identified.

Linking Quinn's Competing Values to the Organisation

Phase	Work Stream	Initiatives	Impacts	Link to Competing Values	Source Material
Foundation of CAW 1998 - 2002	1998 - Introduction of organisational corporate governance	Establish control over the operation of the business adopting internal control procedures	Detailed procedures were imported from one of the founding shareholders businesses which was much larger than CAW and operating in a highly regulated environment resulting in a high degree of control and very low flexibility.	There was a high degree of **planning** within the internal procedures focusing on **efficiency**, **productivity**, and **reporting** or **evaluating** leading to a low degree of flexibility. There was a strong focus on **control** and **stability** within the organisation as a result of the highly **proceduralised** operation.	Early Audit Reports Sample Procedure Lists
Quality Manage-ment 2002 - 2005	2002 - Implementation of a quality management system	Implement an accredited quality driven management system to deliver of services to the customer	The implementation of a quality management system resulted in a greater level of control over the delivery of contractual requirements to the customer. All aspects of the business were detailed in internal procedures leading to a high degree of administration and a narrowing of roles and responsibilities.	High degree of **procedural planning** at all levels leading to excessive burden of administration. **Control** of all aspects of the operation was the highest priority. **Evaluation** of **performance** was promoted without focus on the root cause of defects and focus was always on **immediate improvement** to deliver **productivity** as opposed to strategic planning	2002 CAW ISO 9001 accreditation
	2005 - Implementation of integrated quality, health and safety, and environmental management	Improve the management of health and safety and environmental aspects of the organisation by implementing an accredited integrated	The organisation moved towards measuring performance in areas outside of contractual compliance and identifying areas for improvement. This structured approach led to the organisation setting objectives in areas outside quality and looking for means of driving improvements in environmental and health and safety performance.	The implementation of an integrated management system resulted in a greater level of **control** and **procedure** oriented delivery of the organisational **objectives** removing flexibility from individuals to improve processes. Annual **objective** setting and **planning** had the overriding influence on the operation of the business resulting in **short term**	2005 CAW ISO 9001, 14001 & OHAS 18001 accreditation
Focus on Data 2006 - 2007	2006 - Thermal Hydrolysis Plant Improvement Action Plan	Increase throughput in the Thermal Hydrolysis Plant by d introducing management controls	Throughput, a critical element of the treatment works, was improved by 23% by addressing defects within the process and implementing controls which employees were required to follow.	This was the first effort by the organisation at delivering a **brainstorming** session to look **beyond short term** productivity and address longer term **performance**. Results were **communicated** on a daily basis to the entire organisation.	CAW THP Action Plan. Procedures for operation of the plant.
	2006 - KPI Reporting Introduced	Increase the monitoring and reporting of the plants performance	Key performance indicators were identified for critical areas of the plant and an emailed report was sent to senior management on a daily basis	**Longer term performance metrics** were identified to focus on **improvement** as opposed to productivity and **communication** of these metrics was identified as critical.	First emailed KPI Report 9 June 2006
	2007 - Optimisation Project Delivery	Deliver three large projects to improve performance in specific areas of the plant	The plant process manager recruited a dedicated resource for the purposes of collecting data, measuring performance, identifying areas for improvement, and implementing improvement in three specific areas. Three successful projects were delivered with all three removing large elements of waste.	A much more **data** driven approach to process management focusinf on **root casuse analysis** was adopted leading to an increased level of **information** available upon which decisions could be made based on **facts** as opposed to opinions. The result was a more **informed** discussion on performance over a longer term.	Project Reports
Focus on Commu-nication - 2008	2008 - Restructure of Operations Team	Improve communications and organisational effectiveness through restructure of the operations team	As the level of management control increased the existing structure of the team led to the senior manager becoming an impediment to progress as there was too much information and requests being processed through the function. The revised structure provided more autonomy to individual teams allowing them to make more decisions themselves.	While a strong focus on **control** and **stability** remained within the organisation there was a realisation that in order to drive **improvement** there need to be more effective management of **information** and **communication** within the structure of the organisation.	Presentation on the restructure of the operations team as present to SMT
	2008 - Introduction of Management improvement meetings	Implementation of cross functional teams, KPI measurement, energy teams, and improved communications	An energy management team was introduced including members of a number of different areas within the organisation. A new performance report was implemented for monitoring and communication of performance. A CAW company newsletter was introduced to communicate with people within the company.	There was a **broadening** of roles and responsibilities with **cross functional teams** and an increased level of **communications** allowing the entire organisation feed into improvements that were required throughout the organisation. **Planning** and **evaluating** was now carried out based on real data and a **longer term focus.**	Management Improvement Meeting Minutes and Agenda.
	2008 - Delivery of Improved Staff Facilities	Improve the morale and motivation and recognise the efforts delivered by the team	The efforts of the team were recognised and rewarded through the improvement of the welfare facilities used by the team. Employees were provided with open access on phones and internet for both work related and reasonable private use	The **morale** of the team was addressed as a **critical element** to deliver improved **performance** in the longer term and the organisation begun to **value the human recourses** of the organisation in line with the other inputs required by the business.	New Employee facilities and open access employees to internet

Focus on People - 2009	2009 - Performance related bonus mechanism	A mechanism for the award of bonus payments to employees based on performance of the organisation	Through the increased level of performance measurement the critical success factors and key performance indicators became obvious. The remuneration of the team was linked to the performance of the business though identifying targets and rewards.	The organisation begun to **reward the people** within the organisation delivering the increased value by linking **remuneration** to **performance**. There was clear **communication** of priorities to the team resulting in a **cohesive** effort by the organisation	CAW Target and Reward Mechanism Procedure
	2009 - Implementation of Advanced Operator Training	Improve the knowledge of the employees charged with the operation of the plant	Through advanced training operators were provided with a wider range of knowledge allowing them to make informed decisions base on facts and a wider view of the operation of the entire business as opposed to their unit.	Through increased **training** and **knowledge** employees had the ability to resolve problems as opposed to solely reporting them. There was an initial move away from the proceduralised control of the operation to increased **flexibility** within the organisation.	Advanced Operator Training Program
	2009 - Advanced Project Management Training	Improve ability of organisation to deliver complex projects	Larger more technical projects were delivered by the team through a more structured approach to measurement, analysis, and implementation.	**External** technical **training** was provided to staff to provide the **skills** required to deliver improvements of a more technical manner.	Prince Project Management course
Focus on Motivat-ion - 2010	2010 - CAW Corporate Social Responsibility Policy	Increase the organisations interaction with surrounding communities	A corporate social responsibility policy was developed by the organisation and employees were encouraged to bring forward worthwhile and relevant projects that the organisation could become involved in.	Employees were encouraged to become involved in projects outside of the daily roles within the organisation and work on projects within the community leading to a more **cohesive** team within the organisation.	CAW Corporate Social Responsibility Policy
	2010 - Human Resource Management	Improve the way in which the organisation managed	A more structured approach to managing human resources was adopted focusing on training, staff retention, and staff involvement at all levels of the	The organisation **evaluated** its use of **human resources** in a structured way identifying the organisation's **readiness** to deal with unforeseen	CAW HR Audit. Appointment HR Coordinator
	2010 - CAW Family Day	Improve Team Morale encouraging family events	As a young organisation there was little focus outside of organisational performance, however with increased focus on the human aspects of the organisation came the realisation of the need to provide greater intrinsic motivation for employees.	**Morale** and **cohesion** within the organisation was improved by encouraging family based company events as opposed to solely focusing on productivity within the organisation.	CAW Family Day Announcement
Pilot Testing of Six Sigma - 2011	2011 - First Six Sigma Green Belt Project	Improve Performance of the Thermal Drying Plant	The first lean six sigma project was delivered on improvement of the performance of the Thermal Drying Plant, delivering a 30% decrease in plant downtime and a 11% reduction in gas consumption	**External** **training** and **resources** were applied to deliver an increased level of **knowledge** in driving **improvement** within the organisation	Thermal Drying Plant Green Plant Project Charter
	2011 - Six Sigma Procurement Project	Improve procurement processes within the organisation	A six sigma project was undertaken to reduce the time required for procurement and invoicing by 33% while satisfying internal governance	A second green belt project was delivered on an **organisational level** to drive improvement within **internal processes** demonstrating the **flexible** nature and benefits of lean	Procurement Improvement Project
	2012 - Lean Six Sigma Conference	Investigate the benefits of implementing lean six sigma on an organisational level	It became apparent that lean and six sigma could deliver greater benefits to CAW if implemented on an organisational level as opposed to just on a project by project basis post attending a conference on Lean	As a result of looking **outside** the organisation the benefits of lean were identified and these benefits were communicated to the senior management of the organisation to secure **commitment** at the highest levels within the organisation to implementing lean	Irish Lean Conference - RDS March 2012
Lean Implementation Phase 2012 - Present	2012 - Presenting on Lean	Secure senior management buy in	Through presentation and providing information the but in of senior management was secured and the implementation of lean begun	Formal implementation of lean commenced in an effort to deliver increased levels of **flexibility** and **readiness** to adapt to ever changing environment.	Lean Presentation to Senior Management Team

Figure 6.9 - Linking Quinn's Competing Values to the Organisation

6.4 Findings Phase 1 - Retrospective Examination of Value Structure

As the organisation evolved throughout the 15 years the value system within the organisation also evolved to that of one with a more flexible orientation. As values are identified in the phases of evolution and moved into a table the orientation of the value system within the organisation becomes apparent in addition to how it has evolved. The dominant values of the early phases such as productivity and efficiency have been accompanied that of human resource focus and resource acquisition in more contemporary times. This would suggest an evolution towards a more flexible orientation before the six sigma pilot test phase and the lean implementation phase.

Control v's Flexibility	Developmental Period	Work Stream	Initiatives	Impacts	Link to Competing Values	Source Material
Control	**Foundation of CAW 1998 - 2002**	1998 - Introduction of organisational corporate governance	Establish control over the operation of the business adopting internal control procedures	Detailed procedures were imported from one of the founding shareholders businesses which was much larger than CAW and operating in a highly regulated environment resulting in a high degree of control and very low flexibility.	There was a high degree of **planning** within the internal procedures focusing on **efficiency**, **productivity**, and **reporting** or **evaluating** leading to a low degree of flexibility. There was a strong focus on **control** and **stability** within the organisation as a result of the highly **proceduralised** operation.	Early Audit Reports Sample Procedure Lists
	Quality Phase 2002 - 2005	2002 - Implementation of a quality management system	Implement an accredited quality driven management system to deliver of services to the customer	The implementation of a quality management system resulted in a greater level of control over the delivery of contractual requirements to the customer. All aspects of the business were detailed in internal procedures leading to a high degree of administration and a narrowing of roles and responsibilities.	High degree of **procedural planning** at all levels leading to excessive burden of administration. **Control** of all aspects of the operation was the highest priority. **Evaluation** of **performance** was promoted without focus on the root cause of defects and focus was always on **immediate improvement** to deliver **productivity** as opposed to strategic planning	2002 CAW ISO 9001 accreditation
		2005 - Implementation of integrated quality, health and safety, and environmental management system	Improve the management of health and safety and environmental aspects of the organisation by implementing an accredited integrated management system	The organisation moved towards measuring performance in areas outside of contractual compliance and identifying areas for improvement. This structured approach led to the organisation setting objectives in areas outside quality and looking for means of driving improvements in environmental and health and safety performance. There was a strong focus on immediate improvement based on measurement and objective setting.	The implementation of an integrated management system resulted in a greater level of **control** and **procedure** oriented delivery of the organisational **objectives** removing flexibility from individuals to improve processes. Annual **objective** setting and **planning** had the overriding influence on the operation of the business resulting in **short term improvements**.	2005 CAW ISO 9001, 14001 & OHAS 18001 accreditation
	Controlled Improvement Phase 2006 - 2007	2006 - Thermal Hydrolysis Plant Improvement Action Plan	Increase throughput in the Thermal Hydrolysis Plant by d introducing management controls	Throughput, a critical element of the treatment works, was improved by 23% by addressing defects within the process and implementing controls which employees were required to follow.	This was the first effort by the organisation at delivering a **brainstorming** session to look **beyond short term** productivity and address longer term **performance**. Results were **communicated** on a daily basis to the entire organisation.	CAW THP Action Plan. Procedures for operation of the plant.
		2006 - KPI Reporting Introduced	Increase the monitoring and reporting of the plants performance	Key performance indicators were identified for critical areas of the plant and an emailed report was sent to senior management on a daily basis	**Longer term performance metrics** were identified to focus on **improvement** as opposed to productivity and **communication** of these metrics was identified as critical.	First emailed KPI Report 9 June 2006
		2006 - Introduction of Integrated Annual Objectives	Identify areas that could be improved and implement projects to address deficiencies	A more structured approach was implemented in measuring performance outside areas such as contractual compliance and critical deliverables. Areas such as efficiency and effectiveness were measured and targeted for improvements. Measurable outcomes were identified in throughput and waste reduction	A **longer term** view was considered on means of **improving** performance as opposed to simply delivering contractual requirements. **Root causes** of defects were identified and a structured approach was adopted to address issues raised.	2006 CAW Annual Objectives
		2006 - Increased Performance Measurement	Implement a more structured and detailed means of measuring performance	Through increased monitoring and measurement the organisation went about determining areas of waste within the organisation. There was significant data ascertained in the areas of power use and efficiency of the process	**Data** or **information management** was focused upon to drive **improvement** as opposed to reactive initiatives to address defects in **productivity**	Email on the implantation of power monitoring 27 July 2006
		2007 - Optimisation Project Delivery	Deliver three large projects to improve performance in specific areas of the plant	The plant process manager recruited a dedicated resource for the purposes of collecting data, measuring performance, identifying areas for improvement, and implementing improvement in three specific areas. Three successful projects were delivered with all three removing large elements of waste.	A much more **data** driven approach to process management was adopted leading to an increased level of **information** available upon which decisions could be made based on **facts** as opposed to opinions. The result was a more **informed** discussion on performance over a longer term.	Project Reports

	Culture Conditioning Phase - 2008	2008 - Restructure of Operations Team	Improve communications and organisational effectiveness through restructure of the operations team	As the level of management control increased the existing structure of the team led to the senior manager becoming an impediment to progress as there was too much information and requests being processed through the function. The revised structure provided more autonomy to individual teams allowing them to make more decisions themselves.	While a strong focus on **control** and **stability** remained within the organisation there was a realisation that in order to drive **improvement** there need to be more effective management of **information** and **communication** within the structure of the organisation.	Presentation on the restructure of the operations team as present to senior management within the
		2008 - Introduction of Management improvement meetings	Implementation of cross functional teams, KPI measurement, energy teams, and improved communications	An energy management team was introduced including members of a number of different areas within the organisation. A new performance report was implemented for monitoring and communication of performance. A CAW company newsletter was introduced to communicate with people within the company.	There was a **broadening** of roles and responsibilities with **cross functional teams** and an increased level of **communications** allowing the entire organisation feed into improvements that were required throughout the organisation. **Planning** and **evaluating** was now carried out based on real data and a **longer term focus.**	Management Improvement Meeting Minutes and Agenda.
		2008 - Delivery of Improved Staff Facilities	Improve the morale and motivation and recognise the efforts delivered by the team	The efforts of the team were recognised and rewarded through the improvement of the welfare facilities used by the team. Employees were provided with open access on phones and internet for both work related and reasonable private use	The **morale** of the team was addressed as a **critical element** to deliver improved **performance** in the longer term and the organisation begun to **value the human recourses** of the organisation in line with the other inputs required by the business.	New Employee facilities and open access provided to all employees to internet
	Focus on People - 2009	2009 - Performance related bonus mechanism	A transparent mechanism for the award of bonus payments to employees based on performance of the organisation	Through the increased level of performance measurement the critical success factors and key performance indicators became obvious. The remuneration of the team was linked to the performance of the business though identifying targets and rewards.	The organisation begun to **reward the people** within the organisation delivering the increased value by linking **remuneration** to **performance**. There was clear **communiction** of priorities to the team resulting in a **cohesive** effort by the organisation	CAW Target and Reward Mechanism Procedure
		2009 - Implementation of Advanced Operator Training	Improve the knowledge of the employees charged with the operation of the plant	Through advanced training operators were provided with a wider range of knowledge allowing them to make informed decisions base on facts and a wider view of the operation of the entire business as opposed to their unit.	Through increased **training** and **knowledge** employees had the ability to resolve problems as opposed to solely reporting them. There was an initial move away from the proceduralised control of the operation to increased **flexibility** within the organisation.	Advanced Operator Training Program
		2009 - Advanced Project Management Training	Improve the ability of manager within the organisation to deliver complex projects	Larger more technical projects were delivered by the team through a more structured approach to measurement, analysis, and implementation.	**External** technical **training** was provided to staff to provide the **skills** required to deliver improvements of a more technical manner.	Prince Project Management course
	Focus on Morale - 2010	2010 - CAW Corporate Social Responsibility Policy	Increase the organisations interaction with surrounding communities	A corporate social responsibility policy was developed by the organisation and employees were encouraged to bring forward worthwhile and relevant projects that the organisation could become involved in.	Employees were encouraged to become involved in projects outside of the daily roles within the organisation and work on projects within the community leading to a more **cohesive** team within the organisaiton.	CAW Corporate Social Responsibility Policy
		2010 - Human Resource Management	Improve the way in which the organisation managed its human recourses	A more structured approach to managing human resources was adopted focusing on training, staff retention, and staff involvement at all levels of the organisation	The organisation **evaluated** its use of **human resources** in a structured way identifying the organisation's **readiness** to deal with unforeseen events.	CAW HR Audit. Appointment of HR Coordinator
Flexibility		2010 - CAW Family Day	Improve Team Morale encouraging family events	As a young organisation there was little focus outside of organisational performance, however with increased focus on the human aspects of the organisation came the realisation of the need to provide greater intrinsic motivation for employees.	**Morale** and **cohesion** within the organisation was improved by encouraging family based company events as opposed to solely focusing on productivity witihin the organisation.	CAW Family Day Announcement
	Pilot Testing of Six Sigma - 2011	2011 - First Six Sigma Green Belt Project	Improve Performance of the Thermal Drying Plant	The first lean six sigma project was delivered on improvement of the performance of the Thermal Drying Plant, delivering a 30% decrease in plant downtime and a 11% reduction in gas consumption	**External** **training** and **resources** were applied to deliver an increased level of **knowledge** in driving **improvement** within the organisation	Thermal Drying Plant Green Plant Project Charter
		2011 - Six Sigma Procurement Project	Improve procurement processes within the organisation	A six sigma project was undertaken to reduce the time required for procurement and invoicing by 33% while satisfying internal governance	A second green belt project was delivered on an **organisational level** to drive improvement within **internal processes** demonstrating the **flexible** nature and benefits of lean	Procurement Improvement Project
		2012 - Lean Six Sigma Conference	Investigate the benefits of implementing lean six sigma on an organisational level	It became apparent that lean and six sigma could deliver greater benefits to CAW if implemented on an organisational level as opposed to just on a project by project basis post attending a conference on Lean	As a result of looking **outside** the organisation the benefits of lean were identified and these benefits were communicated to the senior management of the organisation to secure **commitment** at the highest levels within the organisation to implementing lean	Irish Lean Conference - RDS March 2012

Whilst Quinn's competing values model may suggest a presence of either a set of control orientated values or a set of flexible orientated values, our examination, presented in Figure 6 below, would suggest that whilst there is evidence of flexibility, the original emphasis on control of key organisational functions remains. However, the pace of the implementation and the early successes experienced by the organisation, coupled with further evidence of increased flexibility, would suggest that the flexible orientation of the culture of the organisation fostered a successful implementation by introducing many of the necessary values prior to the implementation phase. Had the organisation been moving from a position earlier in its evolution, where a more control orientated value system dominated, the implementation phase may have been much more challenging. The task of implementing a new value structure in addition to the challenge of implementing a new strategy would certainly have been greater. These results suggest that the presence of a flexible orientated value system within the organisation facilitated the implementation of the lean philosophy.

Where there was no reference to any of Quinn's values in the analysis of the historic information analysed a score of "low" was determined for that value, in the case that there was one reference to a value in the historic information a score of "medium" was determined, in the event, there were multiple references to a value a score of "high" was determined. The output of this analysis has been presented in Table 6.10.

Organisational Timeline Linked to Quinn's Competing Values

Organisation Developmental Period	Organisational Values															
	CONTROL - Rational Model									FLEXIBILITY - Natural Systems Model						
	Rational Goal Model					Internal Process Model				Open Systems Model				Human Resource Model		
	Productivity	Efficiency	Planning	Objective Setting	Evaluation	Control	Stability	Information Management	Communic-ation	Resources acquisition	External Support	Flexibility	Readiness	Value of HR	Cohesion	Morale
Foundation of CAW 1998 - 2002	High	High	High	Medium	Medium	High	High	Low	Low	Low	Low	Low	Low	Low	Low	Low
Quality Management 2002 - 2005	High	High	High	High	Medium	High	High	Low	Low	Low	Low	Low	Low	Low	Low	Low
Focus on Data 2006 - 2007	High	High	High	High	Medium	High	High	Medium	Medium	Low	Low	Low	Low	Medium	Low	Medium
Focus on Communications 2008	High	High	High	High	High	Medium	Medium	Medium	Medium	Low	Low	Low	Low	High	Low	Medium
Focus on People 2009	High	High	High	High	High	Medium	Medium	Medium	High	Medium	Medium	Medium	Medium	High	Low	Medium
Focus on Morale 2010	High	High	High	High	High	Medium	Medium	High	High	Medium	Medium	Medium	Medium	High	Medium	Medium
Pilot Test of Six Sigma 2011	High	High	High	High	High	Low	Medium	High	High	High	Medium	Medium	High	High	Medium	High
Implementation of Lean 2012	High	High	High	High	High	Low	Medium	High	High	High	High	High	High	High	High	High

Figure 6.10 Organisational Timeline Linked to Quinn's Competing Values

6.5 Propositions Phase 1 - Retrospective Examination of Value Structure

Phase one of the research sought to answer questions three and four as posed in previous chapters. The literature suggested that for there to be a successful implementation and a realisation of the benefits of the lean philosophy there would need to be alignment between the culture of the organisation and the values of the philosophy (Zammuto, 1992). This, therefore, suggests that, for a successful implementation, elements of a lean culture should be present prior to the formal implementation.

Question 3	*How were the values in the organisation structured prior to the implementation of lean?*	***Phase 1 & 2 Research***
Proposition No 3	**Prior to the implementation of lean the factors of innovation, respect for people, attention to detail, and decisiveness will have the most prominence whilst the factors of stability, results orientation, and aggressiveness will have the least.**	
Question 4	*Was there a change in the value structure within the organisation prior to the implementation of lean?*	***Phase 1 Research***
Proposition No 4	**In the years prior to the implementation of lean the organisation moved from a control orientated structure towards a more flexibly orientated organisation**	

6.5.1 Phase 1 - Proposition Number 3

Proposition number three suggested O'Reilly's factors of innovation, respect for people, attention to detail, and decisiveness will have most prominence in the values of the organisation, these factors would equate to Quinn's competing values of readiness, the value of HR, external support and the analysis identifies that before the formal implementation of lean there were already strong indicators of a lean culture. Secondly,

proposition number three would also suggest that O'Reilly's factors of stability, results orientation, and aggressiveness will have the least prominence.

When considering proposition three from a competing values perspective the factors of stability, productivity, and control on the Rational Control side of the model have become more prominent. The factors of control and stability became less prominent through the evolution of the organisational culture. This would lead to confirming proposition number three when analysing from both phase one and phase two independently. This would further serve to confirm the reliability, validity, and repeatability of the research and methodology selected.

6.5.2 Phase 1 - Proposition Number 4

Proposition number four suggested that prior to the implementation of lean the organisation moved from a control orientated structure towards a more flexibly orientated organisation. This proposition has been confirmed, the flexibly oriented factors of resource acquisition, readiness, external support, morale, human resources, cohesion and flexibility all increased in prominence towards the end of phase one of the research. This confirms that the organisation moved from a control orientation to a flexible orientation over time.

6.5 Modified Occupational Culture Profile Analysis

To carry out an initial assessment of the values in the organisation prior to consideration of the factors, the values were ranked in year 1 and their movement was then tracked from that base. The values were ranked from most characteristic value to least characteristic with the movement tracked both in direction and by the number of positions in the ranking. Flexibility, quality, and being supportive were ranked in the top ten values across the four years of the survey which would suggest a strong orientation towards flexibility. However, so too was results orientation which would suggest a shorter-term focus.

6.6 Analysis Phase 2 - Longitudinal OCP Data

This section presents the results from the four years of quantitative surveys carried out in the organisation throughout the formal lean implementation programme. The surveys required respondents to rank the provided values in order from most characteristic of the organisation to least characteristic of the organisation. The responses to the surveys were collated in an excel data base and an average score for each value was calculated for each year. This allowed the values to be ranked and baselined in year one and tracked over the four years to establish the direction and level of movement as the implementation progressed.

The collated averages for each value for years one to four are presented in table 6.1. The values are ranked in each year from the most characteristic to the least characteristic and the level and direction of movement are identified by both an indicator and a numerical level of movement in ranking. The level of movement is tracked from a baseline of year one to establish a level of movement from the beginning of the implementation as opposed to the incremental movement from year to year.

6.6.1 OCP Value Analysis

As anticipated in the literature, the level of movement in value ranking and average scoring is not enormous and whilst this makes the identification of movement in the organisational culture more challenging, it has demonstrated the high degree of repeatability and accuracy of the survey model in establishing the value structure in the organisation.

2014 Values Order of Importance - Prior to Implementation			2015 Values Order of Importance and change in position since 2014 - Post Year 1 of Implementation			Change	2016 Values Order of Importance and change in position since 2014 - Post Year 2 of Implementation			Change	2017 Values Order of Importance and change in position since 2014 - Post Lean Implementation			Change
1	Flexibility	6.361	1	↑	Having a good reputation	6.516	1	1	↑	Being results oriented	6.338	2	1	↑	Security of employment	6.145	5
2	Having a good reputation	6.200	2	↓	Flexibility	6.281	-1	2	→	Having a good reputation	6.311	0	2	↑	An emphasis on quality	6.039	2
3	Being results oriented	6.141	3	→	Being results oriented	6.203	0	3	↑	An emphasis on quality	6.149	1	3	↓	Having a good reputation	5.987	-1
4	An emphasis on quality	6.041	4	↑	Security of employment	6.047	2	4	↑	Security of employment	6.000	2	4	↓	Being results oriented	5.987	-1
5	Achievement orientation	6.028	5	↓	An emphasis on quality	5.984	-1	5	↓	Flexibility	5.959	-4	5	↑	Action orientation	5.907	8
6	Security of employment	6.027	6	↑	Having high expectation for performance	5.953	4	6	↑	Action orientation	5.932	7	6	↑	Being supportive	5.840	1
7	Being supportive	5.914	7	↓	Achievement orientation	5.891	-2	7	→	Being supportive	5.892	0	7	↓	Flexibility	5.827	-6
8	Being careful	5.889	8	↓	Being supportive	5.719	-1	8	↑	Fitting in	5.716	7	8	↑	Being socially responsible	5.787	8
9	Stability	5.847	9	→	Stability	5.594	0	9	↑	Enthusiasm for the job	5.649	13	9	→	Stability	5.680	0
10	Having high expectation for performance	5.817	10	↓	Being careful	5.578	-2	10	→	Having high expectation for performance	5.630	0	10	↓	Being careful	5.658	-2
11	Being team oriented	5.806	11	↑	Enthusiasm for the job	5.563	11	11	↑	Being competitive	5.589	24	11	↑	Having high expectation for performance	5.640	1
12	Respect for the individual's right	5.542	12	↑	Taking initiative	5.500	7	12	↑	Low level of conflict	5.581	14	12	↑	Low level of conflict	5.635	14
13	Action orientation	5.452	13	↓	Being team oriented	5.469	-2	13	↑	Being analytical	5.568	5	13	↓	Achievement orientation	5.600	-8
14	Being easy going	5.408	14	↑	Opportunities for professional growth	5.453	13	14	↓	Stability	5.507	-5	14	↑	Enthusiasm for the job	5.461	8
15	Fitting in	5.394	15	↓	Action orientation	5.406	-2	15	↓	Being team oriented	5.438	-4	15	↑	Tolerance	5.400	9
16	Being socially responsible	5.380	16	↑	Low level of conflict	5.359	10	16	↑	Decisiveness	5.438	20	16	↑	Taking initiative	5.320	3
17	Predictability	5.356	17	↓	Being socially responsible	5.281	-1	17	↑	Taking initiative	5.397	2	17	↑	Opportunities for professional growth	5.316	10
18	Being analytical	5.329	18	↓	Fitting in	5.250	-3	18	↓	Achievement orientation	5.301	-13	18	↓	Fitting in	5.280	-3
19	Taking initiative	5.304	19	↓	Being analytical	5.219	-1	19	↓	Being socially responsible	5.274	-3	19	↓	Respect for the individual's right	5.227	-7
20	Being innovative	5.292	20	↑	Tolerance	5.203	4	20	↑	Fairness	5.203	5	20	↓	Being analytical	5.211	-2
21	Adaptability	5.247	21	↑	Being demanding	5.094	17	21	↓	Respect for the individual's right	5.189	-9	21	↑	Being calm	5.187	2
22	Enthusiasm for the job	5.222	22	↑	Being calm	5.078	1	22	↓	Being careful	5.151	-14	22	↑	Working in collaboration with others	5.147	7
23	Being calm	5.188	23	↑	Working in collaboration with others	5.078	6	23	↑	Being highly organized	5.108	7	23	↑	Fairness	5.133	2
24	Tolerance	5.167	24	↓	Adaptability	5.063	-3	24	→	Tolerance	5.095	0	24	↑	Decisiveness	5.120	12
25	Fairness	5.127	25	↑	Decisiveness	5.063	11	25	↑	Opportunities for professional growth	5.082	2	25	↑	Taking individual responsibility	5.107	3
26	Low level of conflict	5.085	26	↑	Taking individual responsibility	5.063	1	26	↓	Being innovative	5.027	-6	26	↓	Adaptability	5.105	-5
27	Opportunities for professional growth	5.070	27	↑	Paying attention to detail	5.031	6	27	↓	Adaptability	5.014	-6	27	↑	Being demanding	5.053	11
28	Taking individual responsibility	5.029	28	↓	Fairness	5.016	-3	28	↓	Being calm	4.973	-5	28	↓	Being easy going	4.974	-14
29	Working in collaboration with others	4.985	29	↓	Predictability	5.000	-12	29	→	Working in collaboration with others	4.959	0	29	↑	Being reflective	4.961	12
30	Being precise	4.855	30	↓	Respect for the individual's right	4.906	-18	30	↑	Paying attention to detail	4.918	3	30	↑	Being competitive	4.947	5
31	Being highly organized	4.838	31	↑	Being people oriented	4.891	3	31	↓	Being precise	4.890	-1	31	↓	Being team oriented	4.947	-20
32	A willingness to experiment	4.819	32	↑	Informality	4.891	5	32	↑	Not being constrained by many rules	4.838	7	32	↑	Not being constrained by many rules	4.920	7
33	Paying attention to detail	4.817	33	↑	Developing friends at work	4.891	9	33	↑	Being reflective	4.819	8	33	↑	Developing friends at work	4.895	9
34	Being people oriented	4.803	34	↓	Being highly organized	4.844	-3	34	↑	Developing friends at work	4.784	8	34	↓	Predictability	4.773	-17
35	Being competitive	4.786	35	↓	Being innovative	4.828	-15	35	↑	Being rule oriented	4.770	9	35	↑	Confronting conflict directly	4.763	16
36	Decisiveness	4.778	36	↓	Being precise	4.828	-6	36	↑	Being demanding	4.767	2	36	↓	Being highly organized	4.724	-5
37	Informality	4.767	37	↓	Being easy going	4.813	-23	37	↓	Taking individual responsibility	4.750	-9	37	↑	Working long hours	4.716	13
38	Being demanding	4.746	38	↑	Being reflective	4.734	3	38	↑	Working long hours	4.649	12	38	↑	Autonomy	4.711	7
39	Not being constrained by many rules	4.718	39	↑	Offers praise for good performance	4.734	9	39	↑	Offers praise for good performance	4.635	9	39	↑	Being distinctive-different from others	4.697	8
40	Having a clear guiding philosophy	4.718	40	↓	A willingness to experiment	4.625	-8	40	↓	Being people oriented	4.589	-6	40	↓	Informality	4.667	-3
41	Being reflective	4.616	41	↑	Being rule oriented	4.609	3	41	↓	Predictability	4.562	-24	41	↓	Being people oriented	4.587	-7
42	Developing friends at work	4.616	42	↓	Having a clear guiding philosophy	4.563	-2	42	↓	Being easy going	4.541	-28	42	↑	Offers praise for good performance	4.573	6
43	Being quick to take advantage of opportunities	4.479	43	↓	Being competitive	4.547	-8	43	↓	A willingness to experiment	4.521	-11	43	↓	Being precise	4.547	-13
44	Being rule oriented	4.466	44	↓	Not being constrained by many rules	4.438	-5	44	↑	Being distinctive-different from others	4.405	3	44	→	Being rule oriented	4.467	0
45	Autonomy	4.451	45	↑	Being distinctive-different from others	4.359	2	45	↓	Having a clear guiding philosophy	4.405	-5	45	↓	Having a clear guiding philosophy	4.467	-5
46	Sharing information freely	4.260	46	↑	Working long hours	4.344	4	46	↓	Informality	4.392	-9	46	↓	Paying attention to detail	4.329	-13
47	Being distinctive-different from others	4.239	47	↓	Autonomy	4.219	-2	47	↓	Autonomy	4.342	-2	47	↓	A willingness to experiment	4.263	-15
48	Offers praise for good performance	4.130	48	↓	Sharing information freely	4.206	-2	48	↓	Sharing information freely	4.284	-2	48	↓	Being innovative	4.197	-28
49	organization	4.000	49	→	organization	4.063	0	49	↑	Confronting conflict directly	4.041	2	49	→	organization	4.118	0
50	Working long hours	3.972	50	↑	Confronting conflict directly	3.875	1	50	↓	Being quick to take advantage of opportunities	4.014	-7	50	↓	Being quick to take advantage of opportunities	4.105	-7
51	Confronting conflict directly	3.877	51	↓	Being quick to take advantage of opportunities	3.844	-8	51	↑	Risk taking	3.877	1	51	↓	Sharing information freely	4.000	-5
52	Risk taking	3.875	52	↓	Risk taking	3.844	-1	52	↑	Being aggressive	3.699	2	52	↑	High pay for good performance	3.753	1
53	High pay for good performance	3.296	53	→	High pay for good performance	3.750	0	53	↓	organization	3.630	-4	53	↓	Risk taking	3.750	-1
54	Being aggressive	3.042	54	→	Being aggressive	3.359	0	54	↓	High pay for good performance	3.452	-1	54	→	Being aggressive	3.526	0

Figure 6.11 – Average Value Scores and Direction of Movement (Baseline Year 1)

The results identify flexibility as the most characteristic value of the organisation in year one and continue to rank within the top ten throughout the four years of lean implementation. From a congruence perspective with the proposed strategy to be implemented, this is positive; in relation to seeking to track a movement in the culture of the organisation towards more flexibility, this presents a challenge. If flexibility is there from year one then the secondary indicators of a lean culture need to be examined. Similarly, values associated with focus on supporting people, quality, and stability scored highly in year one and continued to score highly across the following three years.

Of the 54 values surveyed 24 of the values moved five rankings or less across the four years, suggesting a stable and positive culture in the business from the commencement of the project. This level of consistency and repeatability across the four years confirms the accuracy and efficacy of the culture measurement tool.

The values that increased most over the four years in terms of their ranking were confronting conflict directly, low level of conflict, working long hours, decisiveness and being reflective. This suggests that these values were becoming more pronounced within the organisation over the four years.

The values that decreased most over the same period were being easy-going, a willingness to experiment, predictability, being team-oriented and being innovative. This suggests that these values were becoming less characteristic of the organisation; however, as with many elements of culture and its measurement, many factors need to be considered when endeavouring to understand the value structure of an organisation and its evolution. One significant consideration needs to be the starting position of the value in the organisational structure and the forced distribution process of the survey; these and other factors will be discussed in detail in the discussion chapter.

Level and Direction of Value Movement over Four Years			
Value	Ranking Movement	Direction of Movement	
Confronting conflict directly	16	↑	More Chacterristic of CAW
Low level of conflict	14	↑	
Working long hours	13	↑	
Decisiveness	12	↑	
Being reflective	12	↑	
Being demanding	11	↑	
Opportunities for professional growth	10	↑	
Tolerance	9	↑	
Developing friends at work	9	↑	
Action orientation	8	↑	
Being socially responsible	8	↑	
Enthusiasm for the job	8	↑	
Being distinctive-different from others	8	↑	
Working in collaboration with others	7	↑	
Not being constrained by many rules	7	↑	
Autonomy	7	↑	
Offers praise for good performance	6	↑	
Security of employment	5	↑	
Being competitive	5	↑	
Taking initiative	3	↑	
Taking individual responsibility	3	↑	
An emphasis on quality	2	↑	
Being calm	2	↑	
Fairness	2	↑	
Being supportive	1	↑	
Having high expectation for performance	1	↑	
High pay for good performance	1	↑	
Stability	0	→	No Movement
Being rule oriented	0	→	
Emphasizing a single culture throughout the organization	0	→	
Being aggressive	0	→	
Having a good reputation	-1	↓	Less chateristicv of CAW
Being results oriented	-1	↓	
Risk taking	-1	↓	
Being careful	-2	↓	
Being analytical	-2	↓	
Fitting in	-3	↓	
Informality	-3	↓	
Adaptability	-5	↓	
Being highly organized	-5	↓	
Having a clear guiding philosophy	-5	↓	
Sharing information freely	-5	↓	
Flexibility	-6	↓	
Respect for the individual's right	-7	↓	
Being people oriented	-7	↓	
Being quick to take advantage of opportunities	-7	↓	
Achievement orientation	-8	↓	
Being precise	-13	↓	
Paying attention to detail	-13	↓	
Being easy going	-14	↓	
A willingness to experiment	-15	↓	
Predictability	-17	↓	
Being team oriented	-20	↓	
Being innovative	-28	↓	

Figure 6.12 – Value Movement over Four Years

To understand the movement in the values over the four years, the values need to be baselined in year one and tracked over the four years. There also needs to be cognisance of where they are positioned concerning the overall value structure of the business. Figure 6.13 seeks to track the movement of each value over the four years. Each value can be considered in its own right and the direction of travel from year one of the implementation project. This can be visualised in the trend lines and bar charts in the associated table. The lowest measurement point for the value can also be considered as identified in the third graphical representation of the data in figure 6.13.

Individual Value Scoring						Trends over Four Years		
		Year 1	Year 2	Year 3	Year 4	Trend	Bar	Low Point
1	Flexibility	6.361	6.281	5.959	5.827			
2	Having a good reputation	6.200	6.516	6.311	5.987			
3	Being results oriented	6.141	6.203	6.338	5.987			
4	An emphasis on quality	6.041	5.984	6.149	6.039			
5	Achievement orientation	6.028	5.891	5.301	5.600			
6	Security of employment	6.027	6.047	6.000	6.145			
7	Being supportive	5.914	5.719	5.892	5.840			
8	Being careful	5.889	5.578	5.151	5.658			
9	Stability	5.847	5.594	5.507	5.680			
10	Having high expectation for performance	5.817	5.953	5.630	5.640			
11	Being team oriented	5.806	5.469	5.438	4.947			
12	Respect for the individual's right	5.542	4.906	5.189	5.227			
13	Action orientation	5.452	5.406	5.932	5.907			
14	Being easy going	5.408	4.813	4.541	4.974			
15	Fitting in	5.394	5.250	5.716	5.280			
16	Being socially responsible	5.380	5.281	5.274	5.787			
17	Predictability	5.356	5.000	4.562	4.773			
18	Being analytical	5.329	5.219	5.568	5.211			
19	Taking initiative	5.304	5.500	5.397	5.320			
20	Being innovative	5.292	4.828	5.027	4.197			
21	Adaptability	5.247	5.063	5.014	5.105			
22	Enthusiasm for the job	5.222	5.563	5.649	5.461			
23	Being calm	5.188	5.078	4.973	5.187			
24	Tolerance	5.167	5.203	5.095	5.400			
25	Fairness	5.127	5.016	5.203	5.133			
26	Low level of conflict	5.085	5.359	5.581	5.635			
27	Opportunities for professional growth	5.070	5.453	5.082	5.316			
28	Taking individual responsibility	5.029	5.063	4.750	5.107			
29	Working in collaboration with others	4.985	5.078	4.959	5.147			
30	Being precise	4.855	4.828	4.890	4.547			
31	Being highly organized	4.838	4.844	5.108	4.724			
32	A willingness to experiment	4.819	4.625	4.521	4.263			
33	Paying attention to detail	4.817	5.031	4.918	4.329			
34	Being people oriented	4.803	4.891	4.589	4.587			
35	Being competitive	4.786	4.547	5.589	4.947			
36	Decisiveness	4.778	5.063	5.438	5.120			
37	Informality	4.767	4.891	4.392	4.667			
38	Being demanding	4.746	5.094	4.767	5.053			
39	Not being constrained by many rules	4.718	4.438	4.838	4.920			
40	Having a clear guiding philosophy	4.718	4.563	4.405	4.467			
41	Being reflective	4.616	4.891	4.819	4.961			
42	Developing friends at work	4.616	4.891	4.784	4.895			
43	Being quick to take advantage of opportunities	4.479	3.844	4.014	4.105			
44	Being rule oriented	4.466	4.609	4.770	4.467			
45	Autonomy	4.451	4.219	4.342	4.711			
46	Sharing information freely	4.260	4.206	4.284	4.000			
47	Being distinctive-different from others	4.239	4.359	4.405	4.697			
48	Offers praise for good performance	4.130	4.734	4.635	4.573			
49	Emphasizing a single culture throughout the organization	4.000	4.063	3.630	4.118			
50	Working long hours	3.972	4.344	4.649	4.716			
51	Confronting conflict directly	3.877	3.875	4.041	4.763			
52	Risk taking	3.875	3.844	3.877	3.750			
53	High pay for good performance	3.296	3.750	3.452	3.753			
54	Being aggressive	3.042	3.359	3.699	3.526			

Figure 6.13 - Individual Value Scoring

The information presented in figure 6.13 provides significant areas for consideration; however, without distilling the data down to a more manageable size the overall trends within the organisation may be challenging to consider.

6.6.2 OCP Factor Analysis

The factors identified in chapter five provide a simple framework through which the overall culture of the organisation can be considered. The factors as previously identified are as follows: Innovation (Factor 1), Stability (Factor 2), Respect for people (Factor 3), Results orientation (Factor 4), Attention to Detail (Factor 5), Team Orientation (Factor 6), Aggressiveness (Factor 7) and Decisiveness (Factor 8).

The factors are again base lined in year one of the implementation and movement is measured from the base year. In year one the factor of Results Orientation was ranked as the most characteristic of the organisation with Respect For People, Stability, Team Orientation, Attention to Detail, Decisiveness, and Innovation following chronologically in positions two to seven. The factor of Aggressiveness was ranked as the factor least characteristic of the organisation prior to the implementation programme.

Base Case Year 1 2014		
	Ave Score	Ranking
Factor 4 Results Orientation (Achievement, Action,	5.86	1
Factor 3 Respect for People (Respect, Fairness, Tolerance)	5.28	2
Factor 2 Stability (Stability, Predictability, Constrained,	5.20	3
Factor 6 Team Orientation (Team, Collaboration, People)	5.20	4
Factor 5 Attention to Detail (Precise, Analytical, Detail)	5.00	5
Factor 8 Decisiveness (Predictability Decisiveness	4.93	6
Factor 1 Innovation (Innovative, Opportunities, Experiment	4.29	7
Factor 7 Aggressiveness (Aggressive, Competitive,	3.82	8

Figure 6.14 - Factor Ranking Prior to the Implementation Programme

Over the four years, the factors presented remain quite stable again validating the accuracy and repeatability of the survey instrument. Following the first year of the implementation programme, the survey of the organisation identified that five of the eight factors remained stable in relation to their ranking, those being Results Orientation, Stability, Team Orientation, Innovation and Aggressiveness. Results Orientation continued to rank number one in relation to the most characteristic factor and Aggressiveness continued to rank lowest.

	Year 2 2015			
			Annual Movement	
	Ave Score	Ranking	Direction	Movement
Factor 4 Results Orientation (Achievement, Action,	5.82	1	⇨	0
Factor 8 Decisiveness (Predictability Decisiveness	5.19	2	⇧	4
Factor 2 Stability (Stability, Predictability, Constrained,	5.14	3	⇨	0
Factor 6 Team Orientation (Team, Collaboration, People)	5.13	4	⇨	0
Factor 3 Respect for People (Respect, Fairness, Tolerance)	5.03	5	⇩	-3
Factor 5 Attention to Detail (Precise, Analytical, Detail)	5.01	6	⇩	-1
Factor 1 Innovation (Innovative, Opportunities, Experiment	4.09	7	⇨	0
Factor 7 Aggressiveness (Aggressive, Competitive,	3.89	8	⇨	0

Figure 6.15 - Factor Ranking after Year One of the Implementation Programme

After two years of implementing lean Results Orientation continued to rank as the most characteristic factor of the organisation. Decisiveness continued to rank number two whilst Respect for People and Attention to Detail both increased one position to number three and four respectively. Team Orientation decreased one position whilst Stability dropped three positions to number six of the eight factors. The factors of Innovation and Aggressiveness continued to rank lowest and least characteristic of the organisation.

	Year 3 2016			
			Annual Movement	
	Ave Score	Ranking	Direction	Movement
Factor 4 Results Orientation (Achievement, Action,	5.80	1	⇨	0
Factor 8 Decisiveness (Predictability Decisiveness	5.51	2	⇨	0
Factor 3 Respect for People (Respect, Fairness, Tolerance)	5.16	3	⇧	2
Factor 5 Attention to Detail (Precise, Analytical, Detail)	5.13	4	⇧	2
Factor 6 Team Orientation (Team, Collaboration, People)	5.00	5	⇩	-1
Factor 2 Stability (Stability, Predictability, Constrained,	5.00	6	⇩	-3
Factor 7 Aggressiveness (Aggressive, Competitive,	4.34	7	⇧	1
Factor 1 Innovation (Innovative, Opportunities, Experiment	4.32	8	⇩	-1

Figure 6.16 - Factor Ranking after Year Two of the Implementation Programme

After three years of lean implementation, the factors of Results Orientation, Decisiveness, and Respect for People ranked one, two, and three respectively as the most characteristic of the organisation. Stability climbed two positions in the final year back to the fourth position, Team Orientation remained stable, whilst Attention to Detail dropped two positions. Again Innovation and Aggressiveness continued to rank lowest of the factors surveyed.

	Year 4 2017			
			Annual Movement	
	Ave Score	Ranking	Direction	Movement
Factor 4 Results Orientation (Achievement, Action,	5.78	1	⇨	0
Factor 8 Decisiveness (Predictability Decisiveness	5.38	2	⇨	0
Factor 3 Respect for People (Respect, Fairness, Tolerance)	5.25	3	⇨	0
Factor 2 Stability (Stability, Predictability, Constrained,	5.03	4	⇧	2
Factor 6 Team Orientation (Team, Collaboration, People)	4.89	5	⇨	0
Factor 5 Attention to Detail (Precise, Analytical, Detail)	4.70	6	⇩	-2
Factor 1 Innovation (Innovative, Opportunities, Experiment	4.06	7	⇧	1
Factor 7 Aggressiveness (Aggressive, Competitive,	3.90	8	⇩	-1

Figure 6.17 - Factor Ranking Year 2 to 4

Overall Movement over 4 Years		
	Direction	Movement
Factor 4 Results Orientation (Achievement, Action,		0
Factor 3 Respect for People (Respect, Fairness, Tolerance)		-1
Factor 2 Stability (Stability, Predictability, Constrained,		-1
Factor 6 Team Orientation (Team, Collaboration, People)		-1
Factor 5 Attention to Detail (Precise, Analytical, Detail)		-1
Factor 8 Decisiveness (Predictability Decisiveness		4
Factor 1 Innovation (Innovative, Opportunities, Experiment		0
Factor 7 Aggressiveness (Aggressive, Competitive,		0

Figure 6.18 – Overall Positional Movement in Four Years

6.7 Findings Phase 2 - OCP Factor Analysis

When the factor positional movement is considered over the four years of lean implementation Results Orientation remains stable in position number one, whilst Respect for People, Team Orientation, and Stability continue to be amongst the most characteristic factors of the organisation. Decisiveness has climbed the ranking from number six to number two and the factors of Innovation and Aggressiveness continue to be the lowest ranking factors of the eight considered.

In considering the actual scoring for the factors as opposed to just the positional ranking more insight can be gathered in relation to the impact of lean on the organisation. Whilst Results Orientation remained in number one position the score is on a downward trajectory demonstrating a reduction in this factor; scoring with the lowest point for Results Orientation is in year four of the programme.

Whilst Respect for People dropped one position in the overall ranking it continued to score high and remain reasonably stable throughout the implementation programme. Stability also reduces over the four years with the lowest point in year four.

Team Orientation reduces throughout the implementation programme with the lowest point being year four and whilst Attention to Detail initially increased there was a drop off in year four of the programme.

Decisiveness increased significantly over the four years with its highest point in year three but also remaining high in year four. The factor of Innovation fluctuated over the programme initially dropping, then increasing and finally dropping again in year four.

Aggressiveness, the lowest ranking factor, remained low despite a peak in year three and a drop in the following year back very close to the starting position in year one.

Factor Scoring over Four Years 2014 - 2018	Average Scoring				Trends over Four Years
	Year 1	Year 2	Year 3	Year 4	
Factor 4 Results Orientation (Achievement, Action, Performance, Results)	5.859	5.822	5.800	5.783	
Factor 3 Respect for People (Respect, Fairness, Tolerance)	5.278	5.025	5.162	5.253	
Factor 2 Stability (Stability, Predictability, Constrained, Security, Rules,)	5.196	5.142	5.000	5.029	
Factor 6 Team Orientation (Team, Collaboration, People)	5.198	5.126	4.996	4.893	
Factor 5 Attention to Detail (Precise, Analytical, Detail)	5.000	5.010	5.125	4.695	
Factor 8 Decisiveness (Predictability Decisiveness Conflict)	4.931	5.189	5.510	5.378	
Factor 1 Innovation (Innovative, Opportunities, Experiment Risk, Careful, Rules)	4.295	4.088	4.321	4.063	
Factor 7 Aggressiveness (Aggressive, Competitive, Socially)	3.816	3.894	4.338	3.896	

Figure 6.19 Factor Average Scoring over Four Years

In summary, when the individual factor scoring is considered over the four years of implementation, Results Orientation, Stability, and Team Orientation decreased, Respect for People, Innovation, and Aggressiveness remained stable, and Decisiveness increased significantly; Attention to Detail, whilst initially increasing, dropped off in year four.

6.8 Propositions Phase 2 - Longitudinal Analysis of Implementation

The propositions associated with phase two of the research which were set out in chapter five suggested that after the successful implementation of lean the factors that would be most prominent would be innovation, respect for people, attention to detail, and decisiveness with factors such as stability, results orientation, and aggressiveness least prominent. This would suggest there was a lean culture within the organisation. Proposition number two suggested the formal implementation would lead to an increase in levels of innovation, respect for people, attention to detail, and decisiveness and a decrease in levels of stability, results orientation, and aggressiveness throughout the four-year programme. Proposition number three, which was also tested in phase one of the research, would suggest there were high levels of lean values even at the start of the formal implementation.

Question 1	*How are the values in the organisation now structured post the formal implementation of lean?*	***Phase 2 Research***
Proposition No 1	**Post the formal implementation of lean there will be high levels of innovation, respect for people, attention to detail, and decisiveness and lower levels of stability, results orientation, and aggressiveness**	
Question 2	*How did the value structure change in the organisation over the course of the formal implementation of lean?*	***Phase 2 Research***
Proposition No 2	**Over the course of the lean implementation programme the levels of innovation, respect for people, attention to detail, and decisiveness will increase whilst the levels of stability, results orientation, and aggressiveness will decrease.**	
Question 3	*How were the values in the organisation structured prior to the implementation of lean?*	***Phase 1 & 2 Research***
Proposition No 3	**Prior to the implementation of lean the factors of innovation, respect for people, attention to detail, and decisiveness will have the most prominence whilst the factors of stability, results orientation, and aggressiveness will have the least.**	

6.8.1 Phase 2 - Proposition Number 1

"Post the formal implementation of lean there will be high levels of innovation, respect for people, attention to detail, and decisiveness and lower levels of stability, results orientation, and aggressiveness"

The analysis of the data above would demonstrate there was indeed high levels of respect for people, attention to detail, and decisiveness, however, innovation was not amongst the most prominent factors.

The factor aggressiveness did score lowest of all the factors indicating it was least prominent, however, results orientation and stability scored amongst the highest.

6.8.1 Phase 2 - Proposition Number 2

"Over the course of the lean implementation programme the levels of innovation, respect for people, attention to detail, and decisiveness will increase whilst the levels of stability, results orientation, and aggressiveness will decrease."

The analysis of the data above would demonstrate that respect for people continued to score high throughout, decisiveness increased, innovation increased slightly, however in the last year attention to detail decreased after increasing for the first three years. Stability and results orientation decreased from high initial levels; and aggressiveness continued to score lowest of all factors.

6.8.1 Phase 2 - Proposition Number 3

"Prior to the implementation of lean the factors of innovation, respect for people, attention to detail, and decisiveness will have most prominence whilst the factors of stability, results orientation, and aggressiveness will have the least."

The analysis of the data above would demonstrate that respect for people scored particularly high throughout and aggressiveness scored particularly low throughout. Attention to detail and decisiveness were not most prominent, and stability and results orientation were not least prominent.

6.9 Chapter Summary

The Phase one analysis suggests that there was a slow but purposeful move over fifteen years from a culture of internal focus and control orientation towards one more externally focused with a greater level of flexibility.

Phase two analysis identifies a continuation of this trend with a further move towards a more externally focused and flexibly orientated organisation. The organisational values are focused on people, team orientation, and stability. Aggressiveness continued to rank as one of the lowest ranking values of the organisation. Exceptions such as attention to detail and stability will require further research.

While the level and exact point of cultural change may be challenged, the question of movement is undisputable throughout the analysis: there has been a purposeful and significant move over nineteen years towards a lean organisation.

Chapter 7 Discussion of Findings

Chapter Overview

Chapter seven provides insight both from academic and practitioner perspectives on how the formal implementation of lean was influenced by the pre-existing cultural orientation of the organisation, and how the implementation then influenced the value structure of the organisation. The discussion of the findings provides both an account of the observations from the research along with some interesting considerations for both academics and practitioners in terms of future research and lean implementation projects.

7.1 Chapter Introduction

Chapter seven follows on from the analysis of results in the previous chapter and subjects the research findings to a detailed discussion with reference to the literature discussed in chapters two, three, and four, and with some context from an organisational perspective. It includes a discussion of key findings that relate to the research questions and propositions and puts them in context from both an organisational and industry perspective. The key finding in phase one of the research was that preconditioning of the value structure of the organisation did take place prior to formal lean implementation, with a move from a control orientation to a flexible orientation, albeit not absolute. The key finding from phase two of the research was that the anticipated move towards a more flexible culture continued as lean was implemented, although again this move was not absolute.

This chapter will endeavour to bring the reader on a journey in reverse chronological order from the point of destination in the present day to the point of origin nineteen years ago. The references to phase one and phase two of the research will be removed and rather the chapter will speak of the culture post, during, and prior to the implementation of lean. By doing this it is hoped the narrative will present the research in greater clarity and further illuminate the findings to inform the reader in greater detail of the multitude of discoveries from the previous chapters.

7.2 The Objectives of the Study

The primary purpose of this research is to further inform the discussion on the cultural journey organisations may go through throughout a lean implementation process. The research explores the cultural orientation of a specific organisation prior to, during, and post the implementation of lean. The literature would suggest there will be an evolution towards a more flexible cultural orientation as lean is implemented (Näslund, 2013), however, as discussed in chapter two, three, and four, there is also a

convincing argument that a chosen strategy or philosophy will only be selected, and successfully implemented if there is congruence between the existing culture of the organisation and the values of the chosen philosophy.

There is a further argument that if there is congruence between the values of the strategy chosen, and those existing in the organisation already (Zammuto, 1992), it would follow that there is unlikely to be significant movement in value orientation during the implementation process. This would contradict a significant body of research that would suggest differently and argue that the implementation of lean will deliver a flexible culture. There is a counter-argument that philosophies such as lean only seek to work around the periphery of the value structure and do not significantly alter the orientation but rather reinforce existing values and support the established culture.

If this is indeed the case, it becomes apparent that the pre-existing cultural orientation becomes one of the most critical success factors in the implementation of lean, more critical than the commitment of resources or managements understanding of the philosophy as has been identified in the literature as critical success factors (Canato, 2013). Organisations are likely to spend significant resources seeking to implement a philosophy that is doomed to fail unless there is a strategy to mitigate this risk. In this instance the organisation was successful in the implementation of lean, and whilst the management team of the organisation may claim some level of credit in selecting the appropriate philosophy, there was little if any evidence of consideration given to levels of congruence prior to selecting the philosophy. It would seem however there was something of an organic movement from a control orientation largely driven by procedures and processes towards a focus on quality management, process improvement, and education of the team. Unwittingly it would seem the organisation had it gone about preconditioning the value structure towards one more congruent with the lean philosophy ultimately selected in which the organisation moved from a control orientated structure towards a more flexibly orientated organisation.

Whilst these findings will stop well short of providing a definitive answer to the age-old question relating to the influence managers may, or may not have on organisational culture, some interesting learnings may need to be considered in future applications of lean and other such philosophies. This discussion may help understand the sphere of influence managers have when it comes to organisational culture and the impact of adopting such philosophies. This will no doubt help others in future research in similar areas.

7.3 Organisational Culture Post Lean Implementation

The literature would suggest the implementation of lean will ultimately deliver a flexibly orientated value structure (Achanga, 2006). This being the case, and as outlined in Proposition No. 1 "Post the implementation of lean there will be high levels of innovation, respect for people, attention to detail, and decisiveness and lower levels of stability, results orientation, and aggressiveness".

As established in the previous chapter there is evidence to support this proposition albeit far from absolute. Aggressiveness did indeed score lowest, and well below the norm in the 2017 survey of the values in the organisation post the implementation of lean. Decisiveness and respect for people as anticipated in the proposition scored amongst the highest ranked factors at number two and three respectively, however, the factors of stability and results orientation also featured in the most dominant factors edging out team orientation and attention to detail. Innovation also scores a lowly seven in the ranking, far from the top of the list as the literature would suggest it should be in the event of achieving a lean, open, and flexible culture. However, as with any complex case such as this, there is a significant amount of information in the detail behind these factors.

On closer examination of the underlying values included in these factors, some interesting trends reinforce the argument that there is indeed a flexibly orientated value structure within the organisation. These go some way to explaining the apparent deviation from the established literature.

Stability is likely to have ranked higher in this organisation and may be influenced by the security of employment which scored highest in the ranking of the 54 values. This is likely to have been due to the fact that the organisation is delivering long term contracts in a utility setting; however, this could also be considered a positive outcome from a lean perspective as security of employment is promoted as a positive value. Furthermore, there is also, and for very good public health and environmental reasons, restrictions and constraints concerning how the water utility operates and this are likely to influence the level of risk-taking in the organisation. There is a high level of regulation applied in how water and waste water treatment processes are operated to avoid the contamination of drinking of water supplies or water courses in which waste water is recycled; again this is likely to have influenced the level of perceived constraints and rules in the organisation.

These sectoral and organisational influences are also likely to have had an impact on the fact that innovation is considered as one of the lowest ranking factors as there is limited opportunity to experiment, take risks, and avoid being careful. Again, whilst this may be disappointing from a research perspective, it is reassuring to know that the operators of our water and wastewater treatment facilities are not of a mind to consider disregarding the rules that are in place to protect public health.

Similarly, the focus on achievement and a results orientation are also likely to have been influenced by industry drivers. On a daily, hourly, and in some critical cases, continuously the performance of process within the utility are monitored. If there is any deviation away from a strict tolerance immediate action is taken. If the residual chlorine levels in a drinking water treatment process, which are critical for the disinfection of a water supply, should deviate for any reason there is an immediate suspension of production. Operators continuously analyse and scrutinise performance to ensure the process is operated within compliance standards. The organisation reviews performance on a daily, weekly, and monthly basis to ensure compliance with both contractual and statutory obligations. Public health and environmental regulators then audit this performance to ensure compliance with those statutory requirements. This focus

on achieving specific levels of performance at all times is likely to have influenced the apparent focus on results.

In examining the top twenty values in the organisation the research findings suggest high levels of flexibility, outward focus, and value of people. Values such as emphasis on quality, having a good reputation, action orientation, being supportive, flexibility, being socially responsible, low level of conflict, enthusiasm for the job, tolerance, taking initiative, opportunities for professional growth, fitting in, respect for the individual's right, and being analytical all feature strongly in the ranking. These values would strongly correlate with an open, flexible and outwardly focused culture. Furthermore, 13% of respondents to the survey considered flexibility as the most characteristic value of the organisation of the 54 values offered. This was equalled by the value of being results orientated which similarly was identified as the most characteristic value of the organisation by 13% of respondents, the reasoning for which has already been discussed. Ten per cent of respondents thought that action orientation was the most characteristic value of the organisation, whilst a further 10% thought that security of employment was the most characteristic value of the 54 values offered. Again this would support the argument that the organisation supported people in employment and was quick to take action in the event of there being an opportunity to improve.

Being aggressive and taking risks feature as the lowest-ranked values in the organisation post the implementation of lean. Over 22% of respondents identified aggressiveness as the least characteristic value of the 54 values offered, by far the lowest scoring value and the value that most respondents agreed was least characteristic of the organisation.

Taking all of this into account it is fair to say that proposition number one has been confirmed and whilst there are deviations from the established literature in some respects there is sufficient evidence to support the argument that there is an open, people-focused, action-orientated, and flexible culture well established within the organisation. The deviations that have been identified can be illuminated in closer examination,

and the explanations offered may provide some further insights and considerations that could be taken into account in future research.

7.4 Cultural Evolution through Lean Implementation

Now that it has been established that there is an open, flexible, people-focused culture within the organisation, consideration can be given to the route through which this was achieved. It may be that there had always been such a value structure with the organisation and the implementation of lean only served to reinforce values that already existed. On the other hand, the implementation of lean may have radically altered the value structure in the organisation delivering the desired culture through the introduction of a philosophy that supported such values, through the training and tools provided to the organisation, and through the reinforcement with communications and reward from the organisation. The second proposition suggested that "throughout the lean implementation programme the levels of innovation, respect for people, attention to detail, and decisiveness will increase whilst the levels of stability, results orientation, and aggressiveness will decrease" (Laureani, 2012). To examine this proposition in detail the factors identified need to be considered over the four years of the lean implementation. The proposition would suggest that there should be an incremental increase or decrease in the scoring of these factors over the four period.

The outcome from the research, in this case, is far from absolute. Whilst an annual incremental increase and decrease in the factors selected is desirable, the real-world environment, particularly relevant in an examination of organisational culture, rarely allows for such straightforward results. On initial review, it is challenging to identify any significant cultural change in the organisation throughout the implementation programme. The factors of results orientation and stability score consistently in the top three factors over the four years, and the factors of aggressiveness and innovation score consistently in the bottom two ranked factors over the four years.

There is evidence to suggest that the implementation did indeed have an impact on the organisation and the factor that did move significantly and consistently over the four years was in fact decisiveness. This would suggest the implementation of lean in the organisation did bring about a change in how opportunities were addressed, even if it did not materially change the ranking of any of the other factors.

There is however evidence of movement in the value structure in the organisation when the values behind the factors are examined in closer detail. The values that respondents identify as the most characteristic of the organisation - being action-orientated, being socially responsible, having low levels of conflict, enthusiasm, tolerance, and opportunities for professional growth - were the values that moved most in the top twenty values identified in the organisation in 2017 post the implementation with all of these values moving more than eight places up the ranking from 2014. At the bottom of the ranking being innovative was once again one of the biggest movers down the scale. Whilst there was movement in the mid-ranking values it is difficult to argue that these movements were significant given the closeness of the scoring at the mid-range of the scale.

It can be further identified that, while only 1% of respondents thought the organisation was action-oriented in 2014, over 10% of the respondents suggested that action orientation was the most characteristic value they would associate with the organisation in 2017. There is evidence of definite change in values associated with lean and flexibility, however, it is challenging to definitively or categorically argue that there was a significant change in the overall culture of the organisation as suggested in proposition number two.

The fact remains that throughout the four-year implementation programme four of the eight factors measured failed to move in the ranking being ranked in the same position in year four as they were in year one. A further three factors only moved one position as a result of the decisiveness factor moving up three positions from number six to number three. There is evidence of movement in the value structure within the organisation and it could be argued that this constitutes a change towards a more flexible orientation; however, there is little evidence to support the proposition that the cultural orientation of the organisation

significantly changed as a result of the implementation of lean over four years. Whilst this may be disappointing from a research perspective there is a body of evidence as identified earlier that would suggest that culture can only be reinforced by the introduction of a strategy that is congruent with that of the existing culture. This would certainly seem to be the case in this instance and further supports the congruence argument. Furthermore, this outcome also leads us seamlessly to our third proposition and offers an opportunity, as anticipated, to consider the value structure in the organisation prior to the implementation of lean.

The third proposition put forward suggested that "prior to the implementation of lean the factors of innovation, respect for people, attention to detail, and decisiveness will have most prominence whilst the factors of stability, results orientation, and aggressiveness will have the least" (Näslund, 2013). This would certainly seem to be the case as has been discussed above. Whilst there is a deviation from the proposition, this deviation can be clearly explained when the values are considered in detail and the industry and sectoral restraints are taken into account. Therefore, whilst evidence fails to support proposition number two, there certainly is evidence to support proposition number three and the fact that there is a flexible, open, people-orientated culture in the organisation prior to the formal implementation of lean.

This is also the case when considered in light of the phase one qualitative assessment using Quinn's competing values model. There is considerable evidence of flexibility and outward focus from the research and the application of Quinn's model. This serves to validate the application of both Quinn's and O'Reilly's models and further mitigate the risk of bias in the research.

7.5 The Pre-existing Culture of the Organisation

The fourth and final proposition suggests that "in the years prior to the implementation of lean the organisation moved from a control orientated structure towards a more flexibly orientated organisation"

(Canato, 2013). The findings suggest that, as the organisation had evolved throughout the 15 years prior to the implementation of lean, the value system within the organisation also evolved to that of one with a more flexible orientation. As outlined in Figure 6.10 when the values identified in the phases of cultural evolution are moved into a table it becomes apparent that the orientation of the value system within the organisation evolved. The dominant values of the early phases such as productivity and efficiency were accompanied that of human resource focus and resource acquisition in more contemporary times. This would suggest an evolution towards a more flexible orientation prior to the six sigma pilot test phase and the lean implementation phase.

7.6 The Impact of the Pre-existing Culture on Lean Implementation

An organisation seeking to implement lean - a flexible orientated strategy - will have a much more challenging task associated with the implementation if the positioning of the existing structure is control orientated (Zammuto et al., 1992). An organisation with highly procedure-driven operations narrowly defined job roles, and limited focus on employee input into the operation will have a greater challenge in implementing a strategy that depends upon high levels of employee involvement (Karlsson et al., 1996). Organisations that promote strict adherence to rules and regulations will fail to secure the vital information required to deliver improvement in processes (Laureani et al., 2012). Only through seeking and encouraging the involvement of employees in determining the best means of delivering the requisite operations will an organisation identify the presence of waste within the organisation (Chauhan et al., 2013). An organisation that has discouraged such practices and embarks on the implementation of a strategy that requires such behaviours is likely to struggle to deliver the necessary involvement to realise the benefits associated with the strategy. Behaviours and traits such as employee involvement are challenging to implement within the confined period associated with the implementation phase of a new technology (Minkov et al., 2011). It has been argued that only through preconditioning the existing culture within the organisation to that of

one more aligned with a lean culture will the organisation maximise the opportunity of success in implementing both the short term productivity benefits and the longer term goals of flexibility (Zammuto et al., 1992).

The culture of the case study organisation can be seen to evolve towards that of one more aligned with a lean culture throughout the fifteen years prior to the formal implementation of lean. Initially, the culture of the organisation was highly focused on productivity, efficiency, and control through procedures; however throughout the eight phases of evolution identified there are incremental moves towards that of a culture of flexibility, readiness, and human resource focus. This may not have been a conscious or deliberate effort by management at the time to align with an ultimate strategy and is more likely a result of leadership decisions to become more human resource focused as an organisation. However, the result was ultimately the same. The culture of the organisation was altered over an extended period thereby facilitating the implementation of a strategy to be adopted across the organisation promoting the values of flexibility and human resource focus to drive further improvement. Had the organisation adopted lean at an earlier stage in the evolution of the culture the implementation would likely have had to be extended to facilitate the changing of behaviours, confirming that the culture within the organisation can be altered in advance of the implementation phase to one that is more congruent with that of the lean strategy being implemented.

Evidence of flexibility appeared as early as 2006 in the Focus on Data Phase which was eight years after the foundation of the organisation. It was a further three years, in 2009, during the Focus on People Phase that flexible orientated values began to appear in a meaningful way. This would suggest that over 11 years the values of the organisation were transitioned from that of control orientation to one of flexible orientation through continuous incremental changes.

It could be argued that the evolution of the culture within the organisation was the cumulative effect of the initiatives delivered throughout the 15 years examined. The evidence points towards specific phases and individual initiatives that bore more responsibility for the order of movement within the phases. Initiatives

such as advanced staff training and team brainstorming sessions delivered a significant order of movement. These initiatives coupled with an output focused reward mechanism delivered a significant element of the cultural change during the Focus on Communications and Focus on People Phases of the evolution. Whilst an extrinsic reward mechanism may suggest something of a coerced implementation of a chosen culture, in this particular case the reward always existed but was based on management's discretion; this initiative only constituted a definitive linking of the reward to desired quality indicators. In this particular case key performance indicators were identified upon which to base the reward to drive long term quality and efficiencies as opposed to short term productivity.

Whilst flexible orientated values emerged within the organisation, many of the control orientated values were retained in critical areas of the operation of the business. This would be at odds with Quinn's spatial model which seeks to position the organisation in a particular quadrant determining it as a control orientated organisation with a rational model or a flexible orientated organisation with a natural systems model. This may be an area for further investigation to determine if this is unique to this organisation or if a mix of control and flexibility is something more common in organisations.

7.7 Chapter Summary

In the case of this particular organisation, the congruence of the values within the organisation at the time of implementation and that of the lean strategy adopted aided the implementation process and reduced the likelihood of failure during the implementation phase of the change initiative. Furthermore, the congruence of these values allowed for the realisation of both the short term productivity and efficiency benefits in addition to the more strategic goals of increased flexibility associated with the change initiative adopted as demonstrated in the early movement in values during the implementation phase.

The evolution of the culture within the organisation throughout the 15 years examined prior to the formal introduction of lean assisted in implementation because there was a pre-existing value system within the organisation that was aligned with that of the change initiative thereby removing the requirement to go about the more onerous challenge of altering the behaviours and values of the organisation during the implementation phase.

More specifically, the phases of the evolution and the initiatives that had the greatest impact on altering the culture of the organisation had been delivered before the formal implementation reducing the burden on the organisation as it went about introducing the new philosophy. The early phase of Quality Management delivered little in terms of altering the values within the organisation but was arguably the foundation upon which many of the later phases were delivered. The value of the objective setting, albeit a control orientated value, was increased during this phase largely as a result of the discipline imposed by the ISO 9001 standard introduced. All of these phases provided the foundation upon which the ultimate philosophy was built upon. Had there been a weakness in this foundation or had the organisation sought to bypass this phase it is unlikely the open, flexible, people-focused culture would have been achieved by the lean implementation alone.

In summary, proposition number one was confirmed in that the organisation now has a lean culture; proposition number three was confirmed in that the organisation had a level of leanness prior to the lean implementation; proposition number four was also confirmed in that the organisational culture did evolve prior to the implementation. It is more challenging to identify definitive evidence to support proposition number two that the culture incrementally became more lean year on year throughout the implementation; however, there is clear evidence of a change in the value structure towards a lean orientation over the four years.

Chapter 8 - Conclusion

Chapter eight will bring together the final findings of this work, explore some of the milestones and points of greatest learning in the research, identify some areas of limitation, and finally suggest some areas for further consideration in the future.

8.1 Chapter Introduction

The research sought to answer two broad questions, did the implementation of lean impact the culture of the organisation and was there a level of preconditioning prior to the implementation.

The research was structured in two phases with phase one retrospectively examining fifteen years of data, amounting to over two terabytes of historical information using Quinn's competing value model to determine movement in the value structure of the organisation over time.

The second phase of the research examined the value structure of the organisation as lean was formally implemented over four years. A modified version of O'Reilly's organisational culture profile tool was used annually over four years to survey over eighty respondents ranking 54 values in order of most to least characteristic of the organisation.

8.2 Main Findings of the Research

There was an unquestionable move in the organisational value structure throughout the phase one examination. The organisation, initially highly control orientated moved towards a move flexibly oriented, an outward-focused organisation seeking to learn from other industries, other sectors and new ideas.

Phase two of the research identified a continuation of this trend as lean was formally adopted into the organisation at every level. Levels of focus on people, teamwork and flexibility continued to rank highest whilst aggressiveness and risk-taking continued to rank lowest.

The implementation of lean did alter the value structure of the organisation towards one more associated with a lean culture. The culture became more flexibly orientated with a stronger focus on people as opposed to short term gain, aggressiveness and risk-taking. There was a strong level of congruence between the strategy selected and the existing culture in the organisation and, whether it was purposeful or not, there

was a level of preconditioning that started quite early in the evolution of the organisation that set it up for the formal implementation.

Allaire and Firsirotu (1984) suggested in their Conceptual Framework for Organisational Culture that society, technology, and history ultimately drive the outputs of the organisation. If one of the outputs of an organisation is a business plan or strategy, then it is easy to see how the culture of the organisation will influence the selection of the strategy and why the strategy will be congruent with the values already existing in the organisation.

Is it possible that the initial first steps by the organisation over nineteen years ago to adopt a quality and continuous improvement philosophy ultimately resulted in the adoption of lean? There is an argument to suggest there was a continuous movement over a prolonged period towards a more open flexible organisation which ultimately manifested itself in the formal adoption of the lean philosophy, albeit much of the heavy lifting had been done in the preceding years. This may have accounted for the lack of resistance to such an implementation and the immediate positive impacts from the philosophy in line with Zammuto and O'Connor's (1992) research on the implementation of philosophies such as lean.

8.3 Research Contribution

The research contributes to a number of areas in both the lean and culture literatures. There have been challenges within the literature and conversation surrounding the impact of lean and its ability to alter organisational culture. There have been challenges in the culture literature surrounding the ability to influence culture in organisations. This research found that the cultural value structure of the organisation was influenced by the leadership team. The values in the organisation were altered over time; while this cannot be achieved overnight, there can be incremental movement year on year ultimately delivering a culture change.

From a practitioner perspective, this may be daunting, however, this does not mean meaningful change cannot be delivered in a shorter period. Such change, however, may be demanding on resources, time and effort. The question for the practitioner may come back to a simple payback calculation of effort versus outcome. The research provides two tools that can be used to access the organisation's culture prior to and during the implementation of this type; these tools may assist practitioners in future applications of lean.

There are limited examples of research documenting such an extended length of time in an organisation. This is obviously due to the necessary time limits associated with academic research; however, as a practitioner in the organisation, the access to historic data allowed a much fuller examination of the data. This provides for a fuller conversation concerning the organisation's evolution, the culture of the organisation, and the impact of lean.

The research has been shared with the organisation and has informed the post-research direction of the organisation. The findings have focused the organisation on its strengths and weaknesses and the adoption of strategies that fit with the culture of the organisation as opposed to strategies that are solely derived from a business need and based on shareholder and management desire. This has influenced the organisation on areas to focus on further and areas to avoid reducing lost or wasted time adopting strategies that are doomed to fail as a result of incongruence with the existing value structure.

8.3 Limitations of Research

The most significant limitation is related to the fact that only one organisation is considered in the research. It would be challenging to examine multiple organisations over such lengths of time, and it would also be challenging to accurately compare or contrast the findings from such an examination, however, the limitation of one organisation will impact the generality of the conclusions that can be drawn from the research.

The research has considered the presence of lean prior to the formal adoption of the philosophy, and established the change in culture as lean is implemented; however, there has not been a direct causal effect established between the pre-implementation culture and the selection of the lean philosophy; such a causal link may be worth considering in future research.

8.4 Future Research

Significant effort and resources are dedicated by organisations to delivering cultural change and implementing lean. There are many areas identified in the literature that need to be considered such as management commitment, understanding, resources, training, and even timing. There has been little work done on establishing an accepted method of measuring the level of congruence prior to selecting the philosophy. There would be a benefit, possibly through retrospectively examining other implementations, both failed and successful, to develop a model for such an examination. This would inform both the cultural and lean literatures specifically in the areas of congruence and management of change in the implementation of a new philosophy. There is also an opportunity to consider with the organisation's agreement some additional research post this thesis to identify the cultural progression over the years after the research, this would provide for an interesting discussion from both a practitioner and research perspective.

8.4 Chapter Summary

The lean journey has been an exciting one for both the organisation and personally in developing this thesis. The philosophy builds upon many of the concepts of quality and total quality management which in turn build upon earlier concepts in manufacturing and organisational theory. The philosophy drives improvement in the delivery of operations by including the people that are carrying out the work in the planning. Given an increasingly educated workforce, philosophies such as lean become more important. There needs to be a

close examination of learnings from other sectors and the adoption of best practice no matter where it comes from. While there are limitations to the philosophy, it steadfastly encourages best practice, promotes a healthy culture of openness and flexibility, and drives the removal of non-value-add activities, all of which add to the competitiveness of the organisation. However, there is a strong argument to suggest there is an entrepreneurial element missing that will drive growth in the business which is also critical for its survival. Furthermore, a level of congruence is required with the values of the philosophy to realise the benefits in an acceptable timeframe. Should there have been too little alignment the levels of resource and effort may not justify the investment. So in summary, whilst the philosophy delivers much to many, there needs to be careful consideration before embarking on the lean journey as it will not deliver all to everyon

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Survey | Confidential | 05/02/2014

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Improve
Adapt
Learn
celtic anglian water

This short survey is being conducted as part of the introduction of our Continuous Improvement Project and the returns are completely anonymous. We would appreciate if everyone within CAW completes the survey in order that we can get a clear picture of our organisation.

The survey can be completed online or in hard copy and completed surveys should be emailed or posted to Suzanne Taylor at the addresses below in order that the anonymity of respondents is maintained. Suzanne will maintain a register of respondents, but will ensure individual's responses remain confidential.

Should you have any difficulty filling in the survey, please feel free to contact your line manager who will be able to advise on how to complete the survey and provide a stamped addressed envelope for return of hard copy responses.

Thank you for your help and cooperation.

Please return to:

suzanne.professionalsafety@gmail.com, or Suzanne Taylor, Ringsend WwTW, Pigeon House Road, Ringsend, Dublin 4.

Question 1

How long have you been working for CAW?

- (●) 0-4yrs
- ( ) 5-9yrs
- ( ) 10-14yrs
- ( ) 15yrs +

Question 2

What is your gender?

- (●) Male
- ( ) Female

Question 3

How would you describe your role?

- (●) Administrative
- ( ) Managerial
- ( ) Operator/Technical

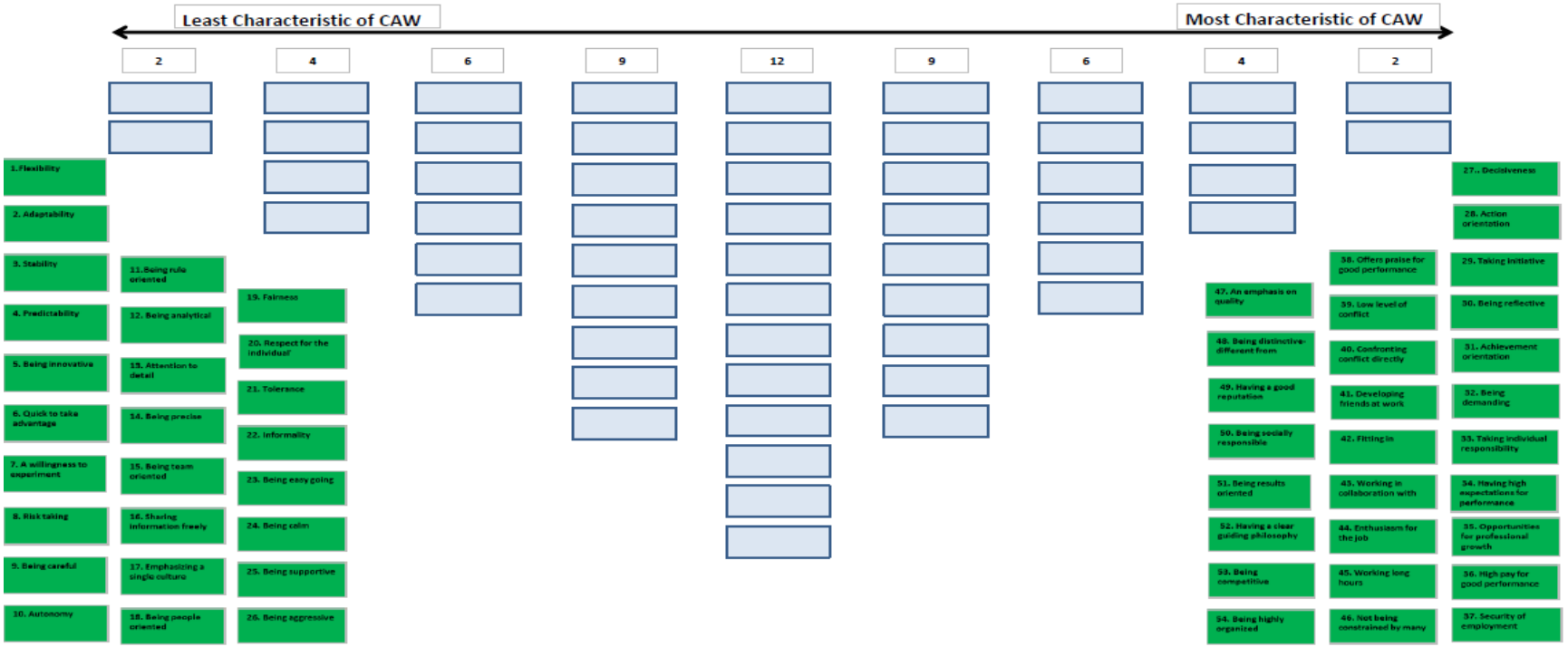
Page 1 of 3

Culture Survey

Important values may be expressed in the form of norms or shared expectations about what's **important about how to behave or what attitudes are appropriate within CAW**.

Please sort the 54 values within the Green Value Boxes into a row of nine categories placing at one end of the row those Green Value Boxes that you consider to be the most characteristic aspects of the culture of CAW, and at the other end those Green Value Boxes that you believe to be the least characteristic of CAW.

This can be done electronically by simply clicking and dragging the boxes to the chosen Blue Grid Box position



Definition of the 54 Value Boxes

The list of 54 values below describe what's important about how to behave or what attitudes are appropriate within CAW

Value	Description	Value	Description
1. Flexibility	CAW expect flexibility in peoples attitude to work	**28. Action orientation**	CAW expect action to be taken when an issue arises
2. Adaptability	CAW values peoples ability to adapt to different situations	**29. Taking initiative**	CAW value people that take an initiative to resolving an issue
3. Stability	CAW recognises the value of a stable work environment	**30. Being reflective**	CAW promotes reflective behaviour in delivering the business
4. Predictability	CAW tries to ensure there is a predictability about its operation	**31. Achievement orientation**	CAW is focused on achieving objectives
5. Being innovative	CAW values innovation and new ideas	**32. Being demanding**	CAW demand a lot from its staff
6. Quick to take advantage of opportunities	CAW are quick to take advantage of an opportunity	**33. Taking individual responsibility**	CAW expect people to take individual responsibility
7. A willingness to experiment	CAW are willing to explore new ideas and experiment	**34. Having high expectations for performance**	CAW expect high levels of performance from its staff
8. Risk taking	CAW are willing to take risks with new ideas	**35. Opportunities for professional growth**	CAW provide opportunities for professional development
9. Being careful	CAW are always careful in the operation of the business	**36. High pay for good performance**	CAW reward good performance with high pay
10. Autonomy	CAW value the autonomy of people in the business	**37. Security of employment**	CAW provides and values security of employment
11. Being rule oriented	CAW are rule orientated	**38. Offers praise for good performance**	CAW promotes praise for good performance
12. Being analytical	CAW take an analytical approach to the business	**39. Low level of conflict**	CAW values a low level of conflict
13. Paying attention to detail	CAW pay attention to detail in the delivery of the business	**40. Confronting conflict directly**	CAW addresses conflict directly
14. Being precise	CAW are precise in the way they deliver their business	**41. Developing friends at work**	CAW promotes developing friend's at work
15. Being team oriented	CAW expect people to work as part of a team	**42. Fitting in**	CAW expects staff to fit into existing teams
16. Sharing information freely	CAW expect people within the organisation to share information	**43. Working in collaboration with others**	CAW recognises the value of working in collaboration
17. Emphasizing a single culture throughout CAW	CAW emphasise the culture within the organisation	**44. Enthusiasm for the job**	CAW expects staff to approach their role with enthusiasm
18. Being people oriented	CAW value the people that work within the organisation	**45. Working long hours**	CAW expects staff to work long hours
19. Fairness	CAW tries to ensure that a level of fairness is applied to situations	**46. Not being constrained by many rules**	CAW does not constrain people with rules and procedures
20. Respect for the individual's right	CAW respects an individuals right to have an opinion	**47. An emphasis on quality**	CAW promotes a culture of quality within the business
21. Tolerance	CAW has a tolerance for differing opinions	**48. Being distinctive-different from others**	CAW values people that have distinctive opinions
22. Informality	CAW operates in an informal way	**49. Having a good reputation**	CAW values their own reputation and the reputation of their peo
23. Being easy going	CAW adopts an easy going approach to the business	**50. Being socially responsible**	CAW promotes a culture of social responsibility
24. Being calm	CAW expects a calm approach to delivering the business needs	**51. Being results oriented**	CAW are focused on results
25. Being supportive	CAW supports and assists staff	**52. Having a clear guiding philosophy**	CAW emphasise a guiding set of principles
26. Being aggressive	CAW are aggressive in their approach to business	**53. Being competitive**	CAW are focused on being competitive
27. Decisiveness	CAW are decisive in when an issue arises	**54. Being highly organized**	CAW are organised in their approach to delivering their business