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The effects of implementing a Lean Six Sigma tool, Visual Process Controls, to improve month-end activities in a finance department – An Empirical Case Study

By:

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A Research Dissertation submitted in partial fulfilment for the Degree of Master of Science in Technology Management of the National University of Ireland, Galway

College of Business, Public Policy and Law – School of Business & Economics

Submission: September 2010

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I hereby certify that I am the author of this document and that any assistance I received in its preparation is fully acknowledged and disclosed in the document. I have also cited all sources from which I obtained data, ideas or words that are copied directly or paraphrased in the document. Sources are properly credited according to accepted standards for professional publications. I also certify that this paper was prepared by me for the purpose of partial fulfilment of requirements for the Degree Programme.

Signed: _____ Date: 31 August 2010

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Abstract

The world that companies operate in today forces them to continually seek out and strive for new cost savings and where possible create a competitive advantage. Lean, Lean Thinking and Lean Six Sigma has seen tools and methods applied in manufacturing environments over the years that have proved effective.

This dissertation takes one of these tools, Visual Process Controls, and seeks to establish the effects of implementing it so that there is an improvement to month-end activities in an accounting environment.

Following extensive research of Lean, Lean Thinking and Lean Six Sigma literature the following two research objectives have been identified for further investigation:

Research Objective One: To explore the impact of introducing Visual Process Controls on Pfizer's Grange Castle and Newbridge accounting departments' month-end processes

Research Objective Two: To ascertain if Visual Process Controls in use in Grange Castle and Newbridge accounting departments provide clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for an accounting department environment.

The data collection method chosen by the author is qualitative as there is a need to take into account the experiences and views of the analysts, accountants and management within the accounting departments. Semi-structured interviews were carried out with respondents appropriately spread between the various sub-functions of the accounting department to give a fair reflection of the impact and effective use of the month-end visual process control board.

The data analysis was both qualitative and quantitative as the author found it necessary to have defined rules for scoring in order to arrive at a conclusion – that the use of Visual Process Control tools within an accounting environment was effective.

The researcher achieved research objective one, to explore the impact of introducing visual process controls on the month-end processes within the accounting departments of Grange Castle and

Newbridge. The research findings indicate many positive impacts across six distinct areas – the month-end process; the finance leadership team; the finance team; team behaviours; tools, systems or processes; and team communication.

The research for research objective two, to ascertain if Visual Process Controls in use in the accounting departments of Grange Castle and Newbridge provide clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for an accounting department environment, have also been achieved. From the twelve respondents interviewed, ten or 83% have deemed the use of the month-end visual process control board to be an effective tool for this environment, based on the defined scoring criteria.

Glossary

APICS	The Association for Operations Management
DMAIC	Define, Measure, Analyse, Improve, Control
SMED	Small Medium Exchange of Dies
SOX	Sarbanes Oxley Act
SUR	Setup Reduction
Takt	The longest period which can be spent manufacturing each unit while still meeting a set level of demand. Derived from the German word taktzeit which translates to cycle time
TPM	Total Productive Maintenance
TPS	Toyota Production System

1 Introduction

1.1 Research Objectives

This dissertation seeks to establish the effects of implementing a Lean Six Sigma tool, Visual Process Controls, to improve month-end activities in a finance department.

Following extensive research of the literature the following two research objectives have been identified for further investigation:

Research Objective One: To explore the impact of introducing visual process controls on Grange Castle and Newbridge accounting departments' month-end processes

Research Objective Two: To ascertain if visual process controls that are in use in Grange Castle and Newbridge accounting departments provide clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for an accounting department environment.

1.2 Structure of Dissertation

1.2.1 Literature Review

Chapter two will examine the body of knowledge of Lean Six Sigma methodology under the following main headings:

- Lean
- Lean Thinking
- Lean Six Sigma

It will consider and search the available body of knowledge pertaining to Lean, Lean Thinking and Lean Six Sigma tools and methods and will detail how these tools and methods are applied.

From the literature review there is clear knowledge and research into the use of Lean Six Sigma tools and methods in a manufacturing environment, but very little research as to their specific use,

success and applicability within non-manufacturing areas such as administrative and accounting environments.

According to Dinero (2005) Lean Thinking has evolved from Lean philosophy as applied to manufacturing organisations. Lean Thinking is the change in focus of the improvement process from manufacturing areas to the whole organisation.

Therefore, the focus of this dissertation was to look at the effects of using one of these Lean Six Sigma tools, Visual Process Controls, in an accounting environment. The focus for the researcher will be to find out if this is an effective process improvement tool in this specific environment – an accounting department.

1.2.2 Method of Research

The objectives of chapter three, the research methodology chapter, is to provide an account of how the research process was developed and to set out the research design that has been developed to achieve the research objectives of this dissertation. According to Yin (2008) research design is a logical plan for getting from beginning to end, where the beginning can be defined as the initial set of questions to be answered, and the end is some set of conclusions (answers) about these questions.

The study will be exploratory in nature, Robson (2002) explaining that exploratory research is to find out what is happening, identify new insights, inquire into and assess phenomena in different circumstances. The data collection method chosen by the author is qualitative. The justification for this is the need to take into account the experiences and views of the analysts, accountants and management within the accounting departments on using visual process controls as a process improvement tool. Qualitative research was chosen over quantitative as it is a better method in making sense of statements and opinions that are collected from the interviewees. Silverman (2006) makes the point that qualitative research's main strength is its ability to study phenomena which are not available elsewhere, particularly areas of social reality which statistics cannot measure.

The data analysis was both qualitative and quantitative as the author found it necessary to have defined rules for scoring in order to arrive at a conclusion – that the use of Visual Process Control tools within an accounting environment was effective.

1.2.3 Findings Chapter

The objective of the research findings chapter, chapter four, was to interview respondents who were selected based on purposive sampling. This allowed the author to select interviewees who were able to answer the research questions and allow the study to meet its research objectives. The respondents were chosen from the accounting departments of Pfizer's Grange Castle and Newbridge sites.

The interviews were semi-structured in nature, the strength of this method allowing the interviewer to enquire for further detail or ask an additional question depending on the responses of each candidate. The respondents were appropriately spread between the various sub-functions of the accounting department to give a fair reflection of the impact and effective use of the month-end visual process control board.

1.2.4 Conclusions and Further Research

The objective of this chapter (five) was to compare, contrast and arrive at conclusions based on the findings of the primary research that has been undertaken in chapter four.

The researcher achieved Research Objective One, to explore the impact of introducing visual process controls on the month-end processes within the accounting departments of Grange Castle and Newbridge. The research findings indicate many positive impacts across six distinct areas – the month-end process; the finance leadership team; the finance team; team behaviours; tools, systems or processes; and team communication.

The research for Research Objective Two was also achieved: i.e. to ascertain if visual process controls in use in the accounting departments of Grange Castle and Newbridge provide clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for an accounting department environment. From the twelve respondents

interviewed, ten or 83% have deemed the use of the month-end visual process control board to be effective based on the defined scoring criteria. However, there were two areas that are achieving below average results when compared to the other findings. These are the status of each activity, and the overall experience of the introduction of Visual Process Controls.

The author has detailed and reviewed the negative impacts that were perceived by the respondents, but concluded that these are a failing of an effective all encompassing framework to support the tool in helping to continually improve and control the process that is clearly adding value based on the respondents' answers in this study.

2 Literature Review

2.1 Introduction

The literature review will examine the body of knowledge of Lean Six Sigma methodology under the following main headings:

- Lean
- Lean Thinking
- Lean Six Sigma

The literature review will consider and search the available body of knowledge pertaining to Lean, Lean Thinking and Lean Six Sigma tools and methods. It will detail how these tools and methods are applied in manufacturing and non-manufacturing environments.

Tischler (2006) found that the application of Lean principles in the office can result in real, visible and quantifiable savings for service departments and the organisation as a whole.

2.2 Lean

Liker (1997) refers to mass production and lean production as a way of thinking about how production should occur within a specific factory, more specifically how solutions are arrived at on how people, equipment, material and funds are organised to build products that people will pay a price for. Mass production, which originated from the Ford production system, reflected the culture of that time. Similarly, a new method evolved from post World War II Japanese manufacturing industry which sought to find further efficiencies on an effective mass operation. This resulted in a new solution to the manufacturing question, the Lean Solution.

Lean evolved from the Toyota Production System, the development of which has been accredited to Sakichi Toyoda, who founded the Toyoda Group in 1902, Kiichiro Toyoda who headed the automobile manufacturing operation between 1936 and 1950, Eiji Toyoda, Managing Director between 1950 and 1981 and Chairman between 1981 and 1994, and Taiichi Ohno, the Father of the Kanban System (Becker, 2009).

2.2.1 Defining Lean

All we are doing with the Lean philosophy according to Ohno (1988) is looking at the time line from the moment the customer gives a purchase order to the point when the cash is collected, this time line is reduced by removing the non-value-added wastes. Lean is the elimination of waste from all aspects of the operations system and process, it was originally devised to remove wastes and add value to key business metrics – lead time and inventory.

This thinking is supported by Krafcik (1988) who refers to traditional production systems as buffered manufacturing which has large volumes of inventories and work in progress, long machine downtime for maintenance and large lot sizes. Lean production is in contrast to this with low inventory levels, methods that quickly highlight quality issues, flexible work arrangements, and small maintenance areas and lot sizes.

Womack et al (1990) support this definition of Lean when they describe lean production as Lean because it uses less of everything when compared to a traditional mass production environment. It uses half of: – the human effort in the factory; manufacturing space; investment in tools and new product development. It requires keeping less inventory on site and results in less defects and produces a greater variety of products.

Graban and Michael (2008) state that providing a definition of Lean that is both concise and comprehensive is a complex issue. Within the industry of medical care they described Lean as a set of principles, methods and tools that will improve patient care by creating an environment that allows management to fully engage employees in a continuous improvement process to find perfection, allows work methods to be precisely defined without stifling creativity. This results in quality and cost improvements without employees being asked to work harder. A comparison of lean and mass production approaches is shown in Figure 1 – The Lean Enterprise versus Traditional Mass Production.

It should be noted that Lean is not a magic wand or silver bullet that will transform processes or companies (Graban and Michael, 2008).

The Lean Enterprise versus Traditional Mass Production

	Mass Production	Lean Enterprise
Primary business	A product-centric strategy. Focus is on exploiting economies of scale of stable product designs and non-unique technologies	A customer-focused strategy. Focus is on identifying and exploiting shifts in competitive advantage.
Organisational structure	Hierarchical structures along functional lines. Encourages functional alignments and following orders. Inhibits the flow of vital information that highlights defects, operator errors, equipment abnormalities, and organisational deficiencies.	Flat, flexible structures along lines of value creation. Encourages individual initiative and the flow of information highlighting defects, operator errors, equipment abnormalities, and organisational deficiencies.
Operational framework	Application of tools along divisions of labour, Following of orders, and few problem solving skills.	Application of tools that assume standardized work. Strength in problem identification, hypothesis generation, and experimentation.

Figure 1

Source: Sayer & Williams, 2007.

2.2.2 Principles of Lean

The principles of Lean detail the method that should be used to implement Lean. Womack and Jones (1996) first documented their Five Steps, which was later expanded by Liker (2004).

2.2.2.1 Five Steps

The principles of Lean as documented by Maskell and Baggaley (2003) which were derived from Womack and Jones (1996) are:

1. **Value:** Lean starts with a precise definition of what constitutes value from the customer point of view in terms of the product features and characteristics that are valued by the customer
2. **Value Stream:** The sequence of processes through which a product is transformed from raw material to delivery at the customer's site
3. **Flow and pull:** The production process is designed to maximise the flow of product through the value stream, initiated by the pull of customer demand
4. **Perfection:** Defined as 100 percent quality flowing in unbroken flow at the pull of the customer
5. **Empowerment:** The system of measurements and controls that provides each employee with the information and authority to take the necessary action at the time it is required

2.2.2.2 Principles of the Toyota Way

Liker (2004) expanded on Womack and Jones (1996) principles, which are:

1. Base your management decisions on a long term philosophy, even at the expense of short term financial goals.
2. Create continuous process flow to bring problems to the surface
3. Use "pull" systems to avoid overproduction
4. Level out the workload (work like the tortoise, not the hare)
5. Build a culture of stopping to fix problems, to get quality right the first time
6. Standardised tasks are the foundation for continuous improvement and employee empowerment

7. Use visual control so that no problems are hidden
8. Use only reliable, thoroughly tested technology that serves your people and processes
9. Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others
10. Develop exceptional people and teams who follow your company philosophy
11. Respect your extended network of partners and suppliers by challenging them and helping them improve
12. Go and see for yourself to thoroughly understand the situation
13. Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly
14. Become a learning organisation through relentless reflection and continuous improvement

According to Liker (2004) an organisation is on its way to sustainable competitive advantage when they follow the Toyota Production System (TPS) by implementing and practicing the above set of Toyota Way principles. To fully appreciate this philosophy, value and waste needs to be understood from a Lean perspective.

2.2.3 Value

Value is the price that a customer is willing to pay for goods, services or information which is produced or provided by the manufacturer, producer or service provider. Womack and Jones (2003) state that it is only possible for the final customer or consumer to define this value. Therefore, it is only meaningful when defined value is expressed in terms of specific product, goods, services or both, which meet what the customer requires at a specific price and time.

Murman (2002) describes value as either worth, utility, benefit or reward that is derived, by a stakeholder, from some organisational action. Murman (2002) states that while it is easy to identify stakeholders, it is very difficult to understand what provides value to stakeholders. This is because they do not see value through the eyes of a consumer in terms of the product, service or improvement provided. Stakeholders only see value that is hidden in the value stream, as in the case of stakeholders in the finance, human resources or information systems functions of a business, who never get near the physical product, but add benefit along the way. In Lean, if it is not adding value, it is waste.

2.2.4 Waste

Muda, is a Japanese word for waste. Womack and Jones (2003) refer to waste as human activities which absorb resources but do not create value. There are many examples of this such as:

- Mistakes which require rectification or rework
- Make to stock orders which produces items no one wants so that inventories and work in-progress goods pile up
- Processing activities which are not required
- The movement of employees and transport of goods from one place to another without any purpose
- Groups of people in a downstream activity standing around waiting because an upstream activity has not delivered on time
- Goods and services which don't meet the needs of the customer.

2.2.4.1 Categorisation of Waste

According to Taylor and Brunt (2001) Taiichi Ohno identified seven areas of waste in the Toyota Production System. Figure 2 documents the different categories of waste and details the nature of each waste:

The Seven Wastes of the Toyota Production System

Waste Category	Nature of Waste
1. Overproduction	Smooth flow of goods and piles of work in progress Target and achievement is unclear Excessive lead-time and storage times
2. Waiting	Operators waiting Operators slower than line Operators watching equipment and operation
3. Transportation	Stacking and un-stacking of components Conveyors and Widely spaced equipment Many busy forklifts
4. Inappropriate processing	Variation between operators' methods Variation between standard and actual operation Processes that are not statistically capable
5. Inventory	Prescribed storage volume exceeded Deteriorating material with old dates Sophisticated stores system
6. Motion	Components and controls outside easy reach Layout not standardised causing double handling Widely spaced equipment and operators bending
7. Defects	Poor material yield Large rework area and work in scrap bin Difficult assembly with high inspection levels Irregularity of work with high customer complaints

Figure 2

Source: Taylor and Brunt 2001, pp.80-81.

Kaufman Group (2000) developed a conceptual model of Lean Manufacturing, which is illustrated in Table 1 – Conceptual Mode of Lean Manufacturing. The seven wastes identified by Taiichi Ohno in the Toyota Production System are categorised by the sources of waste – People; Quantity and Quality. The model also details what waste reduction approach can be used for source of waste, the most appropriate tools and the desired results in each case.

Conceptual Mode of Lean Manufacturing

Category of Waste	Type of Waste	Waste Reduction approach	Tools	Desired Results
People	Processing	Workplace	Standardisation	Highly efficient
	Motion	Management	Workplace organisation (5S)	Safe work areas with high output
	Waiting		Kaizen	
Quantity	Inventory	Just In Time	Kanban	What you need When you need it
	Making too much		Levelling	
	Moving things		Quick set up (SMED) TPM	
Quality	Defects	Built in Quality	Error Proofing	Good Quality

Table 1

Source: Kaufman Group, 2000.

2.2.5 Characteristics of Lean

According to Maskell and Baggaley (2003) Lean Enterprise Thinking includes the following characteristics:

- Widespread use of Lean methods throughout every aspect of the business
- Deeply ingrained Lean culture supporting the lean tools and those who use them
- Understanding of the wider value streams leading to close partnership relationships with customers, suppliers and other business partners
- Passion for perfection leading to a seemingly self-critical approach to ongoing continuous improvement

2.2.6 Lean Tools/Techniques

The lean tools can be used by organisations to help identify and remove non-value adding activities or muda. These tools can be used individually or collectively, depending on the specifics of the process or issue that is the focus of the specific project. The tools and techniques that have been developed are:

2.2.6.1 Just in Time (JIT)

According to Ohno (1988) Just in Time can be described as getting the required parts and quantity of those parts at the required assembly area when they are needed, this will ultimately allow organisations who establish these processes to approach zero inventory levels.

2.2.6.2 Autonomous Control (Jidoka)

Smith and Hawkins (2004) state that Jidoka means autonomous control, also known as autonomation. Jidoka is achieved when ideas are generated that will stop the manufacture of a product or service that does not conform to specification. Kubiak and Benbow (2009) report that the use of intelligent features on machines which can be used as control mechanisms to start, stop, change and even signal when specific parameters are reached is indicated.

Black and Hunter (2003) state that autonomous control allows workers in lean factories to inspect their own work and the work of their colleagues, so that the quality and quantity of the work is

controlled at source. Liker (2004) concurs with this thinking saying that Jidoka keeps control of quality as a defect is never let pass to the next station which frees people from their machines, which Liker (2004) refers to as automation with a human touch.

2.2.6.3 Visual Control

According to Liker (1997) visual controls can provide employees and managers with simple but effective ways of understanding current working conditions, which allow for corrective actions to be taken. Womack and Jones (2003) also support this thinking, while referring to it as transparency, specifically to highlight the need for everyone to view all the activities that occur along a value stream which flows throughout departments and organisations. Hirano (1994) also states that visual control highlights if a situation is adding value or waste. George (2003) is also supportive, but refers to it as visual management.

Perhaps the simplest way to understand the importance of visual controls is the analogy provided by Mann (2005, p.37) – “if *takt* time is the heart of lean production, visual controls and the process surrounding them represent the nervous system”.

Visual process controls involve using various displays, such as posters and charts, or visual markers, such as flags and floor markings, which are conspicuously displayed for work team or department so that everyone is aligned. Visual process controls have many beneficial qualities as they establish and communicate what the work priorities are; display what the target is and if the targets have been met; the process is displayed which shows all dependent relationships and any process bottleneck processes and milestones; the process issues can be flagged, and quickly addressed with an understanding of the knock-on effect; show details of the standardised work methods; feedback to and from management can be detailed and it eliminates the need for meetings (George et al, 2005).

George et al (2005) lists the following as examples of visual process controls::

1. Safety Indicators
2. Production Summary Boards
3. Process Summary Boards
4. Dashboard Metrics
5. Skill & Training Board
6. 5S Board

2.2.6.4 Total Productive Maintenance (TPM)

The origin of TPM may be traced back to Japan's fabrication and assembly industries (Suzuki, 1994). These industries invested heavily in new equipment in an effort to become less labour intensive as the equipment was highly automated. The trend toward automation, combined with the trend toward just-in-time production, stimulated interest in improving maintenance.

Nakajima (1994) defined TPM by five key elements:

1. TPM aims to maximize equipment effectiveness.
2. TPM establishes a thorough system of Preventive Maintenance for the equipment's entire life span.
3. TPM is cross-functional, implemented by various departments (engineering, operators, maintenance, managers).
4. TPM involves every single employee.
5. TPM is based on the promotion of Preventive Maintenance through the motivation of management and autonomous Small Group Activity.

Shirose (1996) defines TPM as:

1. TPM strives for maximum equipment effectiveness.
2. TPM establishes a total system of Preventive Maintenance for the entire life of the equipment.
3. TPM includes participation by all sectors of the organization that plan, use and maintain equipment.
4. TPM participation is from top management to the frontline staff.
5. Execution of TPM is based on Small Group Activity.

2.2.6.5 Single Minute Exchange of Dies (SMED)

SMED was developed by Shigeo Shingo over a nineteen year period (Shingo & Dillon, 1985). The development resulted from the examination of the theoretical and practical aspects of setup improvement. Shingo identified that analysis and implementation are fundamental to the SMED system and must be part of any improvement program.

According to Christensen et al (2007) the goal of SMED is to provide an efficient, but rapid, way of converting a manufacturing process from running the current product to running the next product. Christensen (2007) also refers to SMED as Setup Reduction (SUR). SUR involves quick changeover or rapid exchange to tooling and dies, the time taken for each changeover should be less than ten minutes.

There are a number of steps to reducing setup time using the SMED method as outlined by Shingo & Dillon (1985):

1. Separate the internal and external activities. Internal activities are those that can only be performed while the process is stopped. The external activities can be done while the machine/process is in operation
2. Convert internal activities to external activities, where possible
3. Streamline the remaining internal activities
4. Streamline the external activities so that they are of similar scale to the internal activities
5. Document the new procedure
6. Repeat the above steps

2.2.6.6 Leveling

Liker (2004) asserts that focusing on waste is the most common approach to implementing lean tools, because it is easy to identify and eliminate it. But what many companies fail to do is the most difficult process of stabilising the system and creating evenness – a true balanced lean flow of work. Leveling is also referred to as Heijunka, this is the leveling of production by both volume and mix (Liker, 2004).

The benefits when the schedule is heijunka are:

1. Flexibility to make what the customer wants when they want it
2. Reduced risk of unsold goods
3. Balanced use of labour and machines (resources)
4. Smoothed demand on upstream processes and suppliers to the process

2.2.6.7 Kanban

Kanban means visual control. Ohno (1988) describes Kanban systems as a means of controlling inventory and production scheduling in just in time environments. The kanban system uses cards or signals to govern the flow of materials through the manufacturing facility. While traditional push systems continue to pile up inventory when there is a downstream problem, Kanban systems automatically stop the flow and thus focus attention at the source of the problem. Ohno (1998) states that there are two pillars of the Toyota production system – just-in-time and automation with a human touch, or as Ohno refers to “autonomation”. The tool used to operate this system is Kanban.

Six rules have been devised by Irwin (1997) to keep Kanban effective:

1. Do not send defective product to the subsequent process
2. The customer (subsequent process) withdraws only what is needed
3. Produce only the exact quantity withdrawn by the customer (subsequent process)
4. Level production
5. Kanban as a means of fine tuning
6. Stabilise and rationalise the process

2.2.6.8 Kaizen

Kai means to “take apart” and zen means to “make good”. Kaizen is used as a method to accelerate the pace of a process improvement, by focusing on a continuous stream of small incremental improvements (Imai, 1986). For Brunet and New (2003) Kaizen epitomises the mobilisation of an organisation’s workforce by providing a mechanism for employees to positively develop their organisation which has three key concepts:

1. It is continuous as it is embedded within the organisation on a never ending journey striving for improved quality and efficiency;
2. Incremental in nature; and
3. Participative in nature as it involves the intelligence of the entire workforce

Imai (1986) further expanded Kaizen into an umbrella concept for a large number of business practices which exist within the Kaizen toolkit which include but are not limited to: Customer orientation, Total Quality Control, QC circles, Suggestion system, Kanban, Zero defects, Small group activities and productivity improvements.

2.2.6.9 Workplace Organisation (5S)

The Five S method was developed by Takashi Osada (1991). Osada (1991) defined 5S as method to organise the workplace, to keep it neat and clean, to maintain standards and to sustain the discipline that is needed to do a good job. 5S are the initials of five Japanese words seiri, seiton, seiso, seiketsu, and shitsuke. In English they mean sort, set in order, shine, standardise and sustain. Osada (1991) acknowledges that the 5S discipline while easy to understand is difficult to implement.

Sort (seiri) focuses on eliminating any unnecessary items from the work place; this can be facilitated by Red Tagging (Dennis & Shook, 2007) which involves attaching red tags to items during the sort phase that need to be removed. Set (seiton) in order is about organising the tools and equipment that are left so that everything has a place and there is a place for everything. Shine (seiso) involves cleaning and tidying dirt that is now visible as a result of the sort and set phases including cleaning tools, equipment and work areas. Standardise (seiketsu) is about setting standards for the first three steps, what is needed and not needed, what should be left and what needs to be cleaned and when. Sustain (shitsuke) involves getting the 5S process embedded into the normal day to day activity of this business. The methods to achieve this are promotion, communication and training.

2.2.6.10 Standardisation

Standardisation was first introduced through Taylor's (Taylor, 1923) scientific factory management approaches in the early 1900's. Taylor's (AUA, 2004) objective was to standardise work units and make them interchangeable, he continuously searched for the best way to do tasks in the shortest time possible by removing decision making from employees and embedding a top-down rigid hierarchical command structure. Deming (1995) created the improvement process Plan-Do-Check-Act, a four step model. It is a control mechanism used to supervise, govern, regulate or restrain a system. Lewis (1998) explains that Deming's improvement process defines the objective of a process, develops a plan to meet the objective, executes the plan and the results are reviewed to see if they are as expected. If the results are different to what was expected the plan is modified to fulfil those objectives. This approach allows waste to be continuously identified and removed.

Ishikawa (1985) further expanded Deming's (1995) four step model into six steps, which are:

1. Determine goals and targets
2. Determine methods of reaching goals
3. Engage in education and training
4. Implement work
5. Check the effects of implementation
6. Take appropriate action

Ishikawa's Six Step PDCA Cycle



Figure 3

Source: Ishikawa, 1985.

2.2.7 Decision Making

The previous section has provided an overview of the tools and techniques that exist within the Lean toolbox, but how are they applied to assist with decision making within the work environment? One of the methods used, that was developed at Toyota as part of their fourteen principles (Liker, 2004), is nemawashi. Nemawashi translates “to prepare a tree for planting”. When nemawashi is used decisions are made slowly via a group consensus, considering all options, but once a decision is made implementation is rapid, but cautious. According to Liker (2004) the process of nemawashi involves discussing problems and potential solutions with all those effected. The process, while time consuming, results in a broader search for solutions.

The main purpose of nemawashi is to get the maximum benefit from the human assets within the organisation (Jackson & Tomioka, 2004). Kogut (1993) characterises this form of decision making as decentralised and bottom-up consenses seeking, which has proved to be very effective in domestic Japanese organisations.

2.3 Lean Thinking

According to Dinero (2005) Lean thinking, has evolved from Lean philosophy as applied to manufacturing organisations. Lean thinking is the change in focus of the improvement process from manufacturing areas to the whole organisation. Womack and Jones (1996) refer to this as the Lean Enterprise, and detailed five steps for Lean business logic which are the output of their research of fifty companies around the world in a variety of industries.

The five steps are:

1. Define value precisely from the perspective of the end customer in terms of a specific product with specific capabilities offered at a specific price and time.
2. Identify the entire value stream for each product or product family and eliminate waste
3. Make the remaining value-creating steps flow
4. Design and provide what the customer wants only when the customer wants it
5. Pursue perfection

Murman (2002) refers to Lean thinking as an enterprise wide process that strives to remove waste with the goal of creating value through a dynamic and knowledge-driven process which is heavily customer focused. A common thread is visible through Murman's definition and the five steps of Womack and Jones (1996), that is customer focused, eliminates waste and creates value. Lean thinking was utilized by Toyota after the failure of their highly automated Tahara plant. They returned to much lower levels of automation in final assembly and a reorganization of the assembly line so that related activities – for example the electrical system - are installed and tested in one focused area. This shows that the use of cross functional co-located teams improve the process (Womack & Jones, 2003).

2.3.1 Lean Office

Lean office (Tapping, 2002) evolved from Lean manufacturing processes. Lean office utilises the same techniques and tools that have been designed for Lean Manufacturing. Tischler's (2006) found that with the application of lean principles in the office can result in real, visible and quantifiable savings for service departments and the organisation as a whole. According to Tischler (2006) Lean is a better methodology because:

- Fewer initial tools must be learned by each participant in the improvement process
- The improvement process can be accomplished very quickly
- The results can be more powerful than any single traditional quality improvement effort
- The value stream is a richer concept than the process, as built into the value stream is a focus on customer value and the idea of a stream or flow of activities

The output of Tischler's (2006) lean office project saw real benefits realised. These included the time from the beginning of the process to the end being reduced from two or three weeks to less than one day, and the admissions directorate, a highly paid faculty were no longer involved. This allowed faculty to focus on teaching and research rather than making phone calls, thus improving the university's quality of education and image. Most inquirers received a call within hours or minutes of sending their inquiry and the campus mail system was less burdened which also resulted in \$500 worth of paper saved annually.

There are many positive effects of applying Lean principles in an office environment; these positive effects include changing the manner in which work is done. For example, financial month

end occurs every month. Why is there a rush in every company at this time to get things done, activities left unchecked until after ‘the books have closed’ – Why? Take batch processing, that is, business processes that are carried out just once a month. Why not carry them out once a week, or multiple times a week, or even every day? The third step in Womack and Jones (1996) five steps to Lean Enterprise – Make the remaining value-creating steps flow means that performing a task or activity once a month is not adhering to the third step that the process should flow.

Also, an effect of working in a batch mode results in work building up across the month; this means that there are large amounts of wait time, and large amounts of work in progress. If the activities are done more frequently, or the work is levelled across the month wait time and work in progress reduce, and information quality improves.

According to Locher (2007) impressive improvement is realised when there is a successful implementation of Lean processes within the business, these improvements can see a 90% reduction in lead time and up to a 40% decrease in process time.

2.4 Lean Six Sigma

Lean Six Sigma is an evolution of the methods employed by Lean and Six Sigma; it can also be referred to as Six Sigma Lean (Byrne et al, 2007). They assert that Lean Six Sigma improvements are not just about doing things better, but about doing better things. It is not just about getting data right the first time, being accurate and having a streamlined process, it is also about asking the right questions, ‘should we do this?’, ‘is this necessary?’, ‘what does the customer want?’ and ‘how does the customer want it?’

Jing (2009) states that Lean and Six Sigma convey a wide scope of meaning as they are used differently depending on the context, such as initiatives, programmes, processes, systems, methods, tools or simply activity. According to Rampersad and El-Homsi (2007) the Six Sigma methodology is structured around understanding the customer needs, while identifying key processes linked to the customer needs. Statistical and quality tools are used to reduce variations in the key process which can sustain the process over time. Improvement projects utilising Six Sigma methodologies follow the Define, Measure, Analyse, Improve and Control improvement process, or DMAIC (Rampersad and El-Homsi, 2007).

2.4.1 Six Sigma

As has been extensively documented by the previous literature, Lean (Ohno, 1988) is an improvement approach primarily focused on reducing waste and improving efficiency. According to Jing (2009) Six Sigma is an improvement methodology that is primarily aimed at improving process capability by reducing variation, variation is reduced by being consistent.

Magnusson et al (2003) define Six Sigma as a business process that allows them to monitor everyday business activities and design ways that minimise waste and number of resources which will improve their profitability, and all while increasing customer satisfaction.

Antony (2006) discussing Six Sigma with reference to service processes is of the opinion that the term sigma is a measure indicating the deviation in the performance characteristic of a service from its mean performance. Therefore, the basic goal of a Six Sigma strategy is to reduce variation within the tolerance or specification limits of a service performance characteristic.

2.4.2 Define Measure Analyse Improve Control (DMAIC)

The methodology used to improve an existing process in Six Sigma is the DMAIC process, which is divided into five stages:

<u>Stage</u>	<u>Process</u>
Define	Which process or product that needs improvement The most suitable team members to work with the improvement The customers of the process, their needs and requirements, and create an as-is map of the process that should be improved
Measure	Identify the key factors that have the most influence on the process, and decide upon how to measure them
Analyse	The factors that need improvement
Improve	Design and implement the most effective solution. Cost-benefit analyses should be used to identify the best solution
Control	Verify if the implementation was successful and ensure that the improvement sustains over time

There are many tools that are used during each phase of the DMAIC process; some have been documented in Table 2 – Examples of DMAIC tools.

Examples of DMAIC Tools

Define	Measure	Analyse	Improve	Control
Project Selection Tools	Operational Definitions	Pareto Charts	Brainstorming	Control Charts
PIP Management Process	Data Collection Plan	C&E Matrix	Benchmarking	Standard Operating Procedures
Value Stream Map	Pareto Chart	Fishbone diagrams	Total Preventive Maintenance	Mistake Proofing
Financial Analysis	Histogram	Brainstorming	5S	Plan-Do-Check-Act Cycle
Project Charter	Box Plot	Detailed As-Is process maps	Kaizen	Implementation Plan

Table 2

Adapted from George, 2003.

2.4.3 Benefits of Merging Lean and Six Sigma

Together Lean and Six Sigma combine their independent approaches to form a Lean Six Sigma approach that seeks to improve efficiency and capability primarily by removing wastes and variation (Jing, 2009). Liebesman (2009) supports this definition of Lean Six Sigma, finding that the basic goals of LSS (Lean Six Sigma) are a simplification of the processes by removing non-value added activities and a reduction in variability and defectives during operations. Leibesman also found that combining Lean and Six Sigma improves the bottom line of a company and provides value to its customers.

Similarities and Differences between Six Sigma and Lean

Concepts	Six Sigma	Lean
Origin	The quality revolution in Japan and Motorola	The Quality revolution in Japan and Toyota
Theory	No Defects	Remove Waste
Process View	Reduce variation and improve processes	Improve flow in processes
Approach	Project management	Project management
Methodologies	Define Measure Analyse Improve (or design) Control (or verify)	Understanding customer value Value stream analysis Flow Pull Perfection
Tools	Advanced statistical and analytical tools	Analytical tools
Primary effects	Save money	Reduce lead time
Secondary effects	Achieves business goals and improves financial performance	Reduces inventory Increases productivity and customer satisfaction
Criticism	Does not involve everybody Does not improve customer satisfaction Does not have a system view	Reduces flexibility Causes congestion in the supply chain Not applicable in all industries

Figure 4

Adapted from Andersson, 2006.

Andersson et al (2006) found that the concepts of Lean and Six Sigma are complementary; they are excellent road-maps that can be used one by one or combined. George et al (2003 cited in Andersson et al 2006) state that Lean Six Sigma continues to help companies flourish in a new world where customers expect zero defects and fast delivery at the minimal cost. The similarities and differences between Lean and Six Sigma have been documented in Figure 4 – Similarities and Differences between Six Sigma and Lean.

Bhuiyan and Baghel (2005) point out that Lean and Six Sigma separately cannot achieve improvements at the rate that Lean Six Sigma can. Lean Six Sigma also addresses important issues that are overlooked by Six Sigma and Lean manufacturing individually: the steps in the process that should be first tackled; the order in which they should be applied and to what extent and the ways in which significant improvements can be made in terms of cost, quality and lead times. The fusion of the two helps organisations maximise their potential for improvement.

An analysis of Caterpillar's use of the Lean Six Sigma methodology, carried out by Byrne et al (2007) highlighted a number of characteristics that distinguished their approach to the program from that of other companies. These distinguishing characteristics included:

- An innovation vision based on factual customer and market insights
- Their leadership was committed to perpetual innovation
- Alignment of effort across the extended enterprise
- Growth of capabilities within the organisation that made innovation routine

This positive feedback on the harmonisation of Lean and Six Sigma methodologies is also shown by George (2002) when he found that the combination of Lean and Six Sigma focussing on the highest-value projects and supported by tight performance improvement infrastructure would produce remarkable results and is the most powerful engine available today for sustained value creation by not speeding up the workers or the machines, but by reducing unneeded wait time between value added steps.

Devane (2004) has detailed the advantages of combining the two philosophies, Lean and Six Sigma, instead of selecting one:

- The speed of implementation increases
- More improvement projects can occur in parallel, which increases profits faster
- Senior management expend less time and energy, than if implemented individually
- Faster and more effective adaptation to external events

2.5 Lean Six Sigma – the Holy Grail?

Is Lean Six Sigma the Holy Grail of improvement methodologies for organisations? Devane (2004) believes this not to be the case, as he proposes taking a further step in the development of the ideal improvement methodology – Lean Six Sigma and High-Performance Organisations.

Devane (2004) believes that the combination of Lean Six Sigma and High-Performance Organisation can achieve sustainable and dramatic results by integrating the simple improvement principles and tools of Lean which focus on the elimination of waste; reduce variation by using Six Sigma's statistical methods; plus the cultural focus, creation of accountability, energy and ownership through a new structure and principles that High-Performance Organisations will provide.

The combined disciplines have not yet been widely implemented, but there have been a number of successful implementations, such as StorageTek's implementation in 1995 which saw increased group productivity of four combined departments by sixty percent (Devane, 2004).

2.6 Conclusion

From the literature review there is clear knowledge and research of the use of Lean Six Sigma tools and methods in a manufacturing environment, but very little research into their specific use, success and applicability within non-manufacturing environments such as administration and accounting.

Therefore, the focus of this dissertation will be to look at the effects of using one of these Lean Six Sigma tools, Visual Process Controls, in an accounting environment. The focus for the researcher will be to find out if this is an effective process improvement tool in this specific environment – an accounting department.

The next chapter will look at the research methods that will be used to understand if this tool, originally designed for use in a manufacturing environment, is effective in an accounting environment.

3 Research methodology

3.1 Introduction

The objective of this chapter is to provide an account of how the research process was developed; to set out the research design that has been developed to achieve the research objectives of the dissertation. Kumar (2005) states a researcher has an obligation to conduct a study using an appropriate methodology, as it is unethical to use a method that is inappropriate – i.e. using a highly biased sample.

The Research Process

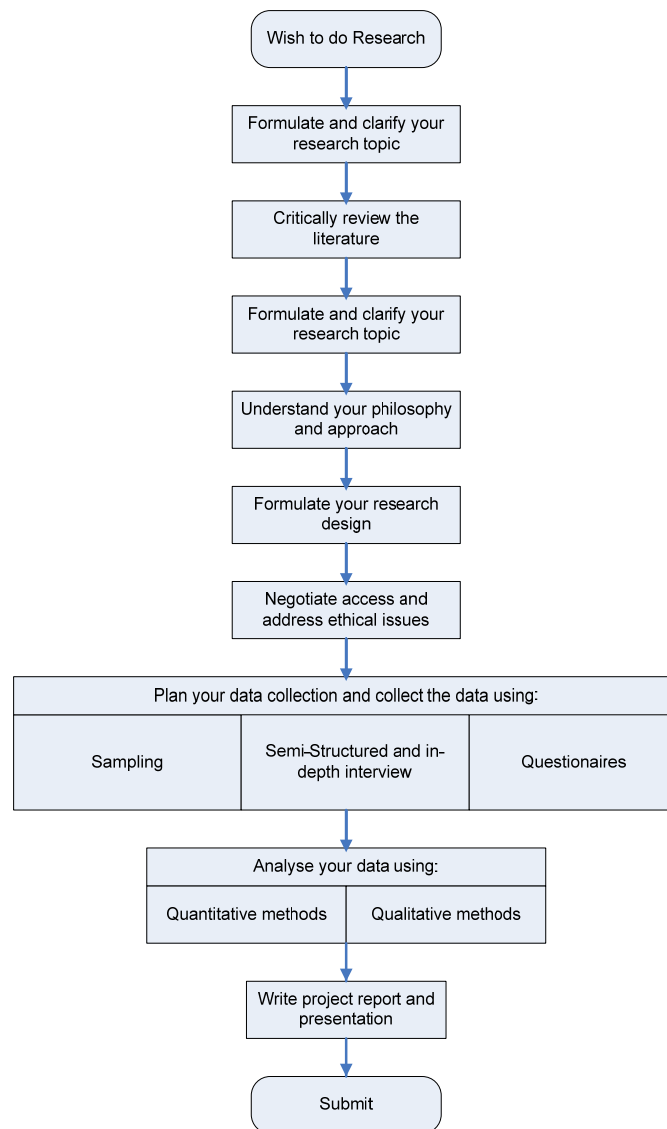


Figure 5

Adapted from Saunders et al, 2007.

Through this chapter the author will detail the research methodology used and the analytical process which influenced this study. The author will then detail how the research problem was identified, how the data was collected and prepared, and how the data was analysed detailing the methods used.

Burgess (1984) states that research process is all about the learning experience, while Bernard (2006) indicates the reporting and presentation of research actually clean up what is a very messy process. Figure 5, The Research Process, steps out and details the research process followed by the author for this case study.

3.2 Overview of Research Design

According to Yin (2008) research design is a logical plan from getting from beginning to end, where the beginning can be defined as the initial set of questions to be answered, and the end is some set of conclusions (answers) about these questions. Saunders et al (2007) support this thinking as they state it is the general plan that the researcher follows in answering the research question or questions.

The author has adopted the following research plan:

1. Research problem
2. Defining the research question
3. Defining the research objectives
4. Methodology
 - a. Research Design
 - b. Data Collection
5. Presentation and interpretation of findings
6. Conclusion

The above plan identifies each stage of the research design, and the position of each stage within the overall process.

3.3 Problem Definition

Kumar (2005) said that the most important step of the research process is formulating a research problem, as it serves as the foundation of the study that follows.

The author has carried out an extensive literature review in the area of Lean, Lean Thinking, and Lean Six Sigma. In reviewing this literature the author has identified that there is no specific research looking at how Visual Process Controls, which is a tool utilised in the Control part of the DMAIC (Rampersad and El-Homsi, 2007) process, are applied in an accounting/finance department and if it is an effective tool for this environment.

3.4 Research Questions and Objectives

The research question will emerge from the research problem. Corbin and Strauss (2008) state that the research question will help to set boundaries of what the researcher wants to study as it is impossible for a researcher to cover all aspects of a problem, therefore, making appropriate question design an imperative. McNiff and Whitehead (2000) state that the research question may not be obvious at the start, emerging only after the research process has begun. They refer to this as progressive illumination.

The main area of research that was explored in the literature focused on the Lean, Lean Thinking, and Lean Six Sigma process improvement methodologies and their tools. The main research objective that emerges from the literature and the research problem is:

- To find out the effects of implementing a Lean Six Sigma tool, visual process controls, to improve month-end activities in two of Pfizer's manufacturing plant accounting departments. The two sites are Grange Castle in Clondalkin Dublin, and Newbridge in County Kildare.

As detailed in the literature review Byrne et al (2007) state that Lean Six Sigma improvements are not just about doing things better, but about doing better things. It is not just about getting data right the first time, being accurate and having a streamlined process, it is also about asking the right questions, 'should we do this?', 'is this necessary?', 'what does the customer want?' and 'how does the customer want it?'. Therefore, the research will be guided by the following two research objectives:

1. To explore the impact of introducing visual process controls on Grange Castle and Newbridge accounting departments month-end processes
2. To ascertain if visual process controls that are in use in Grange Castle and Newbridge accounting departments provide clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for an accounting department environment.

3.5 Research Design

According to Kumar (2005) a research design is a procedural plan or blueprint, that is adopted by the researcher to answer questions validly, objectively, accurately and economically. Kerlinger (1986) also states that the plan is the complete program for the research, and will include an outline of the preliminary steps right through to the final analysis of the data.

The research being undertaken is centred on the effects of utilising visual process controls as a process improvement tool for accounting month-end activities and to assess the impact of utilising the tool which will also specify if the tool is effective for use in the defined environment, an accounting department.

The type of research that will be used involves an empirical investigation of the use of visual process controls within the context of month-end accounting activities. The study will be exploratory in nature, Robson (2002) explaining that exploratory research is to find out what is happening, identify new insights, inquire and assess phenomena in different circumstances.

Saunders et al (2007) state that exploratory studies allow for three main methods of conducting the study:

- Searching the literature
- Interviewing subject matter experts
- Focus group interviews

Adams and Schvaneveldt (1991) state that even though there is flexibility within an exploratory study, it does not mean that there is a lack of direction for the study.

3.5.1 Primary and Secondary Research Data

According to Saunders et al (2007) primary data is collected specifically for a specific study, while secondary data is the reanalysing of data that has previously been collected for alternative purposes.

Primary data is used to understand the area that the study is being carried out on. The information that is collected from original sources would include answers to interview questions and responses to questionnaires. Questionnaires are very popular methods for gathering primary research data due to their flexibility, which allows them to be custom designed to meet the objectives of any research project (McNabb, 2002).

Kervin (1999) states that secondary data can include both raw (which has not been processed) or compiled data that has had some basis of selection and summarising. Saunders et al (2007) state that within business and management research this kind of data, secondary, is used most frequently for case study research strategies and can be split into three main headings – Documentary; Survey based; and Multi-source.

The primary research that has been carried out, in the following chapters, has enabled the author to become familiar with the impact and effect of using the Lean Six Sigma tool – visual process controls, within the accounting departments of the Pfizer plants at Grange Castle and Newbridge. For the purpose of this study no secondary research material will be used as there has been no study of the use of this tool in an accounting environment.

3.5.2 Qualitative vs. Quantitative Data Collection Methods

There are two methods that may be used to collect data, qualitative and quantitative. Ackroyd and Hughes (1992) state that neither the qualitative nor quantitative method is markedly superior to the other; in many studies it is necessary to combine the data from the two methods.

Qualitative is any data collection method or data analysis procedure that results in non-numeric data

Quantitative is any data collection method or data analysis procedure that results in numerical data or data that could be usefully quantified to assist in answering the research question

The main distinctions between qualitative and quantitative data collection methods are documented in Table 3 – Distinctions between Quantitative and Qualitative data.

Distinctions between Quantitative and Qualitative data

Quantitative Data	Qualitative Data
Based on meanings derived from numbers	Based on meanings expressed through words
Collection results in numerical and standardised data	Collection results in non-standardised data requiring classification into categories
Analysis conducted through the use of diagrams and statistics	Analysis conducted through the use of conceptualisation

Table 3

Adapted from Dey, 1993.

Saunders et al (2007) state that qualitative data can be found in many forms (secondary) such as organisational documentation, reports, emails, newspapers and non-written such as audio and video recordings.

Quantitative data is quantifiable and is measured numerically.

3.5.2.1 Qualitative Data Collection Research Justification

The method of data collection that has been chosen by the author for this study is qualitative. The justification for this is that the research which was undertaken was focused on understanding the impact of implementing one of the Lean Six Sigma process improvement tools, visual process controls, on an accounting department’s month-end activities, and also to understand if it is an effective improvement tool in an accounting department environment.

The research is required to be qualitative as it needs to take into account the experiences and views of the analysts, accountants and management within the accounting departments on using visual process controls as a process improvement tool. Qualitative research was chosen over quantitative as it is a better method in making sense of statements and opinions that are collected from the

interviewees. Silverman (2006) makes the point that qualitative researchers' main strength is its ability to study phenomena which are not available elsewhere, particularly areas of social reality which statistics cannot measure.

3.5.3 Data Collection Method

As previously mentioned in this chapter, the author decided to use the qualitative research data collection method for collecting the data for this study. Three methods of research have been considered by the author which is interviews, focus groups and participant observation. However, having reviewed the pros and cons of each of the methods and the time pressures related to this study the author focused on the interview method for data collection.

Figure 6 shows a picture of the different types of interview methods that are available. Saunders et al (2007) state that interviews can be highly formalised and structured, these types of interviews use standardised questions for each respondent, alternatively they can be unstructured. Saunders goes on to say that more than one interviewing method can be utilised while Kahn and Cannell (1957) state that an interview is a purposeful discussion between people.

Interview Methods

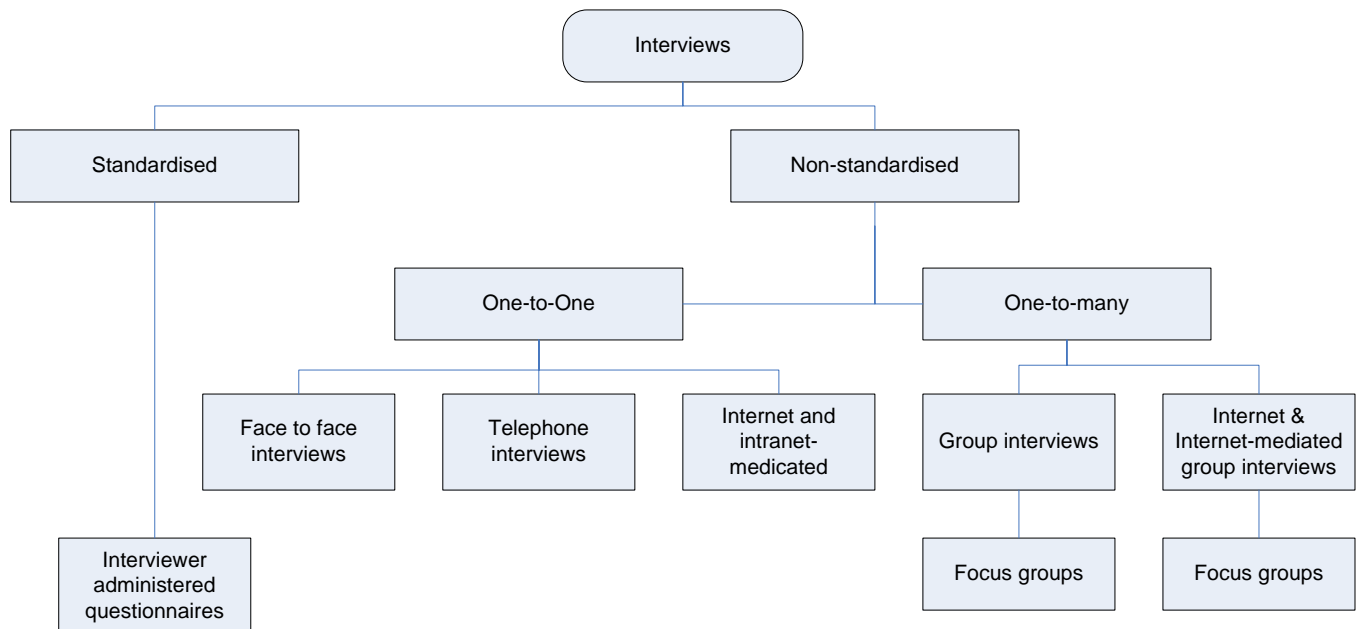


Figure 6

Source: Saunders et al, 2007.

One of these interviewing methods will be utilised by the author as a method of primary research, which will be non-standardised face to face interviews.

3.5.4 Reasoning for Semi-Structured Interviews

The author is basing this study on data derived through qualitative means; therefore the interviewing methods used will be non-standardised, also referred to as semi-structured by Healey and Rawlinson (1993). Saunders et al (2007) refer to non-standardised interviews as methods to gather data and analyse qualitatively.

In semi-structured interviews the author will have a list of themes or/and questions which will not necessarily be identical for each interviewee. The theme of the questions will be relevant to the area that the researcher wants to explore and there is also the flexibility to introduce new questions depending on how the interview evolves around the topic area. New questions are necessary as “it is the interviewee’s perceptions that guide the conduct of the interview” (Saunders et al, 2007, p.312).

Saunders et al (2007) also said that the following situations favour non-standardised semi-structured interviews:

- Where it is necessary for the researcher to understand the reasons for their interviewees’ attitudes and opinions, the interview affords the researcher the opportunity to probe answers for further detail and clarity
- Where the element of trust with the data provided is of primary concern
- Where there are a large number of questions; or the questions are open ended or complex; or the order of the questions needs to be altered

3.6 Preparation for Semi-Structured Interviews

As part of the preparation for this study the author has carried out a broad literature review in the area of Lean, Lean Thinking and Lean Six Sigma process improvement methodology and techniques, and a detailed literature review specifically on visual process controls. The review included both academic and practitioner articles.

The author being familiar with both organisations and departments, and the additional information gained from the literature review, prepared the questions for the interviews that were appropriate and relevant to the study.

3.6.1 Sampling

Hanson (1953) defines a sample as “a subset of a population selected to obtain information”. This is necessary as it is not practical to interview everybody in the finance department of two large pharmaceutical plants. As this study is based on qualitative methods, the sample has relevance to the individuals that will be chosen for interview.

The sampling method that will be used is purposive sampling. Kumar states that purposive sampling is based on the judgement of the researcher as to who can provide the best information to achieve the objectives of the study (2005). This will allow the author to select interviewees who will be able, relevantly, to answer the research questions, allowing the study to meet its objectives.

Table 4 details the list of respondent’s, some details are omitted to protect their anonymity.

Sample for Semi Structured Interview

Respondent	Respondent Profile
A	Business & Process Manager
B	Senior Finance Leader
C	Cost & Inventory Accountant
D	Cost & Inventory Accountant
E	Finance Manager
F	Cost Accountant
G	Finance Manager
H	General Ledger Accountant
I	General Ledger Accountant
J	Cost & Inventory Accountant
K	Finance Manager
L	Finance Manager

Table 4

The study population is twenty, while the sample that was used was twelve, or sixty percent. The sample used can be further broken down into fifty percent from the Finance departments' middle and senior management, and fifty percent from the ranks of the operational accountants. The sample used will allow for conclusions to be balanced, not favouring or detracting either group.

3.7 The Interview

3.7.1 Pilot Phase Interviews

The pilot interview questionnaire had detailed seventeen main questions, some with sub-sections. The researcher carried out two pilot interviews with real candidates. Based on the feedback from these candidates and the information gained by the researcher during the sample interview, the final questionnaire had two questions deleted entirely and minor wording changed in others. This resulted in a total of fifteen main questions remaining for the main research gathering questionnaire which can be reviewed in the Appendix.

Also, the interviews were initially planned to last for thirty minutes, but this proved unrealistic during the pilot phase as they ran to between forty and forty-five minutes. The author amended the planned time for the interview to one hour to give the candidates a realistic time frame of what will be needed.

3.7.2 The Final Interview

One to one semi-structured interviews was the primary data gathering method for this study, therefore the researcher needed to get the answers to the two research objectives solely based on the responses in these interviews. The researcher had the opportunity to interview twelve of the Grange Castle and Newbridge accounting departments' twenty individuals. They were appropriately spread between the various sub-functions of the accounting department to give a fair reflection of the impact and effective use of the month-end visual process control board.

The researcher did gain approval in advance from the Chief Financial Officer of Ireland to carry out the interviews. A number of weeks prior to the interviews being scheduled the researcher sent an introductory email to all of the colleagues of the accounting department introducing the author, the reasons behind the future request for interview and the topic that would be discussed at the

interview. This allowed each candidate time to think about the use of the visual process control board ahead of the interview, and to advise if they did not want to take part. One week later candidates received meeting requests via email for the interview. No respondent declined the request outright but some interview meetings did have to be rescheduled due to personal and professional constraints.

The researcher held the interviews mid month, so as not to impact the busy last week and first week of month cycle for financial period close activities. Each interviewee was thanked at the outset of each interview for accepting the request and giving up their time for the purpose of this study. Also, each interviewee was given an interview consent form to review and sign which granted permission for the interview to occur and the data collected used in the findings of this and possible future studies. A copy of the consent form can be found in the Appendix. The interviews were structured around the interview questionnaire that can be found in the Appendix, thus ensuring that the same format and appropriate questions got asked to each candidate.

Interview times had a small variance, with the shortest lasting fifty minutes and the longest one hour fifteen minutes. Eleven of the interviews occurred in one session, with one being interrupted and completed at the second session. The interruption was due to an urgent business issue which needed to be dealt with immediately.

3.8 Analysis of Data

As the author has previously detailed the data collection method has been qualitative, however, the data analysis methods used will be both qualitative and quantitative. The quantitative analysis will be used to rate how effective or not the respondents perceive the use of the visual process control board to be. The following subsection will detail how this quantitative scoring will be applied and calculated.

3.8.1 Operational Definition for 'Effective' rating

For the purpose of this study, the term 'effective' has been given the following operational definition:

- Visual Process Controls will be deemed to be *an effective process improvement tool for an accounting department environment* if after the summation calculation using the scoring illustrated in Table 5 – Scoring used to Calculate Effective Rating, based on the respondent answers from questions eleven, twelve, thirteen, fourteen and sixteen in the interview equals or is above a score of sixty.

Scoring used to Calculate Effective Rating

Question	Calculation of Score for Effective Rating	Score	Adjustment	
			Yes	No
11	Very Ineffective	-20	N/A	
	Ineffective	-15		
	No Change	0		
	Effective	15		
	Very effective	20		
12	Yes	20	-20	0
	No	0	0	-15
	Unsure	15	0	0
13	Very Unclear	-20	-10	20
	Unclear	-15	-15	15
	Not Sure	0	0	0
	Clear	15	-15	0
	Very Clear	20	-20	0
14	Very Unclear	-20	20	-15
	Unclear	-15	15	-15
	Not Sure	0	0	0
	Clear	15	-15	0
	Very Clear	20	-20	0
16	Very Poor	-20	N/A	
	Poor	-15		
	Neutral	0		
	Good	15		
	Very Good	20		

Table 5

The researcher has included an adjustment score in the calculation of the affective rating. This is to remove any positive or negative score that was already the case prior to the implementation of the month-end visual process control board, e.g. if the answer to question fourteen had been 'Very Clear', but the respondent stated that this had also been the case prior to the implementation of the month-end visual process control board, then there has been no positive effect. The above scoring criteria would reflect this, twenty points for 'Very Clear' minus twenty points for it already being 'Very Clear' equals a score of zero.

3.9 Limitations

The researcher has given a guarantee, detailed in the interview consent form, that the identity of the interviewees will remain confidential and will not be disclosed verbally or written in this study. The researcher has adhered to this throughout the dissertation study and research gathering phase.

3.9.1 Observer Bias

Saunders et al (2007) state that as we cannot avoid observer bias we must seek to control it. Delbridge and Kirkpatrick (1994) agree that this threat is real; they state that we cannot detach ourselves from the world that we live in; therefore the interpretation of the data collected will reflect the author's world.

One method that the author employed to counter this is to use informant verification, which is a form of triangulation. This will involve presenting back the written notes from the unstructured interviews and participant observations, and any conclusions from the author to the interviewees to allow them to verify the content.

Also, Burton and Bartlett (2005) state that there is real danger of an inexperienced researcher reading an opinion from data that is not supported by the question. For example, a question that asks to rate your overall experience of the introduction of Visual Process Controls in a finance environment on a scale of one (very poor) to five (very good) may result in an average response of three. It is possible for the researcher to conclude that this is a positive response; however, the candidate may have specific issues with Visual Process Controls which the question does not allow

them to express. The researcher has catered for this phenomenon in the question design by asking the candidate to explain or elaborate on why their rating is at a particular level.

3.9.2 Ethical Considerations

A major obstacle to any study starting is gaining access to the building and respondents. Difficulty of access to Pfizer's Grange Castle and Newbridge accounting departments did not arise, as the author is a close partner to both organisations, so removing usual research obstacles such as physical access and cooperation.

Prior to the commencement of this study the author met with the Wyeth Ireland's Chief Financial Officer (CFO) and the Manager for Financial Business Processes and Systems (BPS). At this meeting the author advised of the participation in a master's degree course and requested permission to do a study on how Grange Castle and Newbridge finance departments have been using the Lean Six Sigma tool visual process controls. Consent to the study being carried out was given with the proviso that there would be no negative impact on year-end or month-end accounting activities and timelines.

3.9.3 Data Interpretation

This is an area, according to Saunders et al (2007) which has a large possibility of the researcher making logic leaps and false assumptions, as the researcher converts large amounts of data to a set of conclusions that are articulated coherently. To prevent this, the researcher has designed a scoring framework which will provide the answer for each candidate if visual process controls is **an effective process improvement tool for an accounting department environment**. The scoring framework utilises the answers from five separate questions; eleven, twelve, thirteen, fourteen and sixteen, which are individually scored and then totalled.

3.10 Conclusion

This chapter has highlighted the process that the researcher followed to gather the data necessary for the successful completion of this study. The researcher has chosen qualitative data gathering method which will follow a semi-structured interview. The strength of this method allows the

interviewer to enquire for further detail or ask an additional question depending on the responses of each candidate. The analysis of the data will be based on qualitative and quantitative methods which have been outlined.

The next chapter will detail the findings of the twelve respondents. These findings will be based on the two stated research objectives which are to explore the impact of introducing visual process controls on the accounting departments of Grange Castle and Newbridge, and to ascertain if visual process controls that are in use in these accounting departments provide clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for such an environment.

4 Research Findings

4.1 Introduction

The objective of this chapter is to analyse the semi-structured interviews that were undertaken as part of the research study. The interview questions were developed based on studies of chapters one, two and three.

This analysis will address on a per interviewee basis three subsections, which include:

1. Interviewee background, this will identify the organisation they are based in and the role they fulfil within that organisation. The author will also detail if the participant was aware of the implementation of the Lean Six Sigma tool – Visual Process Control board for month-end activities within the department, and the author will detail if the candidate has used this tool before.
2. The second subsection will identify the findings in response to questions relating to the impacts that the interviewees had perceived as a result of the introduction of the month-end Visual Process Control board on:
 - The month-end process
 - The finance leadership team
 - The finance operations and shared services team.
 - Team behaviours
 - Tools, systems or processes
 - Team communication (Horizontal and/or Vertical)
3. The third and final subsection will identify the findings in response to questions relating to the clarity of the month-end visual process control board, and if the month-end visual process controls board is an effective process improvement tool for an accounting department.

4.2 Participant ‘A’ and summary of Visual Process Controls findings

Participant A was based at the Grange Castle facility, with some time spent at the Newbridge facility each week, and had responsibility for implementing process improvements across both the Grange Castle and Newbridge organisations. The respondent has extensive knowledge of Lean Six Sigma and its use within different departments of both organisations. The respondent was fully aware of the implementation of Visual Process Control Board for month-end accounting activities, but had not used this Lean Six Sigma tool before within Pfizer or another organisation.

4.2.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent said that dialogue has started in trying to fully understand the inputs and outputs of each task and their associated interconnectivities of tasks which were viewed as having the greatest positive impact. It has provided a high-level checklist and can be used for process improvement activities or impact assessments. If it didn't exist the initial assessment of potential process improvements would have made it unclear whether to proceed or not. This candidate saw one negative impact of team cynicism to the use of visual mapping tools.

In response to the question on the impact on the finance leadership team, the respondent stated positive impacts included being able to see what tasks colleagues were doing and if reprioritisation was necessary. It also allowed them to get an overview of the status of month-end very quickly and to ask the right questions to the right people. Most important for this candidate was that “it gave confidence to leaders that the revised month-end schedule could be achieved, as it was prepared by the individuals carrying out the activities”. This candidate saw one negative impact in that there was an assumption that everything is alright because it is there.

In response to the question on the impact on the finance team, the respondent stated positive impacts included colleagues now looking at the interconnectivity of their tasks, which also gives a better view of schedule than just a list with no consequences of changes which is viewed as having the largest positive impact. Individuals who are not meeting deadlines are now highlighted as their task deliverable is late. This candidate saw a number of negative impacts, the largest being that

there is no flagging where individuals are working long hours to stay on schedule and other activities that do not affect month-end are not captured on the visual process control board. Also, individuals don't always see what is in it for them, and issue resolution has seen no engagement from a team perspective.

In response to the question on the impact on team behaviours, the respondent deemed that the largest positive impact is that there is dialogue about a process issue quicker and the personality of the task owner is taken out of the issue. Also, it is easier to understand issues/delays without bringing specific colleagues into it. One negative impact was perceived with the potential for causing a rift between groups, when it is not fully clear what both groups are doing and/or the causes for delays.

In response to the question on the impact on tools, systems or processes, the respondent stated positive impacts include critical path and critical cut-offs being highlighted, which is perceived as having the largest positive impact. Critical areas to focus on have been highlighted and visual process management allows an understanding of what the next person in the process needs. This candidate perceived negative impacts which can result in the chart becoming a picture if it is not being setup to drive improvements. Also, and most importantly for this candidate is that it doesn't drive proactive standardisation of systems between or across sites.

In response to the question on the impact on team communication, the respondent saw only positive impacts which include the visual control board aligning the discussions among management and team by having a consistent view and visually being able to pin-point the area of issue. The largest positive impact is that this in turn saves time and avoids frustration due to miscommunication which also helps to manage scope of discussions. This candidate perceived no negative impacts.

4.2.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. It was rated at this level as there needs to be full management usage of the tool for coaching and driving process improvements by team.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent stated that month-end activities are clear now to all colleagues which was not the case prior to using the month-end visual process control board as there was just a list of activities maintained on a folder imbedded in other folders which was maintained individually and not shared. Activity sequencing was perceived as being very clear as it is now built into the visual plan with swim lanes, time lines and accountability. The status of each activity was perceived as being clear, which was not the case prior, as “individuals take ownership for updating” which has been made simpler by the use of the visual board.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent stated that it was good because it was possible now to understand the end to end process and each task’s interconnectivity dependencies.

Calculation of Scoring for Effective Rating for Respondent A

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	15	0	15
16	15	N/A	15
Total			85

Table 6

The calculation of the score for respondent A (as illustrated by Table 6) which is used to deem the month-end visual process control board as **an effective process improvement tool for an**

accounting department environment is 85. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.3 Participant ‘B’ and summary of Visual Process Controls findings

Participant B was based at the Grange Castle facility, is a member of the Finance Leadership Team. The respondent has limited knowledge of Lean Six Sigma and its use within the organisations. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities, but had not used this Lean Six Sigma tool before within Pfizer or another organisation.

4.3.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent notes positive impacts ‘that it makes the month-end process visible, which in turn raises awareness which forces people to meet their objectives’. Raising awareness of the process had the greatest positive impact for this candidate. This candidate saw no negative impacts.

In response to the question on the impact on the finance leadership team, the respondent noted positive impacts included the leadership team being aware of all the activities that had to occur which was also seen as having the greatest positive impact; the use of visual process control boards being useful in other areas of finance and the assisting the Leadership team in meeting tighter deadlines. This candidate saw no negative impacts.

In response to the question on the impact on the finance team, the respondent stated positive impacts included individuals being more accountable for what they do and don’t do which is perceived as having the highest positive impact; has helped to improve the process flow and reduce the working hours. This candidate saw only one negative impact that some people don’t like the visibility that it gives to the leadership team.

In response to the question on the impact on team behaviours, the respondent stated positive impacts included short status meetings each morning which gives a good overview of how the month-end is progressing; forces open communication of deadlines and status; knock on-effects of delays are visible to whole team which has resulted in the number of delays dropping; dependencies are known by all which has resulted in a greater effort by everyone to get tasks

completed, which is also perceived as having the greatest positive impact. This candidate saw no negative impacts.

In response to the question on the impact on tools, systems or processes, the respondent acknowledged positive impact that the visual process control board highlights problems and issues in the processes that are used. This candidate saw no negative impacts.

In response to the question on the impact on team communication, the respondent stated positive impacts included the month-end visual process control board assisting the chief financial officer in getting status updates at a glance. Also, it has promoted open discussion on missed or late tasks and the reasons behind it so promoting future improvements which are seen as having the greatest positive feedback. This candidate saw no negative impact.

4.3.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board appeared the respondent deemed the use of the month-end visual process control board to be effective, and perceived no down side to its use within the finance department, but definitely thought that it could be used even more effectively.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent reply was that the department month-end activities are now clear, as “the visual process control board leads you to believe they are clear”. However, the candidate perceived that the activities were clear before the introduction of the visual process control board. The respondent also stated that the sequence of month-end activities was clear, which was not the case before as “activities were not done in the correct sequence which hurt the time it took to complete the close”. The status of each activity was perceived to be clear, which was not the case prior to the introduction of the visual process control as the respondent felt “it was vague and ambiguous”.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent stated it was neutral as they perceived that much more could be done with visual process controls within the department.

Calculation of Scoring for Effective Rating for Respondent B

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	-20	0
13	15	0	15
14	15	0	15
16	0	N/A	0
Total			45

Table 7

The calculation of the score for respondent B (as illustrated by Table 7) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 45. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are not an effective** process improvement tool for an accounting department environment.

4.4 Participant ‘C’ and summary of Visual Process Controls findings

Participant C was based at the Grange Castle facility and is a member of the Finance Operations team. The respondent has knowledge of Lean Six Sigma and its use within the organisation and other organisations. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities, and had knowledge of using this Lean Six Sigma tool before within another organisation, such as Microsoft, but rated its use as poor because it was not used at department level.

4.4.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent notes positive impacts ‘of having the interdependencies visible for all to see’, which gave clear deadlines and a schedule that was known in advance. Deadlines known from the outset had the greatest positive impact for this candidate. This candidate saw negative impacts as the process is not promoting the right behaviour as individuals are using it inappropriately. Concerns and actions tabled are not being followed up as there is no strong owner of the process. This candidate asked “does the right group own the process”? The candidate also perceives that there is no proactive behaviour to build on the existing framework. The greatest negative impact is that there is no strong owner of the process.

In response to the question on the impact on the finance leadership team, the respondent stated positive impacts included the leadership team being aware of the interdependencies within the process; the scale of work being known which is seen having the greatest positive impact and the individual effort by all during month-end which has resulted in more focus being placed on month-end by the leadership team. This candidate saw negative impacts as it has and is highlighting management and control weaknesses of the month-end process and that it has no finance leadership owner of the Visual Process Control board which is resulting in it being perceived as a “picture and ticking the box exercise”.

In response to the question on the impact on the finance team, the respondent noticed positive impacts as some people have become very proactive in making sure that their deliverables are on time by putting in remedial measures and/or starting the activity earlier. The entire operations and

shared services team are aware of the schedule and timelines which is perceived as having the largest positive impact, and there is more focus to achieve the month-end closure goal. This candidate sees a number of negative impacts on the finance team which are that the month-end visual process control board is perceived by some to be non-value adding; that the month-end visual process control board is an ambiguous chart which has no effect on behaviour which is promoting the wrong type of behaviour – “ticking the box”, which is perceived as having the largest negative impact; and it has created tension between sub-teams where interdependencies are not being achieved effectively.

In response to the question on the impact on team behaviours, the respondent stated only one positive impact – the visibility of interdependencies which has resulted in a greater effort to meet the documented time lines. This candidate saw a number of negative impacts – perceived new tensions between some colleagues and for others the individual goal of meeting the time of their task is more important than the concerns raised in the process of achieving the results. This is also seen as having the largest negative impact.

In response to the question on the impact on tools, systems or processes, the respondent said that a positive impact was the improvement of variance analysis requiring descriptive explanation which gets reviewed at the finance leadership spend review meeting. This candidate saw two negative impacts as there is not enough time to review the final variance numbers to give a comprehensive explanation which is seen as having the largest negative impact, and it was felt that it was not necessarily the right people thinking the process through which has been applied to the month-end visual process control board.

In response to the question on the impact on team communication, the respondent stated positive impacts include improved communication as the interdependencies are known which is resulting in these colleagues talking more to each other as it is now very clear who should be talking to who which is seen as having the greatest positive impact; the leadership team can get a status update on an ongoing basis from reviewing the control board, and the morning status check gives an opportunity for all to voice concerns and raise issues. This candidate has perceived two negative impacts which include issues being raised at the status check meeting not being assigned an owner for follow-up and no minutes are taken so there is no close out of what is raised unless it is sorted at the meeting. Also, there are no rules of engagement for the status check meeting – the meeting has no terms of reference which is perceived as having the largest negative impact.

4.4.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. However, the respondent articulated that there is still room for improvement as the process lacks an owner at the finance leadership level and that steps on the visual process control board are deemed of equal importance.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent stated that the month-end activities are now clear; this was not the case prior to the implementation of the month-end visual process control board. The respondent also stated that the sequencing is now clear which is a change, however, “it (the sequence) is visible, but lacks critical path identification and the scale of effect of an activity not being done per schedule”. The respondent further said the clarity of status was unclear as the “chart (visual process control board) being updated with the process in green was after the fact”.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent thought it was good saying that there was potential for benefits to be gained. However, the concerns raised by team members at the status check meetings needed to be addressed.

Calculation of Scoring for Effective Rating for Respondent C

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	15	0	15
14	-15	15	0
16	15	N/A	15
Total			65

Table 8

The calculation of the score for respondent C (as illustrated by Table 8) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 65. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments are **an effective** process improvement tool for an accounting department environment.

4.5 Participant ‘D’ and summary of Visual Process Controls findings

Participant D was based at the Grange Castle facility and is a member of the Finance Operations team. The respondent has knowledge of Lean Six Sigma and its use within the organisation and other organisations. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities, and had knowledge of using this Lean Six Sigma tool before within another organisation rating its use a good.

4.5.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent acknowledged positive impacts of the wider team understanding the knock-on impact of time lines not being met. This candidate saw negative impacts as ‘the rate of change in the process and business makes the month-end Visual Process Control board redundant quickly’. This was also seen as having the largest negative impact. The perception of the increased attention from peers on the time of task completion was seen as negative.

In response to the question on the impact on the finance leadership team, the respondent stated positive impacts included the leadership team being more aware of what the team does; greater awareness of the obstacles the team face which is also seen as having the greatest positive impact; the knock-on impacts of delays or changes on the process. This candidate saw negative impacts in there being no clear owner of the process in the leadership team; the schedule review meetings during the close do not always happen; conflict between leadership and team during the review meeting and management not being totally aware of what the team is doing is seen as having the largest negative impact.

In response to the question on the impact on the finance team, the respondent said positive impacts included individuals working more as a team at month-end; there is a better understanding of what each other does, particularly shared services and operations; efficiencies have been created through the better understanding of the end to end process and people now understand the knock on effect of being late so tasks are moved earlier and completed on time which is perceived as having the greatest positive impact. This candidate saw only one negative impact in that the

month-end visual process control board becomes redundant quickly as the business and process change.

In response to the question on the impact on team behaviours, the respondent stated positive impacts include improved morale as there is light hearted ‘banter’ during the status meetings around the month-end visual process control board. This candidate perceives a number of negative impacts which include some colleagues’ behaviour resistant to the changes that the month-end visual process control board has brought, which is seen as having the greatest negative impact, and some team members “moaned” as it changed their timelines.

In response to the question on the impact on tools, systems or processes, this respondent saw no positive impacts. This candidate saw a negative impact as there has been no management reaction to the long working hours of some colleagues as a result of the changes in the process which has resulted in more workload condensed into a shorter timeframe.

In response to the question on the impact on team communication, the respondent said positive impacts include horizontal communication among team members has increased; tasks get discussed at the status check meeting with feedback provided by the subject matter experts which is perceived as having the greatest positive impact; and everyone’s role is clearly understood by all team members. This candidate perceived one negative impact being that management hear issues but don’t really listen or try to get them resolved.

4.5.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be very effective. “From the onset of its use it was very effective, information was up to date, and as the environment changed the visual process control board ensured that the team changed with it”. However, the candidate highlighted that the lack of an owner is seeing the initial positive effect decrease.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent stated that the month-end activities and sequencing are now clear, which they were not prior to the implementation of the visual process control board.

“We all know what has to be done from the visual process control board”. However, the respondent stated that the status of tasks is ‘very unclear’, and “relies on verbal communication” which is what had been done by the respondent prior to the implementation of the visual process control board.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent acknowledged it was very good. The respondent stated that the tool helped to manage process change, which was critical to its success, and it allowed financial results to be provided to tight deadlines.

Calculation of Scoring for Effective Rating for Respondent D

Question	Score	Adjustment	Total
11	20	N/A	20
12	20	0	20
13	15	0	15
14	-20	20	0
16	20	N/A	20
Total			75

Table 9

The calculation of the score for respondent D (as illustrated by Table 9) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 75. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.6 Participant ‘E’ and summary of Visual Process Controls findings

Participant E was based at the Grange Castle facility and is a member of the Finance Leadership team. The respondent had no previous knowledge of Lean Six Sigma or its use within other organisations. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities.

4.6.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included the new discipline of meeting deliverables on time; improved communications; understanding the critical path activities of the month-end process and the improved efficiencies with the team as everyone knows what they should and should not be doing. Understanding the critical path activities was perceived as having the highest positive impact. This candidate saw negative impacts as there are still people who are dubious of the process which is resulting in different levels of engagement and enthusiasm which is seen as having the greatest negative impact.

In response to the question on the impact on the finance leadership team, the respondent said positive impacts included those detailed for the month-end process. This candidate saw negative impacts as there are different levels of engagement and enthusiasm, which is seen as having the largest negative impact, with some people doubtful of the value of the month-end visual process control board.

In response to the question on the impact on the finance team, the respondent stated positive impacts included increased communications among team members around their interrelated activities; there is a better understanding of the dependencies and linkages with colleague’s tasks and an increased awareness of individual milestones. This candidate saw only one negative impact related to the differing levels of engagement from team members.

In response to the question on the impact on team behaviours, the respondent observed positive impacts included a “one team” feeling that didn’t exist before between operations and

shared services and there is a new level of preparedness for key meetings and status checks which wasn't the case before the month-end visual process control board process. This candidate perceives no negative impacts.

In response to the question on the impact on tools, systems or processes, the respondent acknowledged positive impacts included the improvements in terms of accuracy and completeness in time for the review meeting, which was seen as having the greatest positive impact. Also, there had been a number of successful streamlining activities for some of the accrual journals, such as utilities. This candidate saw no negative impact.

In response to the question on the impact on team communication, the respondent said positive impacts include the greatly improved horizontal communication amongst team members as the critical inputs for different milestones are better understood which is seen as giving the greatest positive impact. This has also been helped by knowledge sharing by team members which gives a better holistic understanding of the process for the whole team. This candidate saw no negative impact.

4.6.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. "It has given an early warning of delay, and increased efficiencies as people can plan what needs to happen in the right sequence". The respondent also stated that it has facilitated the building of cross functional knowledge between operation and shared services teams.

In response to the questions on the clarity of the month-end activities, activity sequencing and status of each activity the respondent stated that the month-end activities and the status of activities are now clear, "each person knows what their key deliverables are and each milestone has an identified owner to each activity". The sequence of activities was rated as 'very clear', which was not previously the case. "The current process is much more efficient".

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent thought it was good there being clear understanding of

the dependencies, better and improved readiness for the cost reviews, and improved efficiency of the close cycle time by moving tasks earlier had been instrumental in its success.

Calculation of Scoring for Effective Rating for Respondent E

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	15	0	15
16	15	N/A	15
Total			85

Table 10

The calculation of the score for respondent E (as illustrated by Table 10) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 85. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.7 Participant ‘F’ and summary of Visual Process Controls findings

Participant F was based at the Newbridge facility and is a member of the Finance Operations team. The respondent has previous knowledge of Lean Six Sigma and its use within the organisation. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities. They had previously used them in another organisation, rating them as very good.

4.7.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included deadlines being known for all activities; bottlenecks had been removed from the process; there was increased ownership by the whole team resulting in greater accountability. The candidate said that “people are now aware of who they are impacting where delays occur”. Having the bottlenecks removed had the greatest positive impact for this candidate. This candidate saw only one negative impact initial fear of the introduction of the month-end Visual Process Control board.

In response to the question on the impact on the finance leadership team, the respondent deemed that positive impacts included the leadership team being more aware of who the bottleneck holders are; the process for them has become much clearer; decisions are being made sooner and activities have been moved earlier which is perceived as having the largest positive impact. This candidate saw negative impacts, which included conflicting priorities during the implementation phase which is perceived as having the largest negative impact and the process was also launched at a time of high stress due to operation review and budgeting meetings.

In response to the question on the impact on the finance team, the respondent said positive impacts included an improved morale as “everyone was now on the same page” and everyone’s role is now clear as it is visible on the month-end visual process control board, which is seen as having the greatest positive impact. This candidate saw only one negative impact as the deadlines resulted in some individuals being busier.

In response to the question on the impact on team behaviours, the respondent stated positive impacts included an improved ownership of each task/activity by individuals, which is seen as having the largest positive impact. Individuals are also open to answering questions relating to these tasks/activities and peer pressure is playing an active role in making sure timelines are adhered to. This candidate saw no negative impact.

In response to the question on the impact on tools, systems or processes, the respondent deemed positive impacts included some of the reconciliation process moving from a centralised corporate area to being controlled at the local site, which allowed this part of the process to be completed one day earlier. Also, the inventory reserve process starts earlier and finishes one day earlier as bottlenecks in the process have been removed and a new streamlined data gathering process has been put in place which is seen by this candidate as having the greatest positive impact. This candidate saw no negative impact.

In response to the question on the impact on team communication, the respondent said positive impacts include improved discussions by larger pools of colleagues on all areas of the month-end process which is also perceived as having the greatest positive impact; there is better transparency in the financial accounts as the information is better understood; the personal development of each person has improved as they become more informed about the other areas; and the status of the month-end is much clearer for management as they can review the colour coding on the control board. This candidate saw no negative impact.

4.7.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board proved to be the respondent deemed the use of the month-end visual process control board to be very effective. The respondent stated that the process has become much clearer and has ensured timeliness with no rush thus ensuring more time for the analysis of data.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent stated that the month-end activities are now clear which was not the case prior to documenting the process on the month-end visual process control board. The sequence of activities was rated as “very clear” as “the process is up on the wall”.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent acknowledged it was very good, and that it was the transparency of the process and the ownership which were key to its success.

Calculation of Scoring for Effective Rating for Respondent F

Question	Score	Adjustment	Total
11	20	N/A	20
12	20	0	20
13	20	0	20
14	15	0	15
16	20	N/A	20
Total			95

Table 11

The calculation of the score for respondent F (as illustrated by Table 11) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 95. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in Grange Castles and Newbridges accounting departments **are an effective** process improvement tool for an accounting department environment.

4.8 Participant ‘G’ and summary of Visual Process Controls findings

Participant G was based at the Newbridge facility and is a member of the Finance Operations team. The respondent has previous knowledge of Lean Six Sigma and its use within the organisation. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities and had previously used it in another company, Pioneer Management. The participant rated its use in Pioneer as good.

4.8.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included being able to readily see how the month-end is progressing; the impact of the Visual Process Control board on focusing everyone on the month-end activities and the reduction in time it was previously taking to carry out the close activities. The reduction in cycle time was seen as having the largest impact. This candidate acknowledged only one negative impact in that there was less flexibility for individuals where month-end was not their only priority.

In response to the question on the impact on the finance leadership team, the respondent said positive impacts included the leadership team having more time as they don’t need to check on the status of tasks being done as there is a visual log, and there is a positive external impact as the close is completed quicker from a corporate stance which is seen as having the largest positive impact. This candidate saw no negative impacts.

In response to the question on the impact on the finance team, the respondent stated positive impacts included an increased focus and collaboration among the finance team which is seen as having the largest positive impact; more consideration of the effect on colleagues if late and also getting the job done right the first time. This candidate saw only one negative impact in that it can put pressure on individuals where there are competing priorities.

In response to the question on the impact on team behaviours, the respondent thought positive impacts included there being a new feeling of empowerment for team members. The colour coding process for updating the status of activities on the month-end visual process control board has had

the unusual effect of improving camaraderie and team bonding, which is also perceived as having the greatest positive impact. Individuals are clearly displaying more focus in their specific tasks and deliverables and the team is continuing to improve the process over time. This candidate saw no negative impacts.

In response to the question on the impact on tools, systems or processes, the respondent stated positive impacts included having an early warning system of potential impacts; the process has been visualised which helps identifying areas for improvement, which in turn encourages the team to carry out continuous improvement activities. This is also seen as having the greatest positive impact. This candidate saw no negative impact.

In response to the question on the impact on team communication, the respondent said positive impacts included horizontal positive work encouragement from colleagues, which is perceived as having the largest positive impact, and a decrease in the amount of vertical communication from management. This candidate saw no negative impact.

4.8.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective, “has done what it was intended to do by streamlining and reducing time of the month end process”. The respondent also stated that it is better than in their previous company, and they would have rated it as ‘very effective’ if more time was spent on continuous improvement activities.

In response to the questions on the clarity of the month-end activities, activity sequencing and status of each activity the respondent stated that the month-end activities and status of activities are clear, which prior to using the visual process controls they were not. The sequence of activities is “very clear” now “the visual process control board is split by day and hour with the description and owner of each activity displayed”. The respondent also stated “there can be a two hour time delay on the board being updated with the colour code status; it is rather batch than real time”.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent said it was good as “it is doing what it was intended to do”. The respondent stated it was not given a “very good” rating as there was not enough time spent on continuous improvements.

Calculation of Scoring for Effective Rating for Respondent G

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	15	0	15
16	15	N/A	15
Total			85

Table 12

The calculation of the score for respondent G (as illustrated by Table 12) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 85. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.9 Participant ‘H’ and summary of Visual Process Controls findings

Participant H was based at the Grange Castle facility and is a member of the Finance Shared Services team. The respondent has no previous knowledge of Lean Six Sigma and its use within the organisation. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities.

4.9.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included people have a better understanding of who is doing what; improved timing of activities due to this visibility which is seen as having the greatest positive impact; and giving the Finance Leadership team an overview of the status of month-end without having the need for update meetings. This candidate saw only one negative impact in that sometimes issues arise which impact the completion of tasks, so giving a poor perception of the individual even if the delay is totally out of their control.

In response to the question on the impact on the finance leadership team, the respondent saw positive impacts in the leadership team being able to get an overview status without having to consume time with update meetings. This candidate saw one negative impact in that the leadership team presume that time lines should be met as per month-end Visual Process Control board regardless of issues arising.

In response to the question on the impact on the finance team, the respondent said positive impacts included improved interaction among team members which is seen as having the greatest positive impact, and that dependency and linkages of activities are clearly understood. This candidate saw no negative impact.

In response to the question on the impact on team behaviours, the respondent stated positive impacts include improved collaboration among team members which is also seen as having the greatest positive impact, and improved communication as everyone can see the current status and what is next to be tackled. This candidate saw no negative impact.

In response to the question on the impact on tools, systems or processes, the respondent perceived no positive impact and highlighted it as a negative impact of seeing no positive impacts!

In response to the question on the impact on team communication, the respondent saw positive impact in that the status of month-end can be viewed by all via the control board and negative impact in having the status meetings which the candidate feels is unnecessary.

4.9.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. The respondent stated that it is good to have the timelines set but that it will not work in all instances. Also, the respondent felt that the visual signal that the process is late leads to frustration in that the individual maybe being perceived negatively. The respondent also felt that the month-end process was very rigid with a need for more flexibility built in.

In response to the question on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent stated that the month-end activities are now clear “as they are set out on the visual process control board so everyone knows what to expect”. The respondent said that the sequencing of activity was “very clear” as there is now visibility of the process. The status of each activity was rated as clear and “not rated ‘very clear’ as it is not updated in a timely manner. So individuals can be distracted and not update a completed task until a number of hours later”.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent said it was good. However, the candidate perceives a number of drawbacks which include timelines being set which in some cases are not achievable; visual signal that process is late leads to frustration that you are being perceived negatively and it is very rigid. More flexibility is needed in the month-end process.

Calculation of Scoring for Effective Rating for Respondent H

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	15	0	15
16	15	N/A	15
Total			85

Table 13

The calculation of the score for respondent H (as illustrated by Table 13) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 85. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.10 Participant ‘I’ and summary of Visual Process Controls findings

Participant I was based at the Grange Castle facility and is a member of the Finance Shared Services team. The respondent has no previous knowledge of Lean Six Sigma and its use within the organisation. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities.

4.10.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included a better understanding of each colleague’s role within the month-end process and their busy time points; having a better perspective of people’s pressures makes it easier to arrange meetings during “idle time”; and having a better overview of their own deliverables and team deliverables was seen as having the greatest positive impact. This candidate saw only one negative impact in that there was too much time taken up “standing around the Visual Process Control board discussing issues”, which the candidate felt could be done as a walk around.

In response to the question on the impact on the finance leadership team, the respondent perceived no positive impacts. This candidate saw only one negative impact as there is no apparent change.

In response to the question on the impact on the finance team, the respondent stated positive impacts included colleagues taking into account the work load of others and not interrupting them during this time and there have been efficiencies gained through the various process improvements and publishing of the schedule. This candidate saw only one negative impact the perception that it has helped operations more than shared services.

In response to the question on the impact on team behaviours, the respondent said positive impacts included colleagues being more conscious of others’ pressures at particular time points, also the understanding of the various stress points in a person’s day has resulted in an air of “understanding” when there is an issue, which is also seen as having the greatest positive impact.

This candidate saw only one negative impact which is the “over enthusiasm of the process champion” when other colleagues are stressed.

In response to the question on the impact on tools, systems or processes, the respondent saw no positive impact as the activity had already begun when they started their role.

In response to the question on the impact on team communication, the respondent perceived a positive impact in the improved horizontal communication within the operations team which gave a better understanding of when information would be ready. This candidate saw a negative impact in that there was no effect on vertical communication.

4.10.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. “It has brought the team into a more synchronised state as there is a better understanding of the various roles with the group and less duplication of effort”.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent noted that the month-end activities are now clear as there is “very good visibility of the daily deliverables and the final target”. The sequence of activities was rated as “very clear” as “there are arrows linking the sequence on chart with start and finish time which is updated monthly”. The candidate said that the status of activities is clear as “90% are clear, 10% not clear due to late updating by some people”.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent thought it was good as there is a better understanding of the month-end process. The respondent stated it was not rated as “very good” because there are still inefficiencies in the process, e.g. some activities being unnecessary and ineffective. Also, issues flagged up to management are not actioned due to limited resources.

Calculation of Scoring for Effective Rating for Respondent I

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	15	0	15
16	15	N/A	15
Total			85

Table 14

The calculation of the score for respondent I (as illustrated by Table 14) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 85. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.11 Participant ‘J’ and summary of Visual Process Controls findings

Participant J was based at the Newbridge facility and is a member of the Finance Shared Services team. The respondent has previous knowledge of Lean Six Sigma and its use within the organisation’s accounting departments. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities, and had previously used it in another organisation, Shell. It was used to support month-end processes, SOX controls and balance sheet reconciliation processes.

4.11.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included increased frequency of meeting deadlines; clear ownership of parts of the process which had previously been unclear and the new structure around month-end activities and their linkages had been perceived as having the largest positive impact. This candidate saw a negative impact in that not everyone has bought into the process and that the process is not as good as it could be because there is no individual owner driving it.

In response to the question on the impact on the finance leadership team, the respondent perceived no positive impacts. This candidate saw a negative impact in that the Leadership Team are not focused on specific deadlines, just on month-end time lines overall.

In response to the question on the impact on the finance team, the respondent said positive impacts included each person being accountable for their tasks within the process as the tasks have now been assigned owners and that there is now an environment of clear deadlines so that colleagues are not held up by others. This is also seen as having the greatest positive impact. This candidate saw no negative impact.

In response to the question on the impact on team behaviours, the respondent saw positive impacts in improved collaboration and co-operation, and a better understanding of how each team member fits into the month-end process. This is perceived as having the greatest positive impact. Also, this candidate perceived that new discussions around the process occur which is very

different from the past – questions are being asked “can we change this”, “can we improve...” and “can we be better at...”. This candidate saw no negative impact.

In response to the question on the impact on tools, systems or processes, the respondent stated positive impacts included the documenting of the beginning to end high level month-end process with documented owners of tasks. Some activities got moved out of the busy month-end period which gave time back to some colleagues at this critically busy time period. This candidate saw no negative impacts.

In response to the question on the impact on team communication, the respondent noted positive impacts included all colleagues understanding each other’s role in the month-end process; there is now visual communication via the control board which didn’t exist before; constructive communication among team members which also was not the case before; and this candidate perceived an indirect impact from the various forms of communication in that the attitude within the department had changed from “it will take six days to close” to “we will close in four”. This candidate saw one negative impact as there is no post month-end review of how the close went – “there is no post-mortem of last month’s close”.

4.11.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. The respondent stated that deadlines are now being met, and that it would have been rated at “very effective” if there was a status meeting every day.

In response to the question on the clarity of the month-end activities, activity sequencing and status of each activity the respondent said that the month-end activities and the activity status are now clear. The sequence of activities was rated as “very clear” as a result of having the visual process control board.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent stated it was very good as there was now ownership,

accountability and a visual aspect to the month-end process which has promoted discussion and adoption of best practice.

Calculation of Scoring for Effective Rating for Respondent J

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	15	0	15
16	20	N/A	20
Total			90

Table 15

The calculation of the score for respondent J (as illustrated by Table 15) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 90. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.12 Participant ‘K’ and summary of Visual Process Controls findings

Participant K was based at the Grange Castle facility and is a member of the Finance Operations team. The respondent has no previous knowledge of Lean Six Sigma and its use within the organisation. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities.

4.12.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent stated positive impacts included being able to see when individuals are getting the job done; who is carrying out each activity (seen as having the largest positive impact) and improvements in the process. This candidate saw negative impacts in that it is not taken seriously by everyone and individuals overlap their times on tasks with no regard as to the impact on others. The perception of no buy-in of the process with the Finance Leadership team is seen as having the largest negative impact.

In response to the question on the impact on the finance leadership team, the respondent perceived no positive impact. This candidate saw negative impacts in that the month-end visual process control board has had no impact on the leadership team and that the candidate perceives the leadership team are not driving the process which is perceived to be having the largest negative impact.

In response to the question on the impact on the finance team, the respondent said positive impacts include being able to get a quick visual ‘heads up’ on the status of month-end which this candidate perceives as giving the greatest positive impact; the team as a whole are now aligned in meeting the month-end schedule; there is improved team morale. This candidate saw no negative impact.

In response to the question on the impact on team behaviours, the respondent stated positive impacts include the majority of the team taking it seriously and encouraging each other and more respect by individuals of the dependent time lines of their colleagues which is seen as having the

greatest positive impact. This candidate perceives only one negative impact which is the lack of engagement by the Finance Leadership team.

In response to the question on the impact on tools, systems or processes, the respondent noticed no positive impact, but perceived two negative impacts: i.e. seeing no process improvements being the significant negative impact and the perception of only time lines being juggled.

In response to the question on the impact on team communication, the respondent stated positive impacts include an improvement in communication due to the visualisation of the process and its status and the horizontal encouragement amongst colleagues. Also, it is now easy to see if some one is struggling so help can be sourced which is perceived as having the greatest positive impact. This candidate has seen a number of negative impacts as vertical communication has deteriorated as the leadership team view the tracker for status updates, but they do not enforce it or use it as an improvement tool.

4.12.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. “Weaknesses and problem areas that are highlighted are not reviewed by management at a review of the previous month-end meeting”.

In response to the questions on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent thought that the month-end activities, activity sequencing to be clear and very clear respectively, but that they were in this state prior to using the visual process control board because of the respondents’ experience in the process and the business. However, the respondent has rated the status of activities as being now clear, which is being facilitated by the visual process control board.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent stated it was neutral. “The visual process control board

is good, but poor in the fact it hasn't driven home improvements because senior management don't take too much notice of it or they feel it is a substitute for them”.

Calculation of Scoring for Effective Rating for Respondent K

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	-20	0
13	20	-20	0
14	15	0	15
16	0	N/A	0
Total			30

Table 16

The calculation of the score for respondent K (as illustrated by Table 16) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 30. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are not an effective** process improvement tool for an accounting department environment.

4.13 Participant ‘L’ and summary of Visual Process Controls findings

Participant L was based at the Grange Castle facility and is a member of the Finance Leadership team. The respondent has no previous knowledge of Lean Six Sigma and its use within the organisation’s accounting departments. The respondent was fully aware of the implementation of Visual Process Control board for month-end accounting activities.

4.13.1 Findings in response to questions relating to the impact of introducing Visual Process Controls

In response to the question on the impact on the month-end process, the respondent said positive impacts included the team hitting their targets and being more accountable. The process and the critical path being better understood by the team are perceived as having the greatest impact, bottlenecks and unnecessary activity being removed and workload being distributed more evenly throughout the team. This candidate saw no negative impacts.

In response to the question on the impact on the finance leadership team, the respondent perceived positive impacts on the leadership team as they now have a better understanding of the end to end flow; better decisions can be made on what needs to be done which is also perceived as having the greatest positive impact, and it allows the leadership team to challenge the status quo. This candidate saw no negative impacts.

In response to the question on the impact on the finance team, the respondent stated positive impacts included giving individuals more ownership of their own deliverables; individuals can see that they are part of a team and not to have their own agendas which is seen as having the greatest positive impact; workload is better balanced across the team and teamwork has improved. Also individuals have a clearer understanding of what is expected of them. This candidate saw one negative impact which is that having regimented time deliverables puts pressure points that at times are unnecessary.

In response to the question on the impact on team behaviours, the respondent noted that positive impacts included the team being more focused on activities due to better prioritization and individuals are work balancing which didn’t happen before, this is also seen as having the greatest

positive impact. This candidate saw one negative impact in that no one has voiced the fact that schedule times are not static and need to be amended each month.

In response to the question on the impact on tools, systems or processes, the respondent noticed two positive impacts: the process being changed and improved, and the investigation of getting certain processes automated. This candidate perceived no negative impact.

In response to the question on the impact on team communication, the respondent said positive impacts include the status of the various tasks being visual which is perceived as having the greatest positive feedback. If there is an issue colleagues can direct it to management, and the chart now creates a centre point for the status check meeting, which now occurs on a by exception basis. This candidate saw no negative impact.

4.13.2 Findings in response to questions relating to the effectiveness and clarity of the month-end visual process control board

When asked how effective the month-end visual process control board was the respondent deemed the use of the month-end visual process control board to be effective. “It's one of a number of initiatives to get from seven day to five day close. It has been a clear enabler, drives behaviour, responsibility, attitudes and visualises the critical path and road blocks. It has also improved communication, and is also a tool that is used for process and system improvement”.

In response to the question on the clarity of the month-end activities, activity sequencing, and status of each activity the respondent stated that the month-end activities are now clear as “there is a visible tracker and is understood to the right detail as before there was a too detailed checklist with one hundred and fifty lines”. The sequence and the status of activities have been rated as very clear, which was not the case prior to the use of the visual process control board.

In response to rating the overall experience of the introduction of visual process controls in their finance environment the respondent said it was good. The respondent also said that the month-end visual process control board “hasn't resolved specific issues but is an enabler to identify activities, resources, people, the critical path and process improvements”.

Calculation of Scoring for Effective Rating for Respondent L

Question	Score	Adjustment	Total
11	15	N/A	15
12	20	0	20
13	20	0	20
14	20	0	20
16	15	N/A	15
Total			90

Table 17

The calculation of the score for respondent L (as illustrated by Table 17) which is used to deem the month-end visual process control board as **an effective process improvement tool for an accounting department environment** is 90. Therefore, based on the criteria outlined in the Research Methodology chapter, the visual process controls that are in use in the Grange Castle and Newbridge accounting departments **are an effective** process improvement tool for an accounting department environment.

4.14 Conclusion

This chapter examined the responses relating to the research objectives; exploring the impact of introducing visual process controls on an accounting department's month-end processes and ascertaining if visual process controls that are in use in the accounting departments provides clarity of use and clarity of process, and if the month-end visual process control board is an effective process improvement tool for an accounting department environment. This was based on questions derived from the literature review and asked to twelve respondents from a finance department. The respondents were selected for the research based on the following common factors:

1. The respondents are accountants whose main place of work is located at Pfizer's Grange Castle and/or Newbridge sites.
2. All twelve respondents who participate in the accounting month-end activities and were present in the company prior to the introduction of the month-end visual process control board which facilitates views prior to and post implementation.

From what was discussed in this chapter the perception of the impact of the introduction of the month-end visual process control board is favourable. The researcher found that there were a low proportion of the respondents who did not see positive impacts. The respondents that experienced the positive impacts articulated a general theme of negative impacts which included:

1. No apparent process owner and driver on the finance leadership team
2. Lack of a cohesive structure around the meetings to support and improve the control board, such as the morning 'status check' and a post-mortem style review
3. Varying degrees of acceptance and adoption of the month-end activity process control board among team members and the leadership team

Also, from what was discussed in this chapter there is a general positive perception that visual process controls provides clarity of use and process, and are an effective process improvement tool for an accounting department environment.

These views and opinions will be further explored and elaborated on in the next chapter, Conclusions and Further Research.

5 Conclusions and Further Research

5.1 Introduction

The objective of this chapter was to draw conclusions from the findings and make recommendations for further research.

The literature review has given an overview of where the Visual Process Control tool fits into the wider programs of Lean, Lean Thinking and Lean Six Sigma. It has also highlighted that there is a lack of research in the use of the Visual Process Controls in an accounting environment.

5.2 Focus of Research

The research was carried out to better understand the use of Lean, Lean Thinking, Lean Six Sigma and their associated tools. The author then focused on one of these tools, Visual Process Controls, and how it impacts on a finance environment.

While there is a large amount of research on Lean, Lean Thinking, Lean Six Sigma and how Visual Process Controls function in a manufacturing environment, there is a lack of research on its application in an accounting or administrative environment. Therefore, the focus of this dissertation was to gain an understanding of how well the Lean Six Sigma tool, Visual Process Control, could be applied effectively in an accounting environment.

5.3 Assessment of Research to Objective One

Research Objective One was to explore the impact of introducing visual process controls on Grange Castle and Newbridge accounting departments' month-end processes. Research questions were focused on getting the answer to this research objective in six distinct areas which have been summarised below:

- **The month-end process**

The visual process control has made the month-end process visible, along with the task interdependencies and owners, which in turn has raised awareness thus forcing people to meet their objectives as deadlines are now known in advance. This has enabled improved

communication to the entire team and management resulting in efficiencies being realised as there is no duplication of effort, bottlenecks being removed and work load more evenly distributed. There is also more awareness of the stresses and strains that colleagues are under resulting in more consideration being given.

- **The finance leadership team**

The leadership team are now aware of the scale and obstacles of all the activities, and the individual effort that has to occur. This has resulted in more focus being placed on the month-end activities by the leadership team which has allowed them to challenge the status quo, and it has allowed decisions to be made earlier. Status of month-end can be viewed easily which reduces meetings and assists adhering to tighter reporting deadlines.

- **The finance team**

Colleagues are working better as a team, are now more accountable and have become very proactive in making sure that their deliverables are on time. This is a result of everyone being aware of the schedule and the knock-on effect of being late. Morale has improved as it is now much easier to get an overall status of month-end without having a meeting and colleagues are much more aware of being part of a team.

- **Team behaviours**

There is a greater effort by the owners to get their tasks completed by the documented time line which has resulted in a drop in the number of delays; better prioritization, individuals work balancing and positive peer pressure are all playing a part in this success. Atmosphere has improved in office which can be seen with the light-hearted “banter”, camaraderie and team bonding particularly evident while colleagues update the control board. Colleagues are more prepared for key meetings and status checks, and there is a definite sense of improved collaboration and co-operation.

- **Tools, systems or processes**

The process, problems and issues are highlighted visually on the control board and are also used as an early warning system. Specific process improvements have taken place and there have been a number of successful streamlining activities for some of the accrual journals. One of the centralised reconciliation processes has moved to being locally

controlled which has allowed the task to complete one day earlier. The inventory reserve process has also seen improvements on completion time while some processes are being investigated for automation.

- **Team communication (Horizontal and/or Vertical)**

The control board has assisted the finance leadership team and the finance team in getting visual status updates of the month-end closing activities at a glance. It is easy to see if someone is struggling so that help can be sourced. It has also promoted open discussion on missed or late tasks and the attendant reasons which has prompted future improvements. Knowledge sharing by team members has increased which gives a better holistic understanding of the process to all. Colleagues are also engaging in greater communication with one another (horizontal) as they are clear who their suppliers and customers are. The month-end morning status check has given everyone the opportunity to voice concerns and raise issues.

5.4 Assessment of Research to Objective Two

Research Objective Two was to ascertain if Visual Process Controls that are in use in the Grange Castle and Newbridge accounting departments provide clarity of use and clarity of process, and if the month-end visual process control board is deemed an effective process improvement tool for an accounting department environment. The wording of these questions relating to this research objective establishes the process status prior to and post implementation of the month-end visual process control board.

The data from twelve respondents has been used in this study. The findings on the use of Visual Process Controls within an accounting department environment being an effective process improvement tool have been summarised in Table 18. They show that two of the twelve respondents or 17% deem their use to be **not an effective** tool in this environment, while ten or 83% have deemed their use to be **effective**. The scoring method used is that which has been detailed in the research methodology chapter of this dissertation.

Effective Rating for the use of Visual Process Controls

Respondent	Effective Rating Score	Deemed Effective*
A	85	Yes
B	45	No
C	65	Yes
D	75	Yes
E	85	Yes
F	95	Yes
G	85	Yes
H	85	Yes
I	85	Yes
J	90	Yes
K	30	No
L	90	Yes
Average	76.3	Yes

* Greater than 60 is deemed effective

Table 18

Visual Process Controls being deemed effective in an accounting environment, in this dissertation, supports Liker (1997) who stated that visual controls provide employees and managers with simple but effective ways of understanding current working conditions, which allow for corrective actions to be taken.

The average effective score based on the 12 respondents is 76.3. Taking a holistic view of the data for this study the researcher deems the use of Visual Process Controls within an accounting department environment to be **an effective** process improvement tool. These findings support Dinero (2005) who stated that Lean Thinking has changed the focus of improvement processes from manufacturing areas to the whole organisation – i.e. a finance department.

Research questions were focused on getting the answer to this research objective in three distinct areas:

- **How effective the month-end activity process control board was**

Respondent G said it “has done what it was intended to do by streamlining and reducing time of the month end process”

- **The clarity of the month-end activities, activity sequencing, and status of each activity**

- **Overall experience of using Visual Process Controls**

Respondent E observed it was good there being clear understanding of the dependencies, better and improved readiness for the cost reviews, and improved efficiency of the close cycle time by moving tasks earlier had been instrumental in its success.

Table 19 is a summary of the average results for each of these questions. It is clear from these findings that there are two areas which are achieving below average results. These areas are the status of each activity, and the overall experience of the introduction of Visual Process Controls.

Summary of Scores for Individual Questions

Question	Average Score	Maximum Score attainable
11	15.8	20
12	16.7	20
13	17.1	20
14	12.9	20
16	13.8	20
Average	15.3	20

Table 19

Question 14 referring to ‘Status of each activity’

The low rating in this area equates to two respondents (C and D) giving a rating of neutral, a score of zero, as they perceived the status of each activity as unclear which was also the case prior to the implementation of the month-end visual process control board.

Candidate C responding to the question on the clarity of status said that “chart (visual process control board) being updated with the process in green was after the fact”, while Candidate D said that they rely “on verbal communication” which is what had been done by the respondent prior to the implementation of the visual process control board.

Question 16 referring to ‘Overall experience’

The low rating for this area also equates to two respondents (B and K) giving a rating of neutral, a score of zero. Candidate B said that “we can do a lot more with visual process controls”, while candidate K observed that “the visual process control board is good, but poor in the fact it hasn't driven home improvements because senior management don't take too much notice of it or they feel it is a substitute for them”.

5.5 Candidate observations requiring further analysis

Some negative impacts relating to the use of Visual Process Controls have been perceived by most of the candidates, they include:

- Individual behaviour relating to month-end visual process control board
 - initial fear
 - buy in
 - level of engagement
 - resistance to change
- Individual perception when task is late
 - Goal more important than concerns raised
- Formalised framework to support the process
 - Management ownership of process
 - Meetings, status, actions and review points are not published, adhered to or followed up
 - No documented mission or rules of engagement for each of the above style meetings
 - Visual Process Control board should be continuously developed so that it does not become a picture/redundant
 - Continuous review of hours being worked by all colleagues
 - Rate of business change
- Lack of flexibility for individuals where month-end is not their only priority
- Be mindful of launch time of a new process
- Vertical communication has suffered since its introduction

Having reviewed these perceived negative impacts, and the genesis of each, the author has concluded that they are not failings of the visual process control tool's use within the accounting environment, but rather the failing of an effective all encompassing framework to support the tool in helping to continually improve and control the process that is clearly adding value based on the respondents' answers in this study.

The author will discuss further the above issues and deficiencies in the conclusions sub-section.

5.6 Conclusions

Within the primary research, the author was conscious of the need to extract some lessons from the experience of the respondents on their use of the month-end visual process control board within an accounting environment.

There is clear evidence, from the qualitative analysis of the respondents' interview data and quantitative scoring to deem if the tool's use within an accounting environment is effective or not, that there are beneficial impacts from its introduction and the tool is deemed effective for use within an accounting department environment.

However, as outlined above, the documented issues and deficiencies that have been highlighted by the respondents are the failings of not having an effective all encompassing framework to support the tool. The author recommends that this core issue relating to having an all encompassing framework be addressed by the finance leadership team. The other issues and deficiencies should be worked on in project teams within both sites to seek remedies as they are merely serving as barriers to even greater process improvements and savings for Pfizer.

5.7 Limitations of Research

The research findings have not been broken out for each organisation at Grange Castle or Newbridge. This would be difficult with the current findings as some of the candidates have experiences of using the month-end visual process control board at both sites.

Attempts were made to interview all of the colleagues in the accounting departments of both plants, but based on the time constraints this proved to be very difficult to complete with conflicting work demands and the rapidly changing environment that exists since the Pfizer acquisition of Wyeth.

Also, the researcher is not aware of any other Pfizer facility using Visual Process Controls in their accounting departments, which is why the study was based on Grange Castle and Newbridge.

5.8 Further Research

The author feels that there is further study possible to get more specific information that is suggested by the following criteria which would give more specific findings to the research population:

- Results split per site
- Results split by team members and the leadership team

Unfortunately this proved impossible to do due to the time constraints on this research. An interesting study could then be done to see if the clarity of use, and the effectiveness of the visual process control board are at similar levels at both sites, and if not why. It would also show if there are any major differences from the perspectives of the leadership and the finance team. This would allow some understanding of best practice which could be applied across the two sites and possibly even used as the basis of a project to eventually deploy across the entire network.

To gauge the success or failure of the Pfizer organisation's use of the month-end Visual Process Control board it would be very interesting to identify a similar organisation using Visual Process Controls in their finance department so that a comparative study could be carried out which would allow benchmarking of both organisations' use of the tool.

Given the challenges that are faced by all financial and management accounting departments to have their month-end results produced earlier and more efficiently, the information gained would be well received by the industry, Lean Six Sigma bodies and other stakeholders.

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Appendix A – Letter of Introduction and Consent

Ian Fitzmaurice QA/QC 1A
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March 3, 2010

Dear Colleague,

I am now in the data collection phase of my dissertation, and I'm requesting your co-operation.

One of my data collection activities is to conduct a number of structured interviews with Finance colleagues at Grange Castle and Newbridge, to better understand their use, views and overall experience of Visual Process Controls, specifically the month end activity control board.

Your participation is purely voluntary; it will take only a short time to answer the 15 questions during the interview, estimated @ 40 minutes.

Of course all answers are confidential and will only be used for the purpose of my dissertation and company internal learning's. To assure anonymity, your responses will be coded with an identification number instead of your true name. Please advise during the interview if you are interested in seeing the results of this research, I will publish the results to your email when it is completed.

Please review and sign, if appropriate, the interview consent form attached.

Thank you for your help.

Sincerely,

Ian Fitzmaurice
MSc. in Technology Management Candidate,

Interview Consent Form

The interview, for the above detailed study, will be digitally-recorded and you will be given a chance to review and amend the transcript in due course. Any personal details will be anonymised and I will not intentionally reveal your identity to anyone outside the research supervision team.

The contents of the interviews - including yours - will be analysed and written up during the course of the research. The findings may be included in unpublished thesis submitted for higher degrees, and later lodged in the University Library, NUI Galway. Neither your own name nor any of your other personal details that would identify you will ever be associated with these quotations. I would be grateful if you could confirm, by signing this form, that you are happy for me to use the interview or extracts from it in this way.

Consent: I AGREE to participate in this study.

Name of Interviewee (Block Capitals): _____

Interviewee Signature: _____ Date: _____

Appendix B – Final Interview Questionnaire

1. Individual details?

Participant No.	MT
Department	
Site / Location	

2. What visual process controls have been implemented in this department, within the last 12 months?

3. Have you used Visual Process Controls in another department in legacy Wyeth or prior to joining Wyeth? Yes / No

- If No go to 4.
- If Yes:

A. What organisation / Department:

B. For what purpose:

C. To support what process:

D. What impact did it have?

E. How would you rate their (VPC's) use for that Department / Organisation:

Very Poor	Poor	Neutral	Good	Very Good

- Elaborate / Comment?

4. What impacts have you perceived as a result of the introduction of VPC's on the **month end process**?

A. Specify positive impacts (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest positive impact? 1 / 2 / 3 / 4 / 5

B. Specify negative impact (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest negative impact? 1 / 2 / 3 / 4 / 5

5. What impacts have you perceived as a result of the introduction of VPC's on **the finance leadership team**?

A. Specify positive impacts (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest positive impact? 1 / 2 / 3 / 4 / 5

B. Specify negative impact (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest negative impact? 1 / 2 / 3 / 4 / 5

6. What impacts have you perceived as a result of the introduction of VPC's on the **finance team**?

A. Specify positive impacts (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest positive impact? 1 / 2 / 3 / 4 / 5

B. Specify negative impact (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest negative impact? 1 / 2 / 3 / 4 / 5

7. What impacts have you perceived as a result of the introduction of VPC's on **team behaviours**?

A. Specify positive impacts (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest positive impact? 1 / 2 / 3 / 4 / 5

B. Specify negative impact (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest negative impact? 1 / 2 / 3 / 4 / 5

8. What impacts have you perceived as a result of the introduction of VPC's on **tools, systems or processes?**

A. Specify positive impacts (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest positive impact? 1 / 2 / 3 / 4 / 5

B. Specify negative impact (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest negative impact? 1 / 2 / 3 / 4 / 5

9. What impacts have you perceived as a result of the introduction of VPC's on **team communication (horizontal and/or vertical)**?

A. Specify positive impacts (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest positive impact? 1 / 2 / 3 / 4 / 5

B. Specify negative impact (if any):

Description of Impact
1.
2.
3.
4.
5.

- Which has had the greatest negative impact? 1 / 2 / 3 / 4 / 5

10. IGNORE – REMOVED AFTER PILOT

11. Rate how effective you deem the month end activity Visual Process Control board to be:

Very Ineffective	Ineffective	No Change	Effective	Very Effective

➤ Why do you rate it at this level and illustrate with examples?

12. Are the department's month end activities clear?

Yes / No / Unsure

➤ Explain?

➤ Was this the case prior to using visual process controls? Yes / No

➤ What has changed, if anything?

13. How clear is the sequence of each month end activity?

Very Unclear	Unclear	Not Sure	Clear	Very Clear

➤ Explain?

➤ Was this the case prior to using visual process controls? Yes / No

➤ What has changed?

14. How clear is the status of each activity, at a particular point in time of the month end process?

Very Unclear	Unclear	Not Sure	Clear	Very Clear

➤ Explain?

➤ Was this the case prior to using visual process controls? Yes / No

➤ What has changed?

15. IGNORE - REMOVED AFTER PILOT

16. Rate your overall experience of the introduction of Visual Process Controls in a finance environment in your current organisation:

Very Poor	Poor	Neutral	Good	Very Good

➤ Explain why do you rate it at this level?

17. Any other comments or observations in relation to the use of Visual Control Management?
