Behavioural influences on the implementation of lean construction: the effects of engaged employees

Wolstenholme

Michael John

11029242

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The effects of engaged employees

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List of abbreviations

LCI	Lean Construction Institute
LCIF	Lean Construction Institute of Finland
TPS	Toyota Production System
LT	Lean theory
WIP	Work in progress
JIT	Just-in-time
LP	Lean production
LPS	Last Planner System™
VSM	Value stream management
TQM	Total quality management
HMRC	Her Majesty's Revenue and Customs
BIM	Building information modelling/management
WWP	Weekly work plan
PPC	Percentage planned (activities) completed
OCB	Organisational citizenship behaviour
CWB	Counterproductive work behaviour
IPD	Integrated project design

ABSTRACT

The construction sector as with production industry has long been seeped in waste. In recent years development in the procedural management of production has seen the introduction of 'lean' methodology from the Japanese automobile industry

Attempts to transfer this system into the construction environment have been extremely slow, incomplete, and in most cases unsuccessful.

In order to promote success it is necessary to identify barriers and promoters by researching the necessary criteria for implementation as well as current methods of management.

By analysing the attitudes and levels of engagement towards the implementation of new lean-inducing management frameworks it was possible to gain an insight into some of the reasons for failures and successes, It was also possible to identify a link between the commitment to the implementation of new management frameworks, such as lean, and the engaged employee Commitment is highlighted as an essential element of the lean philosophy and therefore key to its success.

The lack of participation in the research by so-called lean pioneers proposed the possibility that many senior managers are 'going through the motions' only, and that lean may possibly be incompatible with the Finnish mindset.

Keywords

Lean construction, continuous improvement, relationship-based management, employee engagement, Last Planner System™, alliancing

CHAPTER 1: INTRODUCTION

The purpose of this study is to identify the behavioural and systematic influences within construction organizations which affect the smooth and successful implementation of lean philosophy into the company culture.

Whilst introducing lean ideals may prove to be the same as many other changes in the management model, it is well documented that lean management systems demands a whole system approach and is dependent on all participants actively taking part, or 'buying in' (Alarcon, Diethelmand, & Rojo, 2002).

Two fundamental aspects of project management are the planning and the collaboration between the different players in the project organisation, and the planning and procedure of the project itself.

The study will examine the principles of lean theory, and in particular lean construction practices. Focus will then be directed towards planning and collaboration by reviewing Last Planner System planning and control model, and Alliancing methods of collaboration.

Both collaboration and planning involve a high degree of social interaction between members of the organisation. The study will then progress towards these interpersonal relationships with the aim of determining the humanistic influences which obstruct or encourage the implementation of these lean mechanisms.

1.1. Justification

In the 20 years since the Egan report the construction industry, in Finland as well as in the UK, still has not undertaken the same revolutionary changes as seen in the manufacturing sectors during the 1970's, when new, so called 'lean' techniques were adopted on a global scale. Though the trend is rising rather than waning, the original ideology of a total system approach has found itself becoming fragmented, broken down into a series of individual options through tools such as Just-in-time, Six Sigma, Last planner, etc.

If this is the necessary means by which to develop a lean culture then how can the loose ends be tied, and how can the system become 'whole'?

1.2. Aims of the research

The aim of this research is to determine the relationship between the implementation of a lean culture and employee engagement within construction organisations in Finland so as to determine ways to improve the efficiency and therefore success of the construction industry

worldwide. In order to successfully do so an investigation of the current best practices will need to be addressed.

1.3.Research objectives

- Provide an overview of lean and lean construction.
- Consider the application lean tools already adopted in Finnish construction.
- Provide an outline of the requirements of:
- lean culture
- employee engagement
- Determine a link between lean culture and employee engagement.

1.4.Research questions

1. What are the key requirements of lean culture?
2. What are the drivers of employee engagement?
3. How engaged are employees to:
    a. The organisation?
    b. Lean?
4. Does lean culture have some effect of the engagement of employees?
5. Do engaged employees promote the implementation of lean culture?

1.4.1. Hypothesis one

There is a direct link between the implementation of lean and the engagement of employees within organisations in the Finnish construction industry.

1.4.2. Hypothesis two

Engaged employees promote the implementation of lean culture within the organisation.

CHAPTER 2: LITERATURE REVIEW OF LEAN

This literature review will first look at the development of lean theory and practice, scrutinising the components which make up the model and their influences on the production environment, and later their adaptation for the construction sector. As part of the examination of lean practices, popular and quite recent tools (Last planner and Alliancing) will be overviewed in respect to their implementation in the construction sector environment.

2.1. Traditional manufacturing – command and control

Traditional manufacturing systems rely on maximising the speed and efficiency of individual processes (Howell & Koskela, 2000). Machinery and manpower must be steered into producing the maximum returns in a given time period.

With the development of Scientific Management theory in the late 19th early 20th centuries, idealist like Fredrick Taylor were able to use concepts such as standardisation of processes to increase productivity and reduce effort. This became evident through Ford's introduction of mass production lines in the emerging automotive industry. Despite fulfilling his promise to increase outputs, Taylor's top-down hierarchy and 'command and control' management methods also increased friction amongst his workforce, and significant reductions in motivation and engagement (Mullins, 2007).

The problem, according to Seddon (2005) was that decision making was being separated from the actual work, 'command' and 'control' became disjointed from the actual work. He implies that apart from Taylor's method creating an abundance of waste, adverse relationships are created within the shopfloor, within the company and within the extended organisation, leading to a breakdown in value being provided to the customer.

Taylor himself observed the lack of motivation amongst even the smarter, cleverer members of the workforce. He coined the term 'soldiering' to describe the phenomenon of workers performing at the pace of the slowest member only (Taylor, 2007, p. 13) adding that great effort is often expended in preventing an increase in production so relationships from the point of the workforce become opposed towards the employers and their management.

Lean thinking seems to offer a solution to these adversarial relationships by conjoining the roles of management and the shopfloor, 'decision making' and the 'work' itself.

2.2.Lean – a system based approach to manufacturing

The roots of lean can be traced back to the introduction and development of the Toyota way of production in the 1950's. It was at this point that manufacturing experienced arguably its most important advancement since Henry Ford introduced his mass production techniques of the 1920's (Hines, Holweg & Rich, 2004; Ohno, 1988; Shingo & Dillon, 1989; Womack & Jones, 1996; Womack, Jones, & Roos, 1990).

Toyota Management, led by Taichi Ohno, studied Fords production model and noticing waste at every turn, they did not just copy it they adapted it, taking the strong aspects such as continuous flow and removing the waste-adding processes. Waste in Ohno's eyes included excessive manpower, over-production, excess processing, defective products, inventories, waiting time, transportation and excess facility provision (Dahlgaard & Dahlgaard-Park, 2006). In contrast to Ford's model, the Toyota system supported, at its core, the aspects of relationships within the organisation.

The result was the Toyota Production System (TPS), the foundation of what we now refer to as 'Lean' Thinking (LT), a term first coined by John Krafcik (Holweg, 2007) and soon adopted by Womack et al. (1990).

2.3.The Toyota Way – creating productive relationships

The Toyota Production System is universally regarded as being the basis of lean revolution (Liker, 2004; Womack & Jones, 1996; Womack et al., 1990). Liker (2004) studied and documented the way in which the Toyota Motor Company had developed from a newcomer to the American automotive market to market leader over the course of just a few decades. Toyota identifies fourteen principles, through which an organisation may work towards efficiency and excellence, represented in the Toyota House diagram below.

At the core of the TPS lies the philosophy that true perfection is an ideal to be pursued through the slow process of continuous improvement. The Toyota group have always acknowledged that perfection is an impossible goal, but striving to get closer will produce a more efficient (and more profitable) organisation (Liker, 2004).

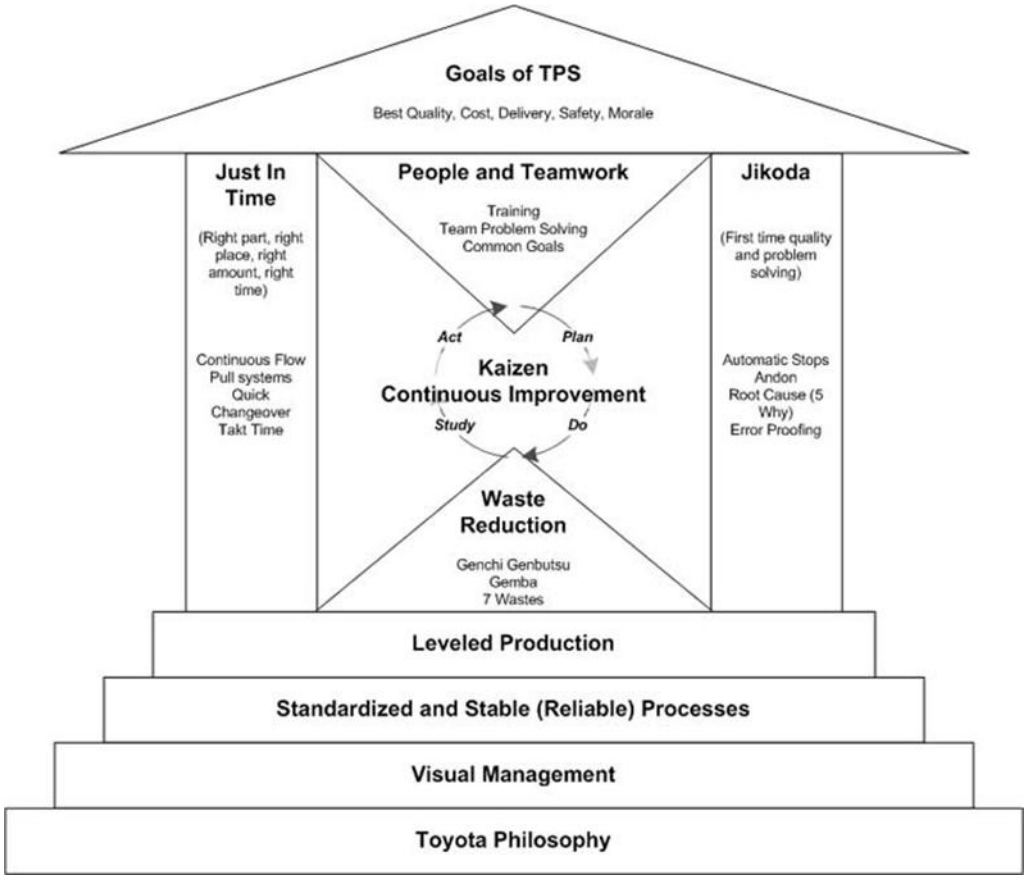

Figure 1, the Toyota House (Liker, 2004)

The Toyota house in Figure 1 has its footings rooted in the long-term thinking. "Base your management decisions on a long-term philosophy, even at the expense of short-term goals" as Liker (2004) puts it.

It is important to understand that the fundamental aspect of Toyota's model is the elimination of waste (Liker, 2004) or, as defined by Koskela (1997), those activities which take time, resources and space but do not add value.

The tools by which waste is eliminated come in the form of Just-In-Time (JIT) supply and Jidoka (built-in quality mechanism). These are seen as the pillars of the system, supporting the ultimate goal of best quality, for the lowest cost, in the shortest time, by the safest methods whilst adopting the highest morals.

These tools are driven by a supportive workforce sharing common goals with the company, and a continuous cycle of self-improvement (for individuals, the organisation itself as well as the flow of production) is intended to create an ever increasing level of efficiency within the organisation.

Value, according to Koskela (1992) is determined by customer requirement and should therefore be systematically considered. Continuous improvement and operation is encouraged to adopt a plan-do-study-act cycle.

Supporting this low waste production cycle is the underpinning prescription of balanced flow driven by "pulling" production, and with the emphasis on levelled workloads for to helping to maintain the even continuity. Standardising operational tasks along with visual control, the use of proven technology and a shared responsibility of stopping work to fix problems provides a transparency which aims to facilitate improvement as well as empower the workforce.

In addition, organisational improvements including employee engagement are supported by a philosophy of home-growing leaders from within the company who are fully supportive of the company's philosophy. Team and personal development is encouraged through on-going training programs and this approach is extended throughout the supply chains to improve understanding and in turn balance the overall production flow.

Management strategy is based on slow consensual decision making (Nemawashi), derived through proven methodologies and hands on approach to understanding (Liker, 2004). Through the formation and development of strong teams of dedicated individuals, in other words by establishing healthy internal relationships, the system is able to facilitate predictable flow which in turn aids to achieve the goal of 'value' through the elimination of waste.

2.3.1. Waste

Three types of waste can be found in a typical production environment; overburdening people or equipment (muri), unevenness of production flow (mura) and none-value-adding waste (muda). Taichi Ohno identified seven types of muda to be transportation, inventory, motion, waiting, overproduction, over-processing and defective product (Ohno, 1988).

Waste, according to Antony (2011) is founded on differentiating between 'value adding' from 'non-value adding' processes, and removing the wasteful (none value adding) steps (muda) to create a more efficient production process. He adds that valuable methods used to aid the facilitation of this include value stream mapping, 'just in time' supply chains, visual management and standardised work flow.

Whilst 'mura' and 'muda' contribute to the burden placed on the organisation, it is the 'muri' that has a direct effect on the workforce. Muri is reduced by aspects such as standardisation

of processes, much in the way that was accomplished by Ford's development of the production line.

2.3.2. Value

Value, according to Koskela (1992), is determined by customer requirement and should be systematically considered. Herrala (2012) supports this, adding that focusing on the customer's need is equally is important as optimising value through the elimination of waste. "*One of the most wasteful efforts is to produce something that the customer does not want or is not prepared to pay for*" (Herrala, 2012)

Erikshammar, Björnfot, and Gardelli (2010) propose that clear definition of value is not so simple, though they agree that despite its vagueness it is a central concept and crucial to all methods and principles applied in the lean process. Reasons for this ambiguity lie in misinterpretation of the concept of production (Koskela, 2004) and bad definition of the metrics used to release the characteristics that are valued by customers (Leinonen & Huovila, 2000; Salvatierra-Garrido & Pasquire, 2011).

It is essential to engage in discussion and agreement with clients and end-users in order to determine the goals of projects and therefore the expected 'value' (Emmitt, Sander & Christofferon, 2005).

Leinonen and Huovila (2000) outline three phases for creating value to be:

- Determine customers' requirements
- Create solutions for these
- Verify execution throughout the production

By giving the customer exactly what they want, noting more, nothing less, satisfaction is introduced to the relationship, an important factor in the pursuit of repeat orders.

2.3.3. Flow

Traditional production management techniques have a tendency to focus on the singular physical activities involved in the process rather than on the flow of activity (Howell, 1999; Koskela, 1992). Continuous flow is essential to the lean production and should be 'pulled' by the demand for the end product.

This 'pull' technique is an important mechanism in the facilitation of the supply chain, and based solely on downstream demand. It involves work in progress (WIP) being allowed to flow only when downstream stations are ready to process them. Essentially all production is

‘pulled’ directly by the customer at the very end of the process (Rybkowski, 2010). The ‘pull’ system can be built into the supply chain through mechanisms like Just-in-time (JIT). Essentially it involves supply being facilitated in sync with the flow of production and is dependent on the same demand for the product. In order to help control this supply, a system of highly visual markers is incorporated (kanban) which trigger the incoming supply of parts. In a similar fashion, batch size is controlled and kept to a minimum throughout the process. As with material stocks and work-in-progress, batch stocks of more than one can be viewed as inventory. Reduction of batch sizes can also allow for quicker identification and correction of errors (dos Santos, Powell & Formoso, 1999)

Unlike Ford’s mass production lines, Toyota promote a process where the production process (or the flow) can be halted from the shopfloor level. Individual workers are encouraged to identify faults and problems and bring about immediate rectification of problems. This is a stark contrast to the traditional lines where production can only be stopped by management, and is rarely done. Faults in this type of production have a tendency to be accepted and passed down the lines for reworking at a later stage.

2.3.4. Strong teams and individuals

In Toyota’s production model there is a great emphasise placed on the structure and functionality of ‘the team’. This position relates to the shop floor team just as much as it does the whole production plant as a team.

Personnel are provided ample training and the exceptional ones are developed further and filtered for promotion. Much importance is placed on employees understanding and sharing the belief in the company philosophy. Green and May (2005) describe ‘three treasures’ which are offered as reward for loyal service to include lifelong employment opportunities and promotion based on length of service, the third being enterprise unionism.

Toyota highlights the importance of bringing management potential up through the ranks from those who are already positioned within the organisation, as opposed to hiring outsiders. This sense of team spirit and oneness is encouraged to spread outwards into the supply chains. Partners and suppliers should also be encouraged and helped to improve.

2.3.5. Continuous improvement

Continuous improvement is the pursuance of perfection over time and is not restricted to the quality of products. It is a philosophy which is disseminated throughout the entire

organisation including, but not limited to, production techniques and supply chain management.

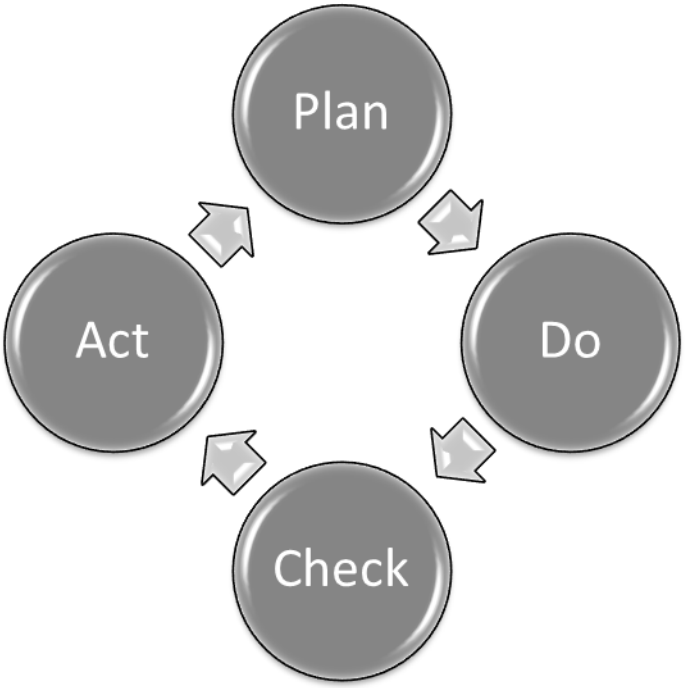

Figure 2, the process of continuous improvement, the Deming Cycle

According to Liker (2004), 'kaizen' or the process of continuous improvement was adopted and adapted by the Japanese from Deming's Plan-Do-Check-Act approach to problem solving (figure 2). Incremental changes to process and thinking improve and sustain the lean system through the input, knowledge and desire of the people working within the organisation (Bhasin, 2012; Hines et al, 2011). The cyclic method is also useful in stimulating and developing these same traits (Kyōkai, 1995).

Whilst improvements are undoubtedly achieved through kaizen, critics of lean such as Hampson (1999) suggests that this is done through the application of stress to the process (including workforce). It is the resulting 'breakdowns' which are addressed and improved, a technique referred to as 'management by stress' (Parker, 1998; Parker & Slaughter, 1990)

2.3.6. Whole system approach

Ultimately, the lean philosophy needs to be viewed in its entirety, as a whole system concept. By addressing individual aspects, short term advantages can be achieved but the change will not be to lean. By adopting a whole system approach, it is possible to create a culture where

the organisation is being continuously improved by all its members (Womack & Jones, 1996).

"*What is important is having all the elements together as a system. It must be practiced every day in a very consistent manner not in spurts*." (Liker, 2004)

2.3.7. Conclusions from the Toyota Way

It can be concluded that the Toyota Production System began to address the role of relationships within the organisation in a unique manner and as part of a whole system view. Teamwork is highly valued, as is the opinions of its workforce, who are encouraged to play an active role in the process. The relationship within the workforce is strengthened and maintained through the recognition that some wastes (especially the muri aspect of overburden) can be detrimental in creating adverse behavioural problems and is addressed through levelling workloads and balancing flow.

Relational bonds are extended from within the company to envelope both the supply chain and the end customers. Satisfaction is provided via the emphasis on 'value' offered to the customer, and 'support' to its suppliers.

Toyota sees each of these aspects as complimenting the others and stresses the importance of adopting the system as a whole concept, forever being perfected through the relentless review culture adopted by every individual within the organisation.

2.4.Beyond Toyota

Womack et al. (1990) sum up Lean Production (LP) as finding out what it is the customer wants, determining how it can be produced with minimum waste, making the flow of production run evenly, uninterrupted and to the pulse of the customers demand, and endeavouring to perfect the process as it is used.

It is a philosophy which relies greatly not only on individual practitioners adopting the system, but on whole organisational conformity (McGill & Slocum Jr, 1993).

Implementation needs a high degree of planning and consideration. Organisational learning requires management to 'unlearn' the old ways before new learning can be achieved (Alves, Milberg, & Walsh, 2010; McGill & Slocum Jr, 1993). Habits related to working practices are equally as difficult to change then those attributed to personal behaviour (Bhasin, 2012).

Whilst much study has been carried out regarding the application and development of lean thinking, as a science it still resides in its infancy and requires further exploration and

agreement within academic as well as professional circles (Alves et al., 2010; Hines et al., 2004; Jørgensen & Emmitt, 2008; Petersen, 2009). It has also been noted that what exactly lean thinking involves has yet to be universally agreed upon (Eriksson, 2009; Green & May, 2005), and is a constantly evolving concept which, as a definition, has determined meaning for a fixed point in time only (Hines et al., 2004), though this aspect is in line with the principle of 'pursuing perfection' through continuous improvement, as outlined in the Toyota Way.

2.4.1. Tools

There are dozens of implements in the lean toolbox to help contribute to the lean environment. Often seen as being a good place to start, the '5 S methodology' is a workplace organisation tool, ideal for bringing about standardisation through organising and slimming down procedures. In addition it provides a means of giving employees the responsibility and authority to look after their own working environment (Schmitz, 2012) thus instilling the element of 'value' and 'worth', and the accompanying emotions they bring to the individual. Poke Yoke is the method of building a system of 'mistake proofing' into the process. By preventing these mistakes from moving downstream, overall production flow will improve (Seddon, 2005).

Value stream mapping (VSM) identifies the value adding and non-value adding aspects of the process by visualising the production in the form of a process diagram, to give a value ratio and identify the seven types of waste (Seddon, 2005). This provides an efficient means of addressing issues and rebuilding the process to be more efficient. Similarly, Total Quality Management (TQM) is a systems management approach to continually improving the quality of products by improving the quality of processes (Ahire, 1997). Key to its successful deployment is the involvement of stakeholders throughout the entire organisation, including customers, management, workforce and suppliers (Cua, McKone, & Schroeder, 2001). Ultimately, the yardstick used to measure the outcome is customer satisfaction.

A word of warning should be made about the over enthusing in the implementation of 'tools' in order to facilitate lean procedures. Koskenvesa and Koskela (2005) highlight the 'irresistible temptation' some implementers encounter when faced with IT solutions. Seddon (2005) refers to them as 'toolheads' and warns that their belief in such mechanisms to single handily bring about organisational change is a fallacy. Such 'methods' are merely an aid, at

best. This kind of change is only facilitated through a change in perspective, obtainable only through the 'philosophy' behind the tools.

2.4.2. Opposition to the lean model

The lean theory is not without its opposition and has been criticised for being exploitative and overly controlling (Garrahan & Stewart, 1994; Green, 1999b), with the whole Japanese model being branded totalitarian (Green, 1999b). JIT and TQM management regimes in particular have been noted for being guilty of this (Green & May, 2005; Kerfoot & Knight, 1995; Tuckman, 1995).

Green (1999b) argues that the view of lean thinking from the perspective of Womack and Jones (1996) bears a stark resemblance to that of Taylorism from the early 20th century, with organisations acting like machines, using customer responsiveness to excuse high levels of management control, in order to achieve their predetermined objectives. He accuses lean construction of regressing through the sacrifices it makes to achieve its improvements.

"Muda is to be eliminated. Karoshi is the price to be paid" (Green, 1999b)

Karoshi, translated literally from Japanese means "death by overwork"

(Hutchinson, Kinnie, & Purcell, 1998, cited in Green, 2000, p.5).

It has also been documented that the increase in transparency and controllability can have the adverse effect of retarding creativity and the feeling of freedom (Green, 1999a). This may be reflected in a reduction in the willingness of employees to make the suggestion which should, in turn, bring about continuous improvement which is essential to the organisation. In addition to the loss of this essential input, organisations may also witness an increased loss of valued employees (Polesie, 2010)

2.4.3. Failures

Bhasin (2012) claims that almost all lean failures are the result of the intangible aspects of culture and change, and are the result of focusing too hard on those tangible outcomes which will yield noticeable profits in a far shorter time frame.

Failure is inevitable if senior management fail to view the aspect of respect towards their workforce as mandatory rather than optional, according to Emilliani (2011) who goes on to blame this for the dramatically bad results at the UK government body, HMRC.

Other factors to consider include insufficient experience, low levels of management commitment, resistance to change (Pedersen & Huniche, 2011), lack of education and

training, insufficient funding as a cause for inadequate and inexperienced implementation management (Achanga et al, 2006; Bateman & Rich, 2003) and a general failure to 'buy in' by workers at any level (Lucey, Bateman, & Hines, 2005).

2.4.4. Conclusions from lean production

Lean production techniques are proclaimed by their masters to be the saviours of industry. This redemption is to be delivered through efficient waste-free procedures and an environment where the workforce itself instigates change and improvement, the bottom –up or inside-out approach.

There is a vast toolbox at hand to help, each element adding its own little piece of efficiency. Though often misdiagnosed as lean in their own right, they can be a part of the overall lean process. Without adopting a whole system approach however, no amount of these tools will ever create a truly lean environment. Adequate planning is essential to successful implementation, including education and training of all concerned parties.

The lean ideology is not without its critics, many of whom claim the relationships between internal members of the organisation are stressful and totalitarian, fuelled by exploitative demands from management and rely on frail interpretations of customer led demands requiring personal sacrifice from employees. It is suggested that without voluntary maintenance of a happy and respectful working environment, the organisation could stifle and become less functional, turnover of staff will increase and customer value will drop. Toyota may say that co-operation should be genuine and voluntary, and not driven by fear. For lean to succeed it needs to promote shared ownership of the process along with universal participation.

"*Without active engagement of employees, lean transitions will fail"* (Lucey et al., 2005)

2.5.Lean construction

For over 50 years the construction industry has been slowly coming round to acknowledge the need for reform within its conventional operational processes in order to improve productivity and efficiency. As it stands, the sector remains disjointed and rife with adversarial practices and a distinct lack of trust between concerned parties (Fearne & Fowler, 2006), the price of which is reflected in the cost, time and/or quality of building projects (Cooper et al., 1998).

At present the industry standard method of construction management relies on a top down hierarchy. Batch and control information processing are the prevalent management tools taught in our formal education systems (Emilliani, 2011).

2.5.1. Need for change

Emmerson (1962), in his report for the British government, noted the need for improved communication and coordination between the different players in the project organisation, while two years later Banwell (1964) recommended the UK solution to be tailored around early contractor involvement. More recently, Latham (1994) and Egan (1998, 2002) have supported these findings with Egan in particular citing lean production methods as being a key in facilitating the necessary performance improvements by reducing the abundant waste incurred throughout the UK construction industry.

Egan (1998) reported that "Lean thinking presents a powerful and coherent synthesis of the most effective techniques of eliminating waste and delivering significant sustained improvements in the efficiency and quality". The report goes on to recommend the use of lean thinking as the favoured strategy to achieve performance improvement within the industry. It is claimed that the benefits of lean construction include increases in client satisfaction, predictability, profit, quality and productivity, whilst reductions in waste, construction periods and accidents should be experienced (Mossman, 2009).

2.5.2. Adaptation of lean theory

The notion that lean production principles could be adopted by other industries was first presented by Womack et al. (1990). Since then this idea has been substantially supported, including its implementation within the construction industry (Howell, 1999; Koskela, 1992; Polesie, 2010).

This is not the universal opinion however. Many sceptics point to the bespoke nature of construction projects and the immensely unpredictable nature of flow as being preventative in the successful transformation into a lean process (Howell, 1999). Supporters of lean, however, insist that the problems encountered in construction projects as with the solutions, maintain a certain level of consistency (Elfving, 2012).

Howell (1999) exacerbates the need for a mechanism for production control as being an essential feature, at least partly in order to help facilitate concurrent design. He offers lean

construction as the new project delivery system, adaptable to every project scenario, in particular "complex, uncertain and quick" ones.
Two such mechanisms to be offered are Ballard's 'Last Planner' system (Ballard, 2000) and Transformation-flow-value theory, or 'theory of production' (Koskela, 1992). Between them they make up the most influential contributions so far to the lean construction table (Bølviken, Gullbrekken, & Nyseth, 2010).

2.5.3. Conclusion – the need for planning and control

So to conclude, there is a need for reform and the construction industry must find a system with which to bind together its fragmented facets and provide better planning and control, whilst at the same time maintaining the ability to adapt around the one-off nature of its projects.
Lean production has offered this means to the manufacturing industry and is believed to offer the same benefit to construction. Tools need to be examined and adapted, it is quite clear that there are cultural differences within both industries which will prevent, or at best hinder, the 'like-for-like' transfer of lean techniques from one sector to the other.

2.6. Lean construction mechanisms

As with the use of tools in lean production, their adaptation to lean construction offers similar pitfalls. Cherns and Bryant (1984) in their study of conflict in the construction industry, list inadequate planning and the lack of coordination between players as being contributing factors of conflict.
Howell (1999) has outlined the essential criteria for lean construction to include "a clear set of objectives to aid the delivery of maximum value to the client, concurrent design and process and production control throughout the process, from design to hand-over".
Coordination through collaborative partnerships and alliances are a means to creating corporate competitiveness through increasing customer value (Inkpen, 1998). Of the different models of cooperation, partnerships and alliances stand out as the predominant variations.
Integrated Project Delivery (IPD) remains relatively new concept and less documented so it shall not be considered in this study, though it does appear to be steeped in the sound foundations of Project alliance theory, adding Building Information Modelling (BIM) as playing a key role in its core workings. (AIACC, 2007).

Last Planner System LPS is one tool which has been receiving relative success in its recent implementation in construction projects, shall be reviewed here.

2.6.1. Last Planner System (LPS)

The last planner is a system for project control that was developed in the 1990s by Glenn Ballard and Greg Howell. It aims to facilitate even and predictable flow of work throughout a project's duration by incorporating a regime of looking ahead at approaching work collectively, with all concerned players from upstream as well as downstream . Ballard (2000) refers to it as a mechanism for transforming what 'should' be done into what 'can' be done, and then ultimately what 'will' be done.

There is an implicit emphasis on the social integration administered through collaboration (Ballard, Hammond, & Nickerson, 2009) which can help to affirm a greater sense of ownership and responsibility within the project.

Last planner is sold by Rybkowski (2010) as a form of 'conceptual kanban'. He adds that as a result of its use, work-in-progress can be greatly reduced through the 'pulling' effects of Lookahead and Weekly Work Plans (WWP).

Headed by collaboration between top management and 'change agents', the system is fed downwards through middle management to the lower ranks (figure 3 p.17). Pilot projects create peer-to-peer coaches from the early adopters who 'infect' other members of the organisation (Leigard & Pesonen, 2010).

Major challenges encountered when implementing the use of LPS in an organisation include a lack of leadership, manpower and training, as well as a general resistance to change (Porwal et al, 2010). Further barriers include partial or late implementation, lack of stakeholder support and legal/contractual conflictions. Leigard and Pesonen (2010) include the failure to engage by top management, and complacency resulting in the restraint of continuous improvement.

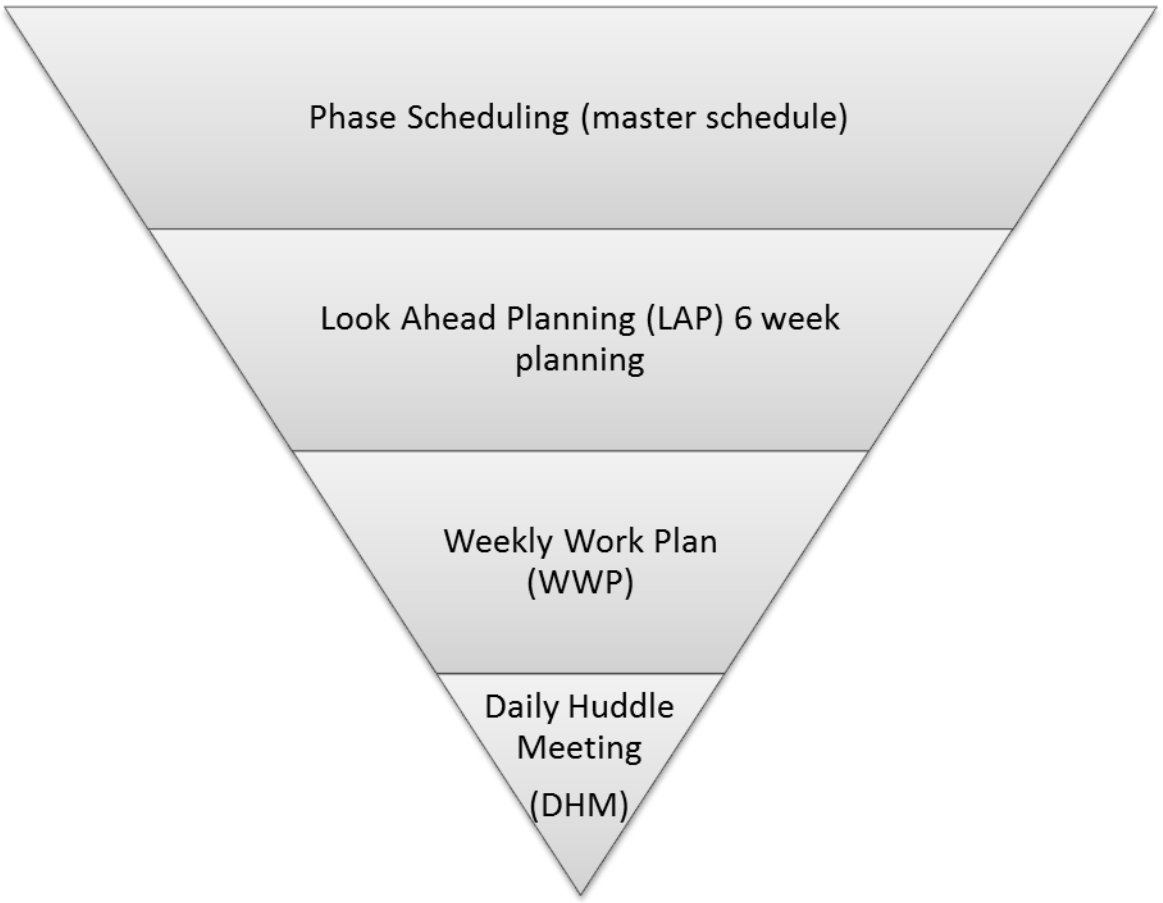

Figure 3, funnelling of the planning mechanisms through LPS

2.6.2. Conclusion – relationship-based environment is needed

Ideally, Last planner offers many of the key concepts necessary for the 'whole lean system'. A social environment is created where ownership of work can be adopted by necessary the parties and at the correct level. This forms the need for collaboration between concerned parties. The regime of forward planning allows problems to be quickly identified, giving more time to take corrective actions, and also provides a route to channel lessons learnt into continuous improvement actions. Work-in-progress can be significantly reduced and JIT supply becomes much easier to introduce as demand becomes far more accurate.
These tools however, are dependent on successful implementation, which itself has several stipulating factors. Being a social environment, LPS will require consideration of the behavioural aspects related to organisational, group and individual behaviour in the workplace.

Considerations of cooperative procurement systems will be made, as will the behavioural aspects of the components of the organisation.

2.7. Implementation of lean tools – relationship-based approach

Successful implementation of the lean criteria will require a specific set of personnel; committed, motivated and skilled (Pekuri et al, 2012). Bashir et al (2010) categorise the barriers facing the successful implementation of new lean procedures into six parts:

1. Management issues; develop and implement a sound plan for implementation (including project definition and long-term focus), ensure adequate resources, provide support and demonstrate commitment, client and supplier involvement (Bashir et al., 2010)
2. Financial issues; including the provision of financial incentives (motivation), employ specialists and champions, and even for bribes!! (Mossman, 2009; Olatunji, 2008)
3. Educational issues; conceptual understanding, awareness, project teamwork understanding, lack of technical skills, illiteracy, poor information sharing (Alarcon et al., 2002; Bashir et al., 2010; Common, Johansen, & Greenwood, 2000)
4. Governmental issues; legislation, bureaucracy and instability, inflation and availability of materials (Bashir et al., 2010; Olatunji, 2008)
5. Technical issues; relating to insufficient planning methodology and design, which affect principles such as reliability, simplicity, flexibility and benchmarking (Koskela, 1999)
6. Human attitudinal; lack of and aversion to transparency, team working ability, resistance to and fear of change, poor leadership (Howell, 1999)

All the issues highlighted above have the potential to directly and indirectly influence the behaviour of members of the organisation at all levels.

2.7.1. Cornerstones of lean implementation

In their study into the implementation of lean in the construction sector, Pekuri et al. (2012) identify five cornerstones which support success (figure 4 p.19). They essentially focus on behavioural and interpersonal relationships within the organisation and the teams which lie within.

Figure 4, Cornerstones for implementing lean in construction (adapted from Pekuri et al., 2012)

2.7.1.1. Leadership

Much has been written about the commitment of management in the successful implementation of new practices within organisations, and in particular lean philosophy as it requires infusion throughout the whole system. Pekuri et al. (2012) list the two most important influences of successful implementation to be management commitment and support. This commitment needs to include the re-learning and understanding of the new ways (McGill & Slocum Jr, 1993).

Emiliani and Stec (2005) warn of the dangers of management adopting 'Imitation Lean' by focusing change on the operation processes only and not the entire organisation. This is reminiscent of Seddon (2005), who challenges tools such as Six Sigma for their lack of change throughout the entire organisation.

This cultural change requires resources as well as direction and the responsibility of this role lies with management (Emiliani, 1998) after which a bottom-up strategy can take over with lower ranks facilitating implementation via the resources and support at their disposal. This helps towards a smooth transition from the old regime to the new (Arubulu & Zabelle, 2006).

2.7.1.2. Competence

The new target system should be understood as a whole in order for an organisation to successfully transform into a lean organisation. Employees need to be involved in order to absorb the transition into the new regime. Competent leaders, fluent in lean ways, should be positioned to guide and coerce the organisation and its members in the desired direction. They also fulfil their role by giving support for the foot soldiers at ground level. Various incarnations of these are the 'lean champions', sensei, gurus change-agents and consultants. They are there to provide training, extinguish doubt and give support.
Incorrect use or partial implementation can have detrimental results (Porwal et al., 2010). Alarcon et al. (2002) support this, noting how Percentage of Planned Activities Completed (PPC) measures are often used out of context in projects to justify failures instead of to facilitate improvements.

2.7.1.3. Trust

Building trust among the participating members of the project is an essential factor (Pekuri et al., 2012). It can reduce potential damage caused by conflict and promotes a culture of relieved risk. Often contractual agreements such as those used in traditional contracting promote trust.
Often, companies perceive the contract as a means of establishing trust due to its legal status and clear definition. There seems to be a belief that the threat of the legal system acts as a deterrent from untoward behaviour on the part of contractually bound parties. On the other hand, contractual frameworks can have a tendency to have adversarial effects on organisational behaviour, and mechanisms for promoting trust need to be installed. (Peldschus et al, 2010) advocate the possible us of game theory applications to steer parties into win-win situations. "*Team members are more likely to act co-operatively if they believe that others are likely to co-operate*" (Dawes & Hastie, 2009)

2.7.1.4. People

It is also essential that team members are committed to change (Pekuri et al., 2012). Failure to commit, or 'buy in' to the new system by one or more members can breed conflict, or disengagement, which may spread to other members.

Teams need a certain degree of familiarity in order to grasp some understanding of the abilities and limitations of other members. This behaviour can lead to healthy (positive) conflict such as competition (Levi, 2007) and can be a driver of success.
Porwal et al. (2010) recommend that more attention should be focused on the way employees are recruited and developed. Due to the nature of the lean environment, social skills are of great importance and should be considered in recruitment criteria.

2.7.1.5. Motivation

Pekuri et al. (2012) report that their findings suggest that financial incentives such as money savings and more efficient working methods would be sufficient (from the perspective of the organisation) to motivate the implementation of many lean aspects, though they add that continuous improvement mechanisms would require direct engagement and involvement of individual personnel. Outside influences are also seen as being key to motivating lean implementation in the construction sector through client persuasion, etc. In addition, employees need motivating in order to ensure their commitment to the transmission to lean. Key to this is the involvement and engagement of the workforce, a concept which can trace its roots right back to the Toyota Way. Pekuri et al. (2012) suggest challenging employees to exercise their new skills and test the lean concepts that surround them.
In engaging the workforce, collectively or individually, certain criteria need to be set in motion. Motivation on this personal level is discussed further under employee engagement.

2.7.2. Other behavioural factors

In addition to those highlighted by Pekuri et al. (2012) there are other behavioural aspects to consider, mainly the aspect of conflict and competition within as well as external to the organisation, and resistance to the intended changes promoted within the company (figure 5 p.23).

2.7.2.1. Resistance to change

Resistance to change has been identified as being the number one obstacle in the implementation of lean (Ballard et al, 2007) but at the same time change is recognised by most organisations as being a key priority in the pursuit of survival (Thomas & Hardy, 2011). Porwal et al. (2010) noticed a distinct lack of commitment towards, and a high resistance to the introduction of LPS. This they reasoned was down to the fact that the system was new.

Failure to fully accept prominent theory and adopt commitment early on plays a big role in the later success of the implementation, as does the exclusion of lesser players such as sub-contractors (Alarcon et al., 2002). These are seen as key ingredients in facilitating the change required to become a new and improved lean organisation.

2.7.2.2. Conflict and competition

Conflict, it seems, is a multi-facetted paradigm. It can be both good and bad for the organisation. According to Levi (2007) it can be positive (healthy) or negative (unhealthy). He also highlights that both varieties have similar roots, relationship based or those that materialise through task based activities, with Jehn & Chatman (2000) introducing a third aspect, process based conflict. Williamson (1979, cited by Kassab et al, 2006, p.1043) adds to this by identifying three root causes of conflict within organisation to be behavioural (in line with Levi's attachment to relationship based), contractual and Technical problems. Individual factors which promote conflict in teams include influence, resources, differing values, opinions and goals (Gardiner & Simmons, 1992; Handy, 1976). This factor of 'bad team chemistry', along with lack of collaboration is supported by Porwal et al. (2010)
Conflict has the power to manifest on an inter-organisational and interpersonal level.

2.7.3. Conclusion

Behaviour and culture needs to be changed. It can be seen that resistance to change is a major issue in the implementation of new systems in organisations and will need to be carefully addressed to prevent the resulting conflict becoming a barrier. This type of resistance could be the product of a lack of trust or motivation to provide the necessary input to learn new methods and may be the product of the disengaged employee.
Development of commitment, engagement, motivation and trust are seen as key factors in the engagement of workers and are essential in the workings of the new approach.
Employees need to have faith in the new system in order to be engaged in its implementation.

Figure 5, the new model of the seven cornerstones, based on Pekuri et al. (2012)

2.8.Methods of implementing control

There need for a mechanism or 'system' through which organisations may implement the lean tools such as Last Planner. This must allow for closer relations, trust, etc. to be formed and cultivated.

Popular techniques include collaborations of individual inputs, i.e. the different parties involved in the project, but the level of involvement can differ immensely from one system to another.

Here we will review the most popular and better documented solutions of collaborative partnering and alliances.

There is a noticeable scale of alignment within the construction project organisation. This ranges from the competitive (low alignment), through cooperation to collaboration, and then further on towards coalescence (figure 6 p.24). The closer to this stage an organisation gets, the higher the potential benefits become (Thompson & Sanders, 1998). It should be noted that whilst the benefits of collaboration may include improved accuracy, if not effectively

implemented, these improvements may come at the cost of reduced speed (Beersma et al., 2003).

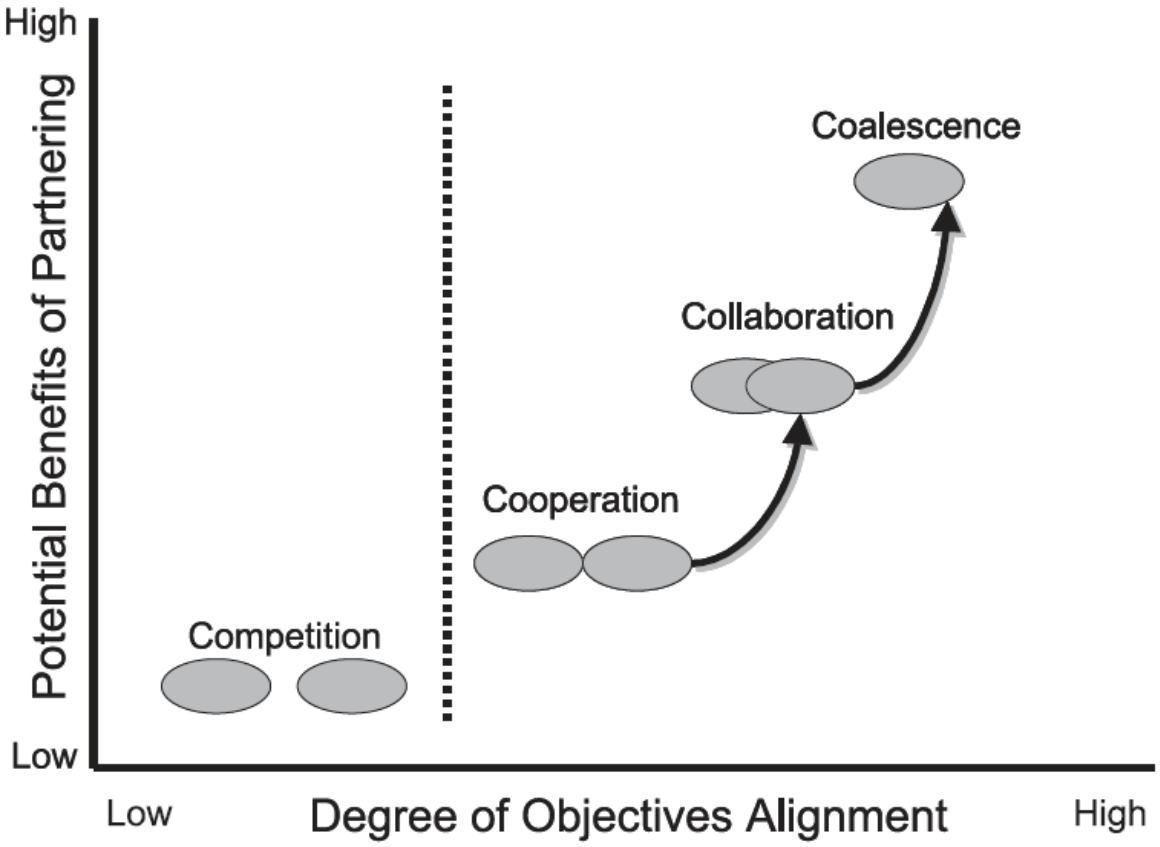

Figure 6, the partnering continuum (Thompson and Saunders, 1988, p.74)

2.8.1. Partnerships

Collaborative partnerships are long term relationships between two or more organisations which require trust and commitment if they are to succeed (Walker, Hampson, & Peters, 2002). Common goals are also essential as is the common understanding of expected values (Eriksson, 2010).

They usually come with a combination of core compulsory procedures such as adequate competence (technical and managerial), experience and openness. Optional elements may include concurrent design and engineering, bonuses and incentives, and shared IT resources (Eriksson, 2010).

Amongst the benefits of partnering is the reduction in waste and costs (Walker et al., 2002), and an increase in follow on work. Cost savings were particularly apparent concerning changes to design and work order.
Partnering has been criticized, however, for its lack of relationship building capabilities. Although aspects such as dispute resolution procedures are pre-agreed, there tends to be a distinct lack of common ownership towards aims and goals, unlike alliances, where these are shared.

2.8.2. Alliancing

Alliances are cooperative agreements between companies engaging in a shared development of a project (Ingirige & Sexton, 2006). They include shared responsibility for design, production, and completion, including change, failures and rewards.
The idea is that clients offer a steady flow of work to the contractor, with a reliable profit margin, in return for cost savings. This win/win relationship requires a great deal of trust from both sides.
Before joining the alliance, prospective partners must prove their potential. Companies bid for membership through a series of performance criteria. This is done before price is considered (Walker et al., 2002), and may include:

- Professional competence
- Proven relationship management skills
- Financial and time commitment
- Ability to accommodate open-book accounting
- Innovation potential, including bonus and incentive infrastructure
- Proven record of the completion of similar scopes
- Quality performance history

The criteria for inclusion in the alliance will differ from project to project as there is not set framework as yet, but the general gist is to ensure that the successful parties will have the ability to provide maximum input to the project and have a good track record to prove this.
Alliances, like partnerships have potential to underachieve long term objectives by neglecting to build for the future. Kanter (1994) points out the potential for building 'rich collaborative advantage' through long term relationships built on trust. She warns of the restrictions imposed by inappropriate financial and contractual frameworks, a problem often cited as

being a failure in partnership agreements. Similarly Ingirige and Sexton (2006) warn of a significant reduction in core-value, knowledge creation and organisational learning through focusing more on short-term aspects such as transparent accountancy and profit allocation. Fernie and Thorpe (2007) support the positive benefits of collaboration and partnering over the negative alternative of traditional 'arms-length' contract based relationships.

2.9. Conclusion

Investment in competence and awareness is needed on the individual as well as the organisational level in order to promote long-term as opposed to short-term relationships. Commitment and motivation are key factors in the implementation of alliances and partnerships, and are fuelled by trust. Workers need to be especially engaged in the organisation so as to adopt these radically new systems with enthusiasm, therefore the investment criteria should include the aspects of engagement.

CHAPTER 3: LITERATURE REVIEW OF ENGAGEMENT

In this chapter the internal behaviour of the organisation is examined. As with the lean model, employee engagement components and their influences on the organisational culture are scrutinised.

Employees can be engaged to individual aspects of their jobs, to the work itself, to the employer (organisation) or to the concept of management change itself (Devi, 2009).

3.1. Definition of engagement in employees

Engagement can be described as the culmination of enthusiasm, motivation and commitment by which an employee is attached to their work. It includes long and short term values, and investment towards the company's successes (Robinson, Perryman, & Hayday, 2004). It is part of the employee's mindset (Seijts & Crim, 2006) and is dynamic in nature and not constant but fluctuating between cognitive (beliefs in the organisation), emotional (attitudes towards company and leaders) and behavioural (discretionary efforts such as the 'extra mile factor' including ingenuity and innovation) aspects (Kahn, 1990; Konrad, 2006)

To engage the workforce it is essential that they share a belief in the bigger picture held by the company, as well as a personal belief that they are responsible in some way for its successes. According to Robinson et al. (2004) this includes 'going the extra mile' when necessary.

Nurturing and promoting engagement requires a two-way dialogue between leaders and lower ranking players (Robinson et al., 2004). According to Lucey et al. (2005) engagement is dependent on soft issues concerning the connection between employees and the rest of the organisation, who go on to highlight the link between engagement of employees and the perceived satisfaction with their personal lives.

3.2. Drivers of engagement

According to Robinson et al. (2004) the strongest driver of engagement is the feeling of worth, being involved and feeling valued for that involvement. Decision making, challenging work and management support all play a part in this perception of value (Robinson et al., 2004; Schaufeli & Bakker, 2004) as do personal growth opportunities and skills enhancement (Devi, 2009),

Towers Perrin (2003) list their top ten drivers to be:

1. Senior management interested in employee well-being
2. Challenging work
3. Decision-making authority
4. Customer focus
5. Career advancement opportunities
6. The reputation of a company as a good employer
7. A collaborative work environment where people work well together
8. Resources to get the job done
9. Input on decision making
10. Management's clear vision about future success

There is a common belief in the strength of financial incentives, such as salary and benefits, as a motivator of engagement (Sirota, Mischkind, & Meltzer, 2008). Whilst this means is effective in the short term (Towers Perrin, 2003), it is not sustainable for engaging in long term according to Devi (2009). Sirota et al. (2008)
Seijts and Crim (2006) summarise the area of focus for drivers of engagement to be included in their Ten Cs: Connect, career, clarity, convey, congratulate, contribute, control, collaborate, credibility and confidence.

3.3. Commitment

Commitment is the attitudinal or behavioural manner by which an individual relates to a something or somebody (Mowday, Steers, & Porter, 1979) and can be focused on any of three key areas of specific work, career or actual organisation itself (Mueller, Wallace, & Price, 1992). The area of focus may vary, and so does the intensity of the commitment (Morrow, 1983) in order to highlight the strength of identification and involvement in the organisation (Mowday, Porter, & Steers, 1982; Mowday et al., 1979). Muthuveloo and Che Rose (2005) identify commitment as the level of attachment associated with a situation.
The three point model (figure 7 p.29) defines the aspects of organisational commitment to be either affective, continuance or normative in type.

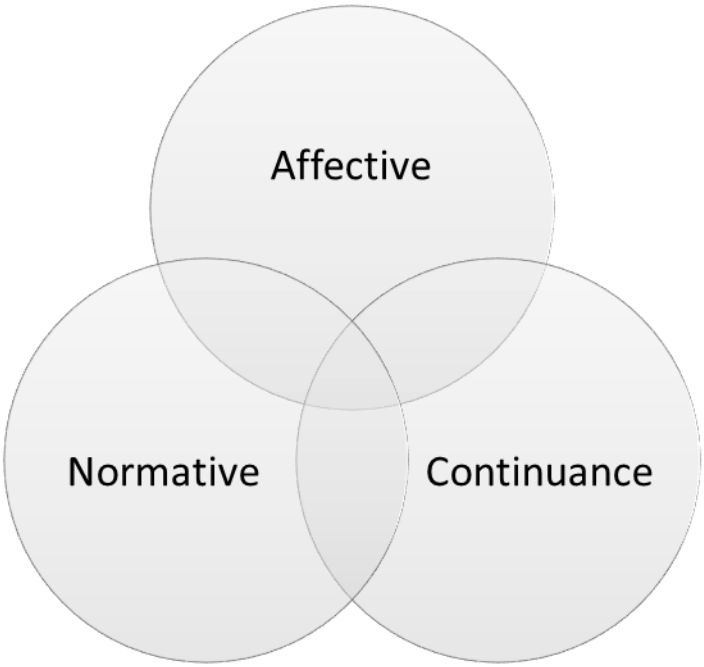

Figure 7, aspects of organisational commitment (Meyer, Bobocel, & Allen, 1991)

Affective commitment correlates to the employee 'wanting to stay'. According to (Robinson et al., 2004) it is the closest to actual 'engagement' and can be directed towards multiple areas including individuals, specific projects or the organisation itself (Abrahamsson, 2002; Robinson et al., 2004).

Continuance commitment relates more to the employees 'need to stay'. This can be influenced by the age of the person, the duration of their employment or the level of satisfaction they hold for their career situation and achievements so far (Muthuveloo & Che Rose, 2005).

Thirdly, normative commitment is the feeling that one 'ought to stay'. This behaviour reflects the moral obligation to perform. It can be influenced through commitment to co-workers as well as to the organisation itself (Abrahamsson, 2002).

Affective commitment (the emotional aspect which drives the individual to want to stay) has the closest relationship to engagement according to Robinson et al. (2004), though Maslow's theory may assign continuance commitment to its primary need for financial security, whereas the affective issue would be higher up the scale on the third tier with 'belonging'.

Other theories of commitment include Mueller et al. (1992) who divide commitment into three categories; career, organisational and work commitment, this being supported by

Morrow (1983) who adds that each of these aspects may be present, to varying degrees, at the same time. Employees may feel very little commitment to the work they are doing but feel much attached to the organisation (Morrow, 1983; Mueller et al., 1992; Muthuveloo & Che Rose, 2005). Another aspect, relating to a lack of education and awareness, could be early adopter scepticism (Leigard & Pesonen, 2010).

3.4.Motivation

"*The process that accounts for an individual´s intensity, direction and persistence of effort attaining any goal*" (Robbins & Judge, 2009)

Understanding motivation can help to explain individual behaviour within a company as this will involve taking a look at what people want and why they want it. All people are hedonists according to Reeve (2005) seeking pleasure, enjoyment and well-being.

Bénabou and Tirole (2003) talk about two types of motivation, Intrinsic and extrinsic, and argue that most people are governed by a combination of the two

3.4.1. Intrinsic and Extrinsic

Intrinsic motivation regards the desire to complete a task purely for the sake of completing it.. Intrinsic motivators include challenging work environments and positions of responsibility (Burn, 2008).

Extrinsic motivation, on the other hand, deals with completing the task for gain or rewards, without which, employees and team members will not perform the required tasks. Condry and Chambers (1978, cited in Bénabou and Tirole, 2003) point out that short term rewards can distract the employee into sacrificing the long term focus and choosing easier solution in order to access these quick-fix gains.

3.4.2. Content and Process Theory

Content theory focuses on the intrinsic factors that influence behavioural motivation whereas process theory explains the cause of behaviour and how it can be stopped or maintained. Amongst the most respected content theories are Maslow's' Hierarchy of Needs' and Mayo's 'Hawthorne Effect'. Both of these disputes the traditional assumption made by Taylor (2007) in his definition of Scientific Management, that work output would only be maximised by offering financial incentives.

Mayo's findings revealed that the work environment had as much to play in the part including, the duration of breaks, and temperature and lighting levels. He further identifies three main factors which effect motivation of the workforce:

- Communication between management and shopfloor
- Relationship and Involvement of management with the workforce, respect towards workers
- Teamwork. Employees enjoy and hold value for group belonging

Maslow's proposes a five tier structure to people's ultimate needs (figure 8). They begin by satisfying the basic 'first tier' and work up the scale to the higher levels. He points out that upon attaining the level one satisfaction i.e. enough money, then this will no longer work as a sufficient motivator in keeping the individual engaged.

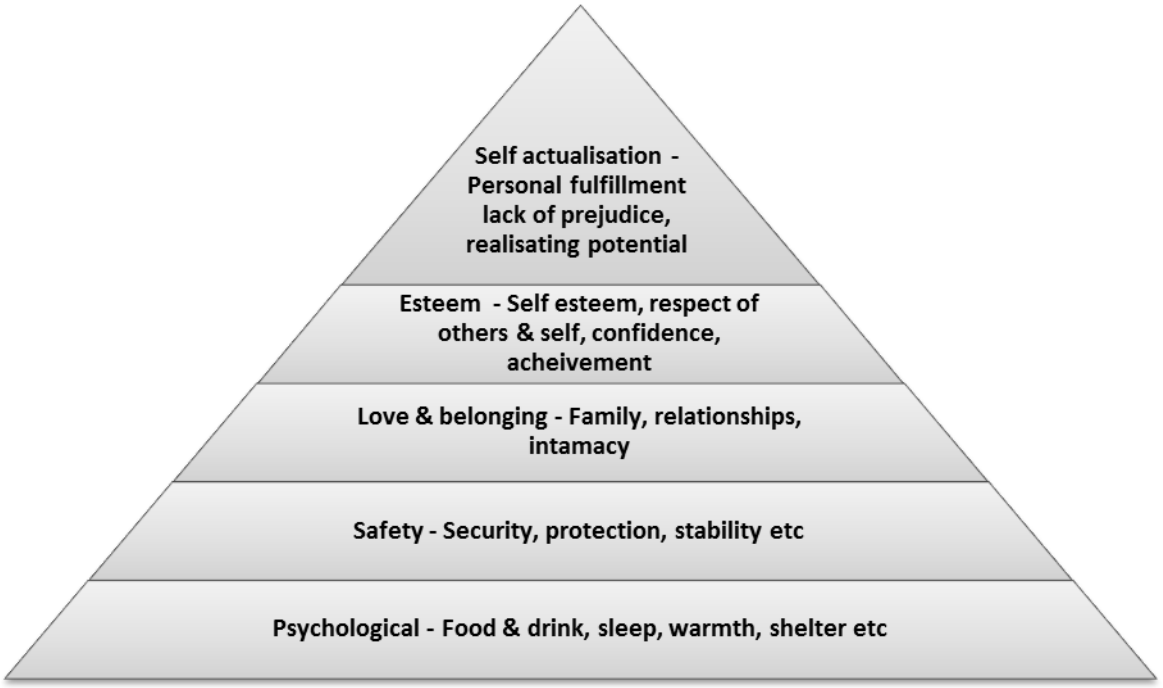

Figure 8, Maslow's Hierarchy of needs

The aspect of teamwork and respect as defined by Mayo is supported by Sirota et al. (2008) who propose the three factors which promote enthusiasm in the workplace to be fair treatment, achievement and recognition, and camaraderie. They add that money is high on the list of motivators as it represents achievement and respect.

3.5.Enthusiasm

"*When companies can meet their employee's needs, the result isn't just satisfied employees but enthusiastic employees*" (Sirota et al., 2008)

3.5.1. Sirota's three factor theory

According to Sirota et al. (2008) enthusiastic employees will outproduce and outperform employees who are not motivated to perform. He stresses that employees have a basic set of need and it is important for employers to identify and fulfil them.
There are three primary goals targeted by the workforce; equity, achievement and camaraderie. Sirota calls this the 'Three factor theory of human motivation in the workplace'
Equity deals with fairness in the working environment and includes physical and psychological safety (including respect), employment security and adequate financial recompense for the duties expected.
The second aspect, 'achievement', concerns the support network and it attitude towards the employee. This concerns the need for important factors such as recognition and rewards, feedback, proper use of resources (human), support and leadership, and the necessary challenges and stimulation that workers need.
Finally, point three deals with camaraderie. Sirota claims that employees have a need to feel a sense of community involvement and teamwork.
When all three of these goals are reached, the employee will become enthused towards accomplishing organisational objectives.

3.5.2. Croston's SAUCE formula

Croston (2008) sums up employee engagement with f the following acronymic formula;
Satisfaction + Awareness + Understanding + Commitment = Engagement
Satisfaction (or the lack of), amongst employees is a major obstacle which must be overcome in order to promote engagement. He includes, as the causes of dissatisfaction, the lack of involvement in decision making, inflexible work practices and a lack of challenge in the work (Croston, 2008).
Awareness comes through the understanding of the needs of the company and the methods by which these needs can be fulfilled, the employee can begin to "*dismantle old orthodoxies and adopt new ways of working*" (Croston, 2008).

Understanding concerning the needs of the organisation and the onus lies with the direction in which the organisation is heading and the means by which it will get there.
Commitment, the essential factor of employee retention, these include the feeling of wanting to ‘go the extra mile’ and are fuelled by the ability of staff to look ahead and see the bigger picture.

3.6. Organisational behaviour theory

Organisational citizenship behaviour relates to the impact individuals, groups or teams have on the organisation. This does not come as a direct result of the reward system, instead it is discretionary action performed by groups or individuals out of personal choice that can add to the effective performance of the organisation (D.W. Organ, 1988). Though these actions fall outside the formal obligations and are therefore not contractually supported by incentive, Organ adds that there is evidence of OCB stimulating increased financial reward for the employee (D.W. Organ, 1997).
Organ’s five point model characterises five aspects of OCB to include altruism, courtesy, civic duty, conscientiousness and sportsmanship. These were expanded on by Podsakoff, MacKenzie, Paine, and Bachrach (2000, cited in Nezakati et al, 2010) to define seven major behaviours as shown in figure 9.

Figure 9, seven major behaviours (Podsakoff et al 2000)

OCB can have close links to, or be promoted by job satisfaction (Organ & Ryan, 1995) and therefore has a direct connection to engagement.
The opposite is counterproductive work behaviour (CWB) which goes directly against the goals of the organisation, though it can be influenced by both conscious and sub-conscious factors.
CWB can manifest itself in a variety of forms including 'withdrawal' related factors such absenteeism, lateness, accidents, poor job performance and high employee turnover, or more malicious behaviour such as theft, , violence, and racial or sexual harassment.
Dalal (2005) does not recognise OCB and CWB as being opposites, instead recommending them to be viewed in separate lights. He adds that both characteristics are possible in the same subjects at the same time.

3.7. Cross-cultural dimensions

Hofstede (1983) rejects the possibility of a 'universal management system' giving three important factors which contribute to differences in national and regional perspectives; political, sociological and psychological. He explains that this 'invisible body of mental programming' develops cognitively from an early age and give us our sense of identity (Hofstede, 1983). These perspectives can differ dramatically across international and cultural borders. His work has identified five dimensions of national culture, of which his interpretation of Finnish society (figure 10 p.35) reveals:

3.7.1. Power Distance (PDI)

This denotes the degree to which the less powerful members of society accept and expect that the unequal distribution is acceptable. A high score indicates acceptance of hierarchical placement. Finland scores exceptionally low here indicating a culture of independence and equality in the workplace with the chain of command being more informal (Hofstede, 2012).

3.7.2. Individualism versus Collectivism (IDV)

Here lies the expectation that members of society are responsible for themselves and close family (individualism) rather than as social collectives where the responsibilities are shared (collectivism). Finland shows an extremely high level of individualism, as opposed to the UK or Germany, and therefore little interest in collectivism (figure 11 p.36). The employee relationship is one based on mutual benefit with employers (Hofstede, 2012).

3.7.3. Masculinity versus Femininity (MAS)

This dimension dictates society's perception of achievement being highly assertive and materially rewarding as opposed to the more 'quality of life' orientated, cooperative and modest style. Finland's score of only 26 indicates its status as a feminine society, requiring consensus, equality and support at work. Well-being is an important issue. (Hofstede, 2012)

3.7.4. Uncertainty Avoidance (UAI)

Lower scores identify an acceptance of not knowing what lies ahead as opposed to the higher end which shows intolerance to uncertainty and unorthodox behaviours. Finland's medium score here would suggest a certain (if not very high) level of acceptance towards the uncertainty attached to change, and are therefore open to new possibilities. (Hofstede, 2012)

3.7.5. Long-term Orientation (LTO)

Highlights the differences between dealing with the 'here and now' and tend to be reliant on tradition (short-term), whereas long-term orientation shows an ability to adapt tradition to new environments. Indicators here suggest that Finnish culture places much emphasis on the short-term orientation. (Hofstede, 2012)

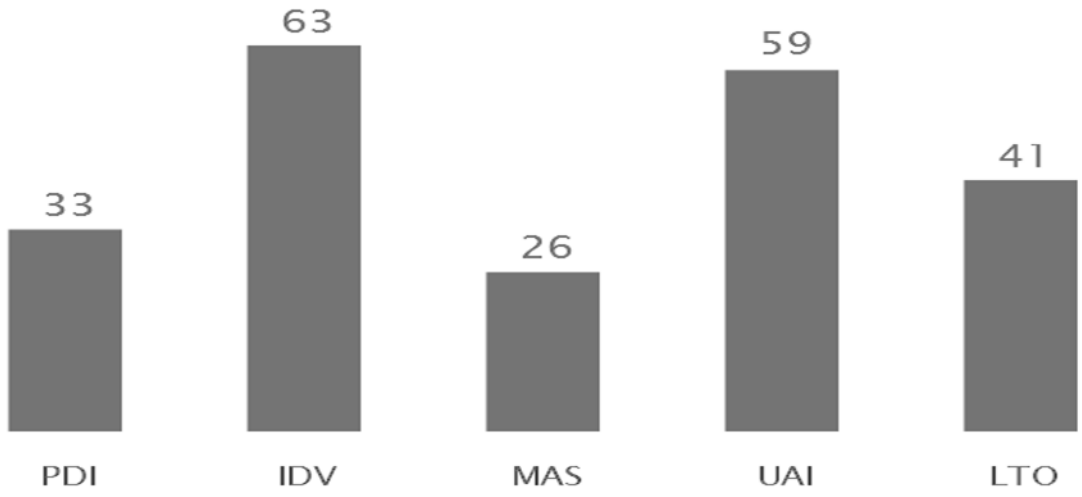

Figure 10, Dimension values for Finland (Hofstede, 2012)

The cross-national aspect of these dimensions is perhaps not as relevant in this study, though the expectations of the Finnish attitude may prove to confirm certain characteristics of the changes being implemented in the organisational culture.

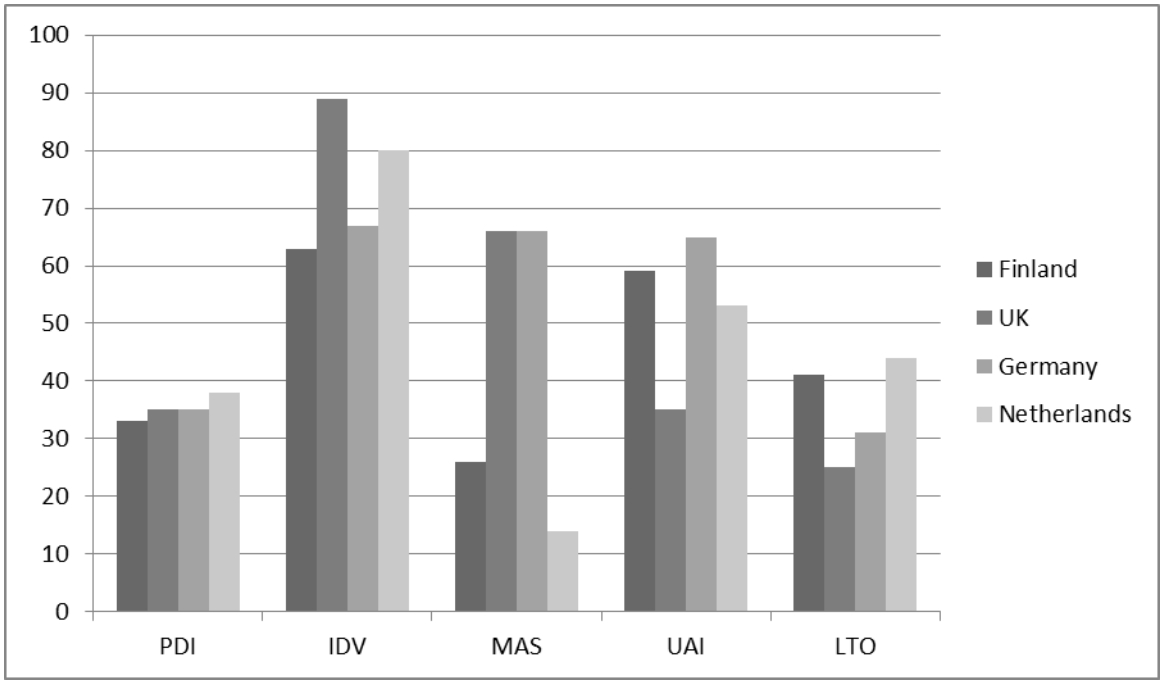

Figure 11, Finland in comparison to other Western European countries (Hofstede, 2012)

3.8. Characteristics

"*Engagement is about passion and commitment-the willingness to invest oneself and expand one's discretionary effort to help the employer succeed*" according to Markos & Sridevi, (2010)

Involvement, enthusiasm, passion and commitment are all attributes of engaged worker (Attridge, 2009). In short, being engaged is about employees feeling positive about their positions (Truss et al., 2006). This in turn makes the engaged employee better equipped to handle stress and change in the workplace, an essential tool in the transformation into a lean organisation (Lockwood, 2007)

3.8.1. Engaged

According to Devi (2009), an engaged employee is both willing and able to contribute to the success of the company by going beyond the minimum effort required to just 'get the job done'. This may sound like commitment but Devi claims that engagement is one step up from this. Robinson et al. (2004) outline nine behavioural characteristics of the engaged employee (figure 12 p.37).

Figure 12, Robinson's characteristics of the engaged employee (Robinson et al., 2004)

The characteristics above are complimentary to the lean philosophy of Toyota. 'Looking for opportunities to improve the organisational performance' holds much of the qualities through principle 10, 'develop exceptional people and teams who follow your company's philosophy' of continuous improvement. It is also indicative of 'going the extra mile' when needed, a key attribute of the truly lean organisation, and encouraging employees to actively participate in 'improving their own jobs' (Liker, 2004).

Robinson et al. (2004) conclude that the overall most important factor that engages the employee is the feeling of being valued. Personal details can be used as indicators to several important aspects affecting both culture within the organisation and the engagement of individuals within that culture. Female employees for example may have a tendency to be more engaged than their male colleagues whilst older (55+) employees are most engaged with under 35s being least engaged (Truss et al., 2006)

Hofstede (1980) outline the link between cultural and emotional diversity and nationality. Some nationalities (Finland included) regard long-term security as being more important and may fit in with the standardisation and look-ahead aspects of the lean environment.

Aspects such as marital status and the introduction of dependents into the lives of workers has been documented by Greenhaus and Beutell (1985); Lingard, Francis and Turner (2010) who argue that the introduction of family into the equation directly effects the engagement of employees through, among other things, the balance between work life and private life.

3.8.2. Disengaged

Disengaged employees are prone to three forms of behaviour; spinning, settling or splitting (Blessing White, 2006). Spinning renders the employee to wasting their efforts in unessential activities, whereas settling employees are plodding along but would move on to as new employer should the opportunity arise and splitting implies that they have already made the decision to move on rather than wait for change where they are now. Employee retention is an important issue within the lean culture and can be aided by deploying an employment sustainability agenda (Hough & King, 2009)

Work-life balance is a key element in maintaining the engagement of individuals in the employ of the organisation. This element is discussed thoroughly in the research work of Greenhaus and Beutell (1985) who propose a model of conflict created by imbalanced work and family roles. The outcome is manifested through strain created by either relationship, extra time being devoted to either or both roles, and conflicting differences in the required behaviour of the two roles.

3.9.Measurement

The assessment of employee engagement is an important measurement and can gauge criteria such as profitability, productivity and employee retention (Little & Little, 2006). Popular methods for measuring the levels of engagement include the ‘attitude and opinion’ medium according to Vance (2006) who lists 10 themes which have influence

1. pride in employer
2. satisfaction with employer
3. job satisfaction
4. opportunity to perform well
5. recognition and positive feedback
6. personal support from one’s manager
7. effort
8. understanding the link between one’s job and the company’s mission

9. prospects for future growth with the employer
10. intention to stay

In order to effectively measure the varying levels of engagement, the essential drivers have been determined as satisfaction, enthusiasm, awareness, understanding, motivation and commitment & loyalty (figure 13).

Figure 13, Drivers of engagement

3.10. Conclusion

The relationship between the requirements of lean implementation and those of employee engagement draw some striking similarities. It could be hypothesised that the implementation of either one would promote the other.

CHAPTER 4: RESEARCH DESIGN

According to the Oxford English Dictionary (Soanes & Stevenson, 2009) research is "*the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusion and research methodology refers to the techniques by which data is collected, analysed and then conclusions drawn from the results*."

4.1. Introduction

The aim of this research is to determine the effect that employee engagement has on the successful implementation of a lean culture within the construction organisation in Finland. Two of the main types of research data are ethnographic, a qualitative set of data (Kumar, 1999) which deals with cultural phenomena, and scientific data, a quantitative approach which deals with more tangible data like statistics as shown in table 1 (Maylor & Blackmon, 2005).

Characteristic	**Scientific/quantitative approach**	**Ethnographic/qualitative approach**
Questions	What? How much?	Why? How?
Methods	Survey, Experiment, database	Observation, Interview
Data type	Numbers	Words
Findings	Measure	Meaning

Table 1, Comparison of scientific and ethnographic approaches (Maylor & Blackmon, 2005)

Quantitative research seeks facts through collecting large volumes of data (Blaxter, Hughes, & Tight, 2006; Kumar, 1999; Naoum, 2007). According to Swetnam (2004) this is the favourable approach where data in required from large numbers of respondents within a limited time frame. Quantitative data can be used to determine causes of phenomena. It is usually collected and analysed at the beginning of the study as can prove valuable in testing theory (Naoum, 2007).

It was decided that by sampling a large number of respondents through a questionnaire would yield a series of employee 'types' through their levels of engagement to the work, the organisation and the lean system that was being implemented. In addition a small amount of qualitative data would be requested, though not too much as to dissuade participation.

A stratified criterion for participation was set to include only those employees from large construction related organisations, operating in Finland and already practicing lean methods for a minimum of 6 months.
The series of questions compiled to retrieve data concerning the culture of the organisation included main topics centred on:

1. the cornerstones of lean as proposed by Pekuri et al. (2012) with the addition of conflict and resistance to change in accordance with the literature review, and
2. the engagement of the employees responsible for working within the lean organisation.

Qualitative forms of data interpretation involve the analysis of non-numerical and unstructured sources such as interviews and observation (Blaxter et al., 2006; Kumar, 1999). It is not uncommon for theories and hypotheses to be developed through this data collecting stage as new ideas emerge from the findings, resulting in the final theory being placed at the end of the study (Naoum, 2007).
According to Blaxter et al. (2006) findings can be extremely rich with a depth that cannot be obtained through quantitative methods. In addition to the survey, semi-structured telephone interviews with higher level management from participating companies were anticipated to provide additional depth to the perceived situation of the ground level employees.
The fundamental requirements of both lean culture and employee engagement have striking similarities. The survey was directed to management as well as lower level ‘employees’ of the organisation in an attempt to discover the level of engagement within the organisation and the level of proficiency in lean methods.
It is anticipated that four characteristic situations will emerge:

- None, or hardly any conception of lean and a disengaged workforce.
- A good understanding of lean but a disengaged workforce.
- None or hardly any concept of lean but an engaged workforce.
- A good understanding of lean and an engaged workforce.

From the results of the questionnaire it was hypothesised that a connection could be made that:

1. lean culture has a positive effect on the promotion of employee engagement

2. Engaged employees promote the implementation of lean culture within the organisation.

4.2.Research process

The following process covered the investigation from conception through a careful review of the available knowledge on the subject, to the concluding results and recommendations. Through the systematic investigation of the culture which is being nurtured within the sample set of construction companies, opinions will be generated and postulated so at to support or denounce the hypotheses outlined at the outset.
The key determinants were examined to determine to what degree they are prominent through analysis of the data. From this assessment, conclusion may be draw as to the relationships evident between the two cultural aspects, and recommendations made as to how organisational efficiency may be improved. The following process was used:

- Comprehensive Literature review in order to gather a comprehensive opinion of the subject from a variety of sources.
- A pilot study will help to fine-tune the data collection mechanisms and hypotheses.
- The data collection itself must be conclusive as further extrapolation of data may not be possible later.
- The follow-up may include interviewing some respondents to clarify their opinions.
- Data analysis is where evidence will be exposed in order to prove/disprove the hypotheses..
- Conclusions and recommendations are drawn from the evidence reported after data analyses.

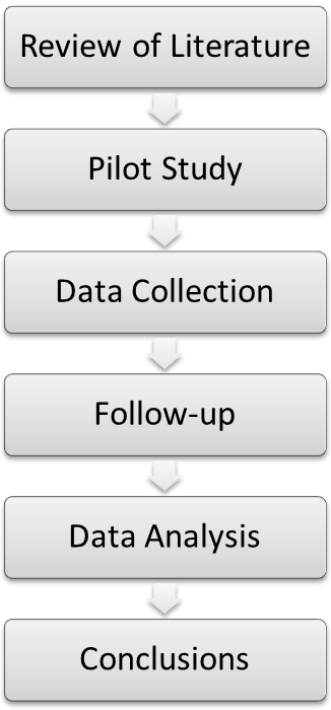

Figure 14, research methodology flow diagram

4.2.1. Data collection

Care must be taken to ensure the data collected through the survey was valid, this included being both unbiased and comprehensive (Hart, 2005). Typical methodology for data

collection can include a pilot sample of questions which can be scrutinised by an audience independent to the main study, questionnaires, interviews and literature sourcing.

4.2.1.1. Interviews

Interviews rely on talking to the focus groups in order to obtain answers to the research questions. They can take the form of structured, semi-structured, unstructured, or focus group varieties. The responses are compared for similarity or difference (Hart, 2005).
With semi-structured or unstructured interviews there is an apparent risk of bias through the inconsistent wording and differences in the 'atmosphere' of the dialogue situation (Krosnick, 1999). Fowler and Mangione (1990) stress that interview questionnaires should be offered identically to different interviewees to reduce this risk.
Interviews were designed in a semi-structured format to be conducted through telephone medium. The draught outline was first offered to the Lean Construction Institute of Finland (LCIF) for constructive criticism and comment. This was also done via telephone conversation. Comments were noted and minor alterations made before the final copy was concluded.

4.2.1.2. Professional Forums

One of the main concerns with offering the questionnaire to a Finnish speaking audience was the element of certain terminology being 'lost in translation'. It had become apparent from the telephone interviews with LCI Finland that the term 'lean' may need to be explained to the respondents first, in order to get a useful and informed reply.
The challenge was set in place to create a short summarised explanation of lean construction, in as fewer words as possible so as not to deter the participants with lengthy texts to read.
It was decided that, after creating a draft, the 'work in progress' (WIP) would be offered on linked in. In particular the pages of the Lean Construction Institute, (Linked-in, 2012a) and the Lean Learning Centre, (Linked-in, 2012b)

4.2.1.3. Questionnaires

Questionnaires are a means of determining the answer to questions such as 'what?' and 'how much?' (Maylor & Blackmon, 2005) or 'how many?' and ' how often?' (Hart, 2005). The responses in most cases will become the form of quantitative data and may be analyses statistically from which trend and similarities can be deduced.

Some words of caution have been made as to the validity of questionnaires. Where there are too many questions, respondents may be inclined to answer superficially (Milne, 1999), and where the industry sector has been saturated with requests to partake in studies, prospective respondents become unwilling (Farrell, 2011).
For the benefit of this study a survey containing ninety three questions was prepared. After piloting the proposed questionnaire it was sent out to several companies in Finland, who have participated recently in Lean influenced construction projects.
Questions were divided into three types; demographics, lean indicators and engagement indicators.
It was perceived that each question or combination of would provide some indication of the level at which a respondent is either engaged to the organisation, empowered by the lean culture or a combination of the two.
The method of capturing the response to each question was set out using a Likert type scale; using a range from 1 to 5. 1 represented extreme disagreement to the statement and 5 an extreme agreement.
One question (42) requested an open (qualitative) response, asking respondents to verify their personal understanding of lean.

4.2.1.4. Webropol™ sponsorship

After browsing the web for prospective alternatives to Google Docs, one major player stood out from the rest. Webropol was both an established player in the on-line survey stage as well as a home-grown business. It was felt that by using this service, respondents may feel more comfortable taking part. They were approached and agreed to provide their service, plus support free of charge.

4.3. Questionnaire design

In order to ascertain a level of engagement to both the lean management model and the organisation, a questionnaire was required which would allow data to be gathered on all key aspects covered under the cornerstones of lean and the drivers of engagement sections. The intention was to measure and compare the levels of lean understanding, commitment and engagement among employees.
Certain considerations needed to be address whilst planning and compiling the questionnaire

4.3.1. Research ethics

The nature of cultural research is to address problems within an environment or organisation, and it is important that respondents do not feel threatened through their participation in the study. Therefore measure should be taken to eliminate these feelings by mechanisms such as anonymity and confidentiality (Cobanoglu, Warde & Moreo, 2001). In an environment where all respondents are of consensual age and sound of mind, the simple acceptance of informed consent may be enough (providing transparency is applied and no elements are not purposely hidden), whereas in the case where vulnerable participants are being studied, such as the mentally impaired or minors, extra precautionary measures will need consideration (Hart, 2005).

In addition to providing measures that protect the identity of individuals, it is often necessary to extend this to the organisational level. This factor may also help to reduce the likelihood of bias or even prevent companies from withdrawing their participation in order to eliminate the risk of identification.

For this reason anonymity will be maintained for all the individual respondents and organisations will have their individual identities concealed from others.

4.3.2. Bias

Lancaster, Dodd, and Williamson (2004) define bias as the combination of various design, data, analysis, and presentation factors that tend to produce research findings when they should not be produced. In essence, bias can render part or the whole research project useless. It may take on several forms including selective and even distortive reporting of findings from data collection (Lancaster et al., 2004), even as far as fraudulent claims (Hart, 2005, p. 71). Likely causes may come from poor research design or improper sample recruitment (Pannucci & Wilkins, 2010).

In a similar fashion reverse bias can have equally damaging effects on research, important results can be missed through conflicts of interest (Lancaster et al., 2004; Topol, 2004), significant data being ‘lost in the noise’ of results (Ioannidis, 2005; Kelsey et al, 1996).

The nature of this study, being to address problems within the organisation, it is important that respondents do not feel threatened through their participation in the study. Therefore full anonymity and confidentiality will be offered to each individual. In addition the approach to questionnaires will remain unbiased against individual companies as well as their agents.

4.3.3. Question focus

From the literature review the drivers of lean implementation were categorised into seven aspects, and likewise, the drivers of engagement into six. From these thirteen points, a further breakdown was made in order to determine what could be measured from each. In addition some form of questioning would be required in order to gain these measurements from members of the organisation. The following was established:

4.3.3.1. Cornerstones

- Leadership - Commitment from management, Long-term outlook, Management support, Guidance
- People – Chemistry, Understanding, Quality personnel, Selection (building teams), Social ability, Collaboration, Other actors
- Trust – Contracts, Behaviour
- Competence - Understanding (lean), Training, Lean champions, Involvement (employee)
- Motivation – Rewards, Results (low-hanging fruits), Customer value, Outside influences
- Conflict (harmony) – Reliability, Trust, Respect, Security, Resolution (conflict)
- Change (acceptance) – Commitment, Buying-in, Understanding, Belief

4.3.3.2. Drivers

- Satisfaction - Personal lives, Challenge (work), Involvement
- Enthusiasm - Shared goals, Fairness, Achievement, Camaraderie
- Awareness - Understanding (needs)
- Understanding – Direction, Means of getting there
- Motivation – Responsibility, Connection (to organisation), Incentives, Recognition, Development (self)
- Commitment & Loyalty - Belief (buying-in to the big picture), Satisfaction (going the extra mile), Looking forward

4.3.4. Questions

From the breakdown of the cornerstone sand drivers, a set of preliminary questions were derived. These questions were grouped so as to maintain some kind of flow for the respondent to follow. In total ninety four questions were compiled. The questions were designed to determine the levels of lean understanding and commitment, as well as the level of employee engagement.

4.4. Distribution of questionnaires

The distribution of questionnaires took on six stages (figure 15 p.48). Firstly the target companies were approached to determine their level of interest and commitment. At the same time the survey itself underwent a process of construction, testing and modification until it reached a stage where the finished questionnaire could be distributed. Further to this a period of monitoring would ensue, during which reminders were issued to participants.

4.4.1.1. Delivery

Initially YIT, Lemminkäinen and Skanska were approached, three big players in the Finnish construction sector. Enquiries were made as to whether they would be prepared to assist in this research by allowing the questionnaire to be forward to members of their organisation. The response was zero, with the exception of one employee of Skanska Finland who agreed to assist by means of a telephone interview, though they did also pass on contact details of the person whom should be approached regarding the survey.
After consideration it was decided that a different tactics were necessary to pierce the outer layer of these Finnish organisations. The LCI Finland was approached to see if they could assist with getting the questionnaire out into industry. They agreed to forward my introduction letter and link to the on-line service to all the active partners within their lean construction project database. This included Sweco, Consti, WSP, Talokeskus, Morenia, The Finnish Transport Agency, Vianova, Systems, Granlund, Skanska, Lemminkäinen and NCC.

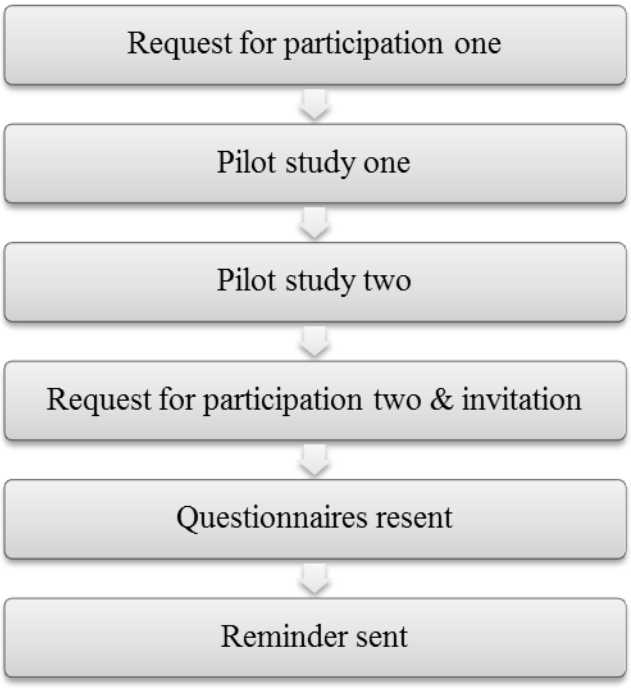

Figure 15, survey distribution flow diagram

4.4.1.2. Request for participation one, 16.10.2012

It was originally considered the best approach would be to reach out to the bigger home-grown construction companies operating in Finland. The three approached were Skanska, Lemminkäinen and YIT. Each with a turnover in excess of 1bn € and employing over 10,000 people.

The outcome of the initial request for participation was that two out of three companies failed to respond to the email, while the organisation that did reply (Skanska) declined the request to take part in the survey, instead agreeing to partake in a telephone interview.

4.4.1.3. Pilot studies

Misunderstandings can return false information which may damage the validity of the study and pilot studies provide a means helping to ensure that research is scientifically valid and publishable (Farrell, 2011; Lancaster et al., 2004). Farrell (2011) lists nine questions which the researcher should be asking when observing the participants:

1. How did they find it?
2. Where the instructions clear?
3. Where the questions clear: if not, which ones?
4. If they paused over any questions, why?

5. What did they think of the scales used?
6. Did they object to answering any questions?
7. Do they think the questions are good measures of the variables?
8. Do they have any other comments or suggestions for improvement?

He also recommends that, further to the pilot study, a sample of around 10% of the target group is approached to make a 'pre-survey' survey. This allows for further tweaking of the questionnaire, though requires additional time.
The pilot study was carried out on-line using 'Google Docs', a free service provided to Google account holders. Whilst the software had quite a good deal of scope, it was lacking in several key functions, one of which was the inclusion of the Scandinavian specific characters (ä. ö and å). It was thought that this would imply an unprofessional portrayal and an alternative method should be found.
The initial questionnaire was offered through the Lean Construction Institute's Linked-in page (Linked-in, 2012a).

4.4.1.4. Pilot study one, 17.10.2012

The initial pilot study was compiled using the cornerstones of lean and the drivers of engagement. It was carefully compiled and given structure so as to guide the respondent and eliminate the sporadic reasoning of questions.
It was offered in succession to a number of pilot respondents starting with the head of construction management at Hämeen University of Applied Sciences in Finland, Jari Komsi. After analysis of the feedback and some alteration it was offered for open scrutiny on two Linked-in social network pages and further changes made.
Finally a wider request was made from several contacts in the global construction industry, but from outside Finland.
In total, six detailed responses were collected, from which a final draft was created.

4.4.1.5. Pilot study two (Finnish version)

The second pilot study was undertaken by two Finnish language participants. The objective being to ensure that the meaning had been successfully translated. Some minor corrections were highlighted and sorted out.

4.4.1.6. Request for participation (2) and release of questionnaire

Finally the finished questionnaire was sent out on 05.11.2012 through LCI Finland to twelve of their partner companies for further distribution amongst their employees.
A reminder was issued, again by LCI Finland on the 14.11.2012 to all companies in the initial distribution group.

4.5.Data Analysis

In order to draw valuable and useable data from a questionnaire, it is important to set up the question correctly in order to yield such answers. Consideration was given to question construction.

- Open-ended questions allow free thinking from respondents and will give the more qualitative data in return. This type of format can require a great deal of analysis in order to make accurate conclusions from the data.
- Multiple-choice will reduce the qualitative aspect and give a fixed range of data. It has the bonus of stimulating the understanding of the respondent by reminding them of possibilities. Drawbacks are the possibility of leading respondents.
- Scale based questions may require the respondent to confirm the importance, or their acceptance, of a statement. The initial claim will be closed-ended and will yield data of a purely quantitate nature. Examples of this type of questions include the Likert Scale.

4.5.1. Assessment of reliability and validity

For the purpose of research, validity comes to mean the effectiveness of the data sourcing in respect to what it is supposed to be measuring. Bruce and Chambers (2002) talk about survey validity having two sides, first the internal validity which denotes how the data is applicable to the particular study and external, which applies to any true representation the data has of the wider populous.
Reliability, on the other hand, refers to the consistence of the findings (whether it can be replicated or applied to other demographics) and can be affected through a range of factors, including poor response rate (Bruce & Chambers, 2002; Polit & Beck, 2006), psychological bias created by affected mood through positive and negative wording of questions (Schriesheim & Hill, 1981) or poor demographic representation (Bruce & Chambers, 2002),

Returns of around 50% are generally accepted though 70-80% would be a more ideal and meaningful target to aim for (Bruce & Chambers, 2002). However Krosnick (1999) cite Visser et al (1996) comparison of telephone versus mail surveying as revealing more accurate responses from their postal survey (yielding 20%) than from the telephone version (yielding only 60%). They conclude that a low response rate will not necessarily reflect in the validity of the survey.

The data collection service which was adopted (Webropol™) had a built-in analysis function which was used to study the data.

CHAPTER 5: DATA ANALYSIS

The overall response was too low to make the desired analysis of the data. The target group had not really been reached either and it was apparent that the responses had come from middle to upper management only; one managing director, one development manager and one project manager. It should be noted that the analysis of the questionnaire data (5.4) is based upon the response of these three participants only and therefore lacks much of the credibility hoped for.

5.1. Introduction

The process of the data collection was initiated through a four stage process.

1. An initial pilot study would be conducted to a small selection of respondents (3-6) in no way connected to the final target group. Comments and recommendations were to be analysed in order to fine tune the questionnaire.
2. A second pilot study of a smaller group (2-3) of Finnish speaking respondents, again not linked to the final target group, was to be conducted. This time with the translated version of the questionnaire.
3. Following a final revision, the amended text was to be offered via a web-based service to the final target group of prospective respondents.
4. Telephone interviews from management personnel at participating organisations would be conducted.

5.2. Pilot study

Two pilot studies were carried out, the first involved four participants and was done in English, the second was necessary to perfect the translation into Finnish language and was carried out using two native Finnish speakers.
Used for construct a useful set of questions in a format which fit the guidelines stated in the methodology section. In addition, industry specialists were asked to provide help with compiling a summary descriptive of ‘lean construction’.
The second stage of the piloting phase was aimed at getting the questionnaire translated in to Finnish language and accepted as a direct and accurate parallel of the English version. This would require making an initial translation the putting it out for completion to independent observers, much in the same way as the first pilot trial.

The result was an acceptable parallel of the original English workings.
Respondents had a tendency to treat the pilot as a means to provide data for the study by answering the questionnaire. This raised questions about the clarity of the instructions given. Some of the comments gave the impression that aims and objectives of the study had also not been fully understood. This could have been coupled with a lack of understanding of either lean methods or employee engagement.
Question and format construction did receive some valuable criticism and valuable amendments were possible through this. A

5.3. Analysis of the Questionnaire

After three weeks in the field, and despite follow-up reminders, the questionnaire yielded only three responses. The following analyses must be recognised for their limitations.
Data was fed into a spread sheet and average values calculate from the range of responses.

5.3.1. Personal details, questions 1-10

From the responses, an average demographic was obtained. Though only three responses were received, one male and two female, it was hope some useful conclusions could be derived.

2	What is your gender?		Female
3	What age group are you?		40-49
4	What Nationality are you?		Finnish
5	Marital status		Married/partner
6	Do you have dependants?		No
7	What is your employment status?		Full-time permanent
8	What is your level of education?		Higher university
9	In what field is your education rooted?		Technical/engineering
10	Is your education linked to the position you hold?		Yes

Table 2, personal demographics

From this set of demographics (table 2) it was ascertained that the audience were all highly educated professionals, middle-aged and working in middle to senior management positions within their chosen field of expertise. A higher percentage of women respondents should reveal a greater engagement score overall (Truss et al., 2006).

5.3.2. Position and Input, questions 11-16

11	Average monthly salary (before tax)?		Over €5000/month
12	What is your current job title?		Various middle to upper management
13	In which role do you work?		Upper management
14	In which department?		Various
15	How long have you been employed with this company		5-10 years
16	How much experience do you have in this industry?		Over 10 years

Table 3, positional demographics

All three respondents had salaries above the national average and had been employed for a minimum of three years for their current employer. Experience in the industry was over 10 years in each case (table 3).

5.3.3. Personal work input, questions 17-27

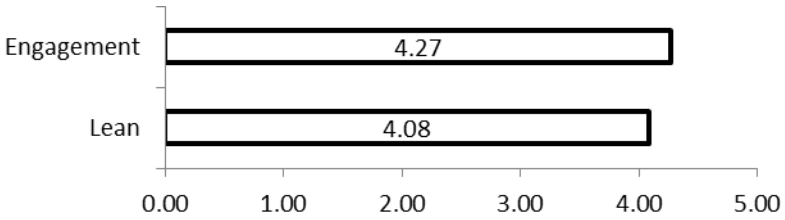

Figure 16, values for personal work input section, questions 17-27

In general, all respondents were quite satisfied with the rewards (salary, holidays and benefits) they received for the amount of effort they put in (figure 16). It was noted that only one person was extremely dissatisfied with the compensation for hours of overtime they put in, There was much evidence that the work required 'going the extra mile', which they were quite willing to accept.

5.3.4. Support and confidence, questions 28-41

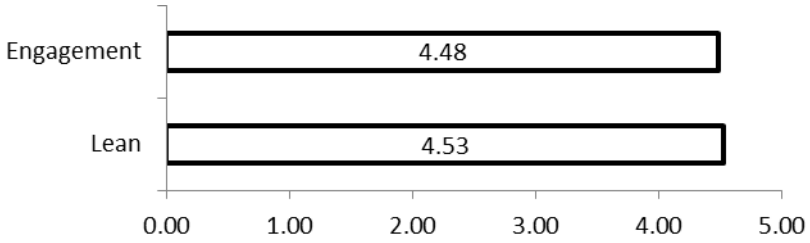

Figure 17, values for personal work input section, questions 28-41

This section was particularly aimed at the lower levels of the workforce. The results (figure 17) indicated a very high level of commitment and support from management, though as the three respondents were all from the upper echelons of the management, the validity of this outcome is cast with severe doubt as far as a generalisation throughout the organisation is concerned.

The results indicate that management believe they are working in the right direction and are familiar with good working practices.

5.3.5. Competence and understanding, questions 42-54

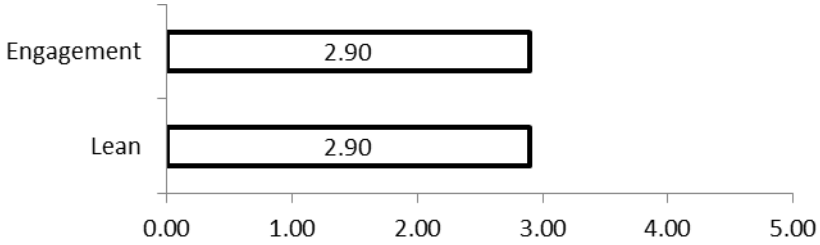

Figure 18, values for personal work input section, questions 42-54

This section was where respondents scored the lowest (figure 18). There was a sense that management did not hold the necessary skills and that more education was needed. This was particularly prominent in question 50 which asked about confidence in partner companies, and score only 1.7, indicating a lack of confidence. Confidence in the management understands and ability to promote lean also scored poorly with one respondent expressing extreme dissatisfaction.

Question 47 asked about whether more training would allow individuals to perform their duties better. This could indicate genuine understanding of the importance of lean competence in light of the high level of responses to question 42.

5.3.6. Trust and responsibility, questions 55-65

Although neither engagement nor lean indicators are particularly high in this section, they do not show signs of disengagement or opposition to the management model either (figure 19).

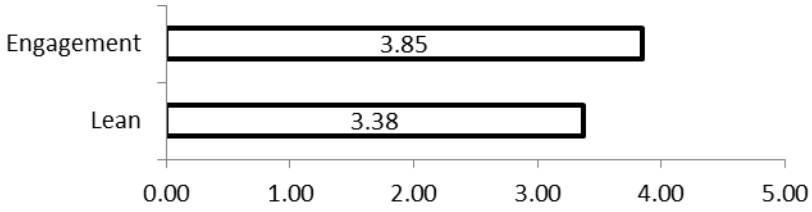

Figure 19, values for personal work input section, questions 55-65

Respondents display a strong feeling of trust within the organisation, though this does not extend outwards to partner companies. This keeps in line with the previous section which highlighted a lack of confidence in their abilities. Interestingly the respondents appear to be aware that these feelings of mistrust are reciprocated.

Whilst the transference of responsibility internally was not felt to be overburdening, all respondents indicated that the levels offered are perhaps not adequate for the duties expected from employees.

5.3.7.Motivation, security and commitment, questions 66-77

Respondents felt motivated and secure in their environment (figure 20). Commitment and loyalty runs high though putting in the ‘extra mile’ could be a problem from some employees. This factor could be partly as a result of the failure to adequately compensate workers for this (question 21).

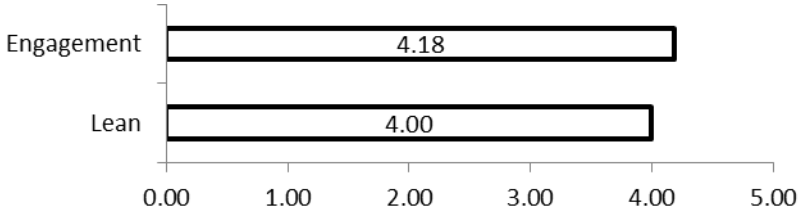

Figure 20, values for personal work input section, questions 66-77

Respondents seem comfortable with motivational mechanisms. Stimulation and enjoyment were derived from positions and the rewards offered included a high level of recognition by superiors.

Two respondents to question 77 were in favour of receiving more professional development. This would indicate evidence of a trade-off for mutual benefit, as per Hofstede's (2012) individualist assessment of Finland. The third answer (more responsibility) indicated a more intangible reward, in line with a deeper level of engagement (Vance, 2006)

5.3.8. Conflict and competition, questions 78-87

The lower result in this section indicates the bond which not obligatory as part of the job description (figure 21). Socialising with colleagues outsold of work creates a bond which is affected through camaraderie and loyalty. It reinforces safety and can promote healthy competition. Here we see a lower score, indicating this type of bond is not so strong amongst respondents.

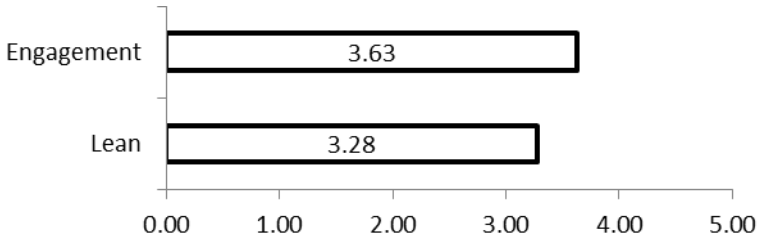

Figure 21, values for personal work input section, questions 78-87

5.3.9. Acceptance of change and commitment, questions 88-93

All respondents scored maximum for all questions in this section, indicating full commitment and engagement for the implementation of lean methodology into the management model (figure 22).

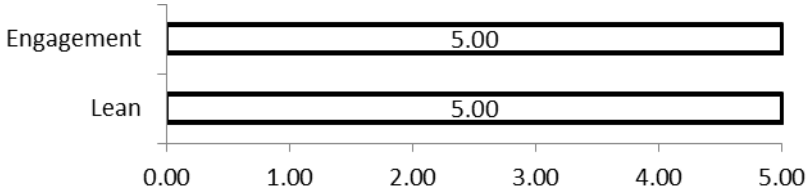

Figure 22, values for personal work input section, questions 88-93

It is difficult to determine whether this result reflects purely the acknowledgement of the company's wishes to change, as opposed to the respondents 'commitment' to it.

5.3.10. Thanks and appreciations, question 94

This was the question by which the reward could be issues randomly and fairly, as it would be too expensive to reward all participants.
In total only one respondent completed this question.

5.3.11. Conclusion

Levels of lean commitment and employee engagement are very similar an all cases, though employees did show to be slightly more engaged than committed to implementing lean. It was apparent that there are some issues with confidence in the ability of superiors as well as partner companies (questions 66-77) this was also highlighted in the trust section on trust and reliability (55-65).

5.4. The relationship between Lean and Engagement

Figure 23 (p.59) shows the level of commitment to lean by each of the three companies who's employees participated in the study. Respondent 2 (R2) showed the highest levels followed by respondent 3 (R3) and then respondent 1 (R1). The corresponding overall results for levels of employee engagement (figure 24) show a similar, pattern.
It is therefore possible to deduce that the levels of engagement and lean commitment within the organisation are indeed linked.

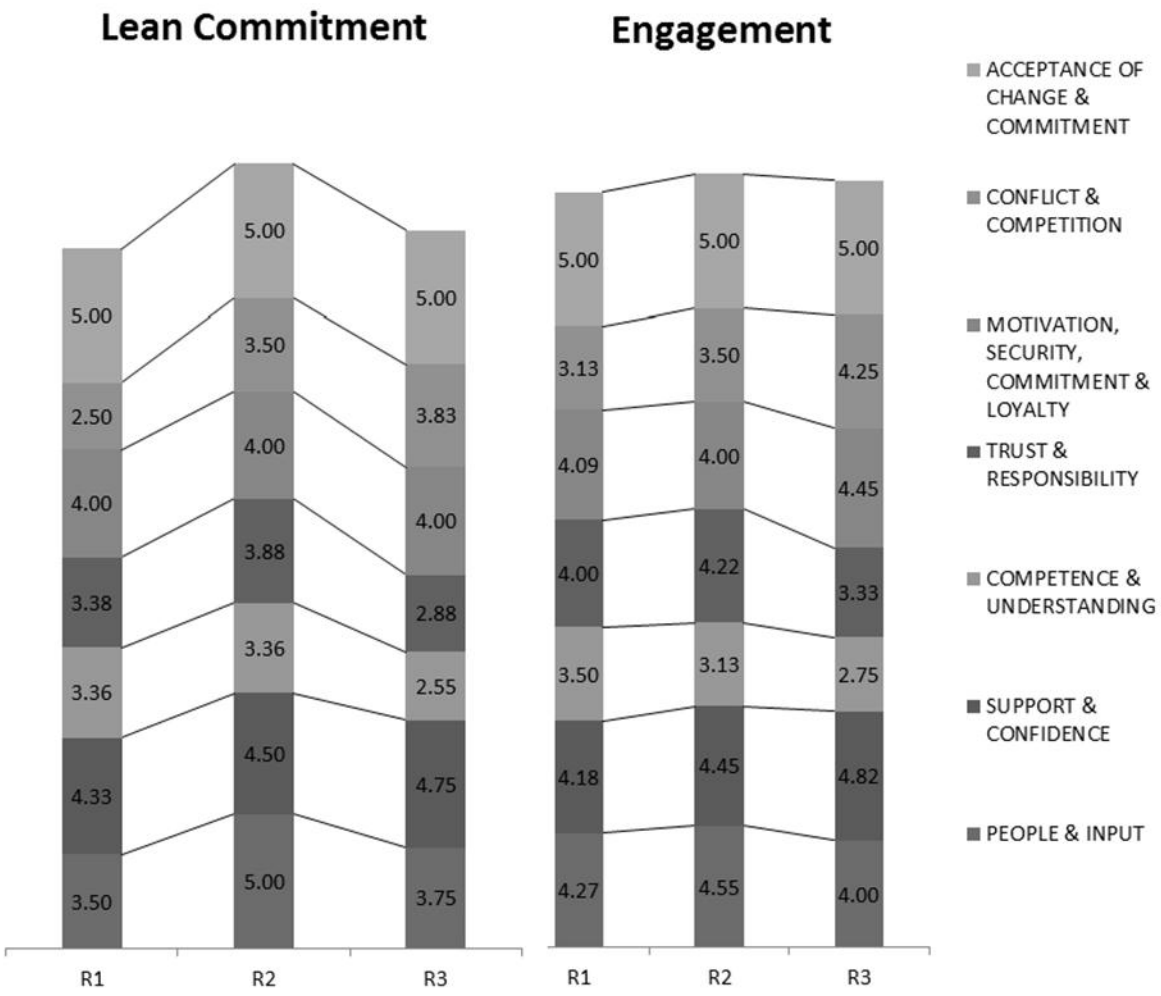

Figure 23, comparison of lean versus engagement over the three respondent companies

5.4.1. Male vs Female

Truss et al. (2006) note that two important factors affecting engagement in employees are gender and age. Females being more engaged than their male counterparts and younger employees, in particular the under 35 year olds, less than their elders.

Whilst there was no difference in the engagement of male and female employees, female employees did show an increased commitment to lean practices, the indication in the previous section (that there is a direct link between the lean commitment and employee engagement), it follows that female workers do in fact have a tendency to be more engaged (figure 24 p.60).

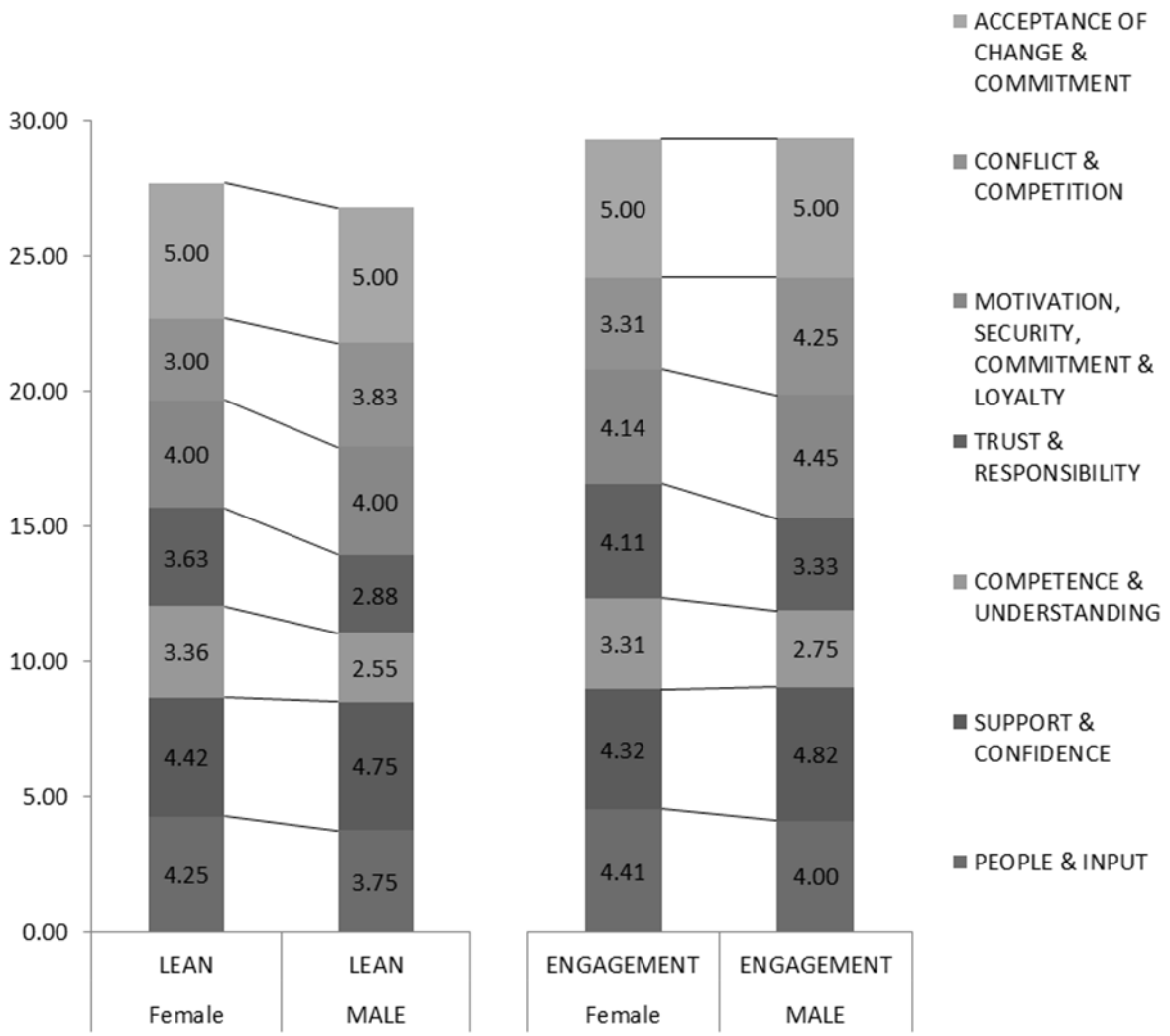

Figure 24, comparison of male versus female values

5.4.2. Question 42 (qualitative insight)

Of the three respondents only two answered this question. Although this figure will affect the validity towards a generalisation of the workforce, it does allow for data to be labelled with respondents actual positions giving possibility of more insight to the meaning.

The question asked for three to five terms which were respondent associated with lean practices.

It was noted that in the questionnaire, a short description of the meaning of lean construction was included. This was to reduce the risk of omission due to a lack of recognition of terminology in the Finnish language. It was ascertained earlier that the tendency in Finland was to use alternative phrasing of the word ‘lean’ and therefore using the term in the

questionnaire may cause confusion. Bearing this in mind, these answers may lose validity through the risk of prompting or leading in the question (Bruce, 2002). Therefore the following analysis is based on responses being uninfluenced by the description of lean. Terms used in the description, which were also included in the responses, were; elimination of waste and continuous improvement.

The following answers were given (figure 25):

- Responded 1: Elimination of waste, value flow, pull, respect, standardised work
- Respondent 2: Removal of waste, continuous improvement, standardised way of working.

Figure 25, word cloud of responses to the understanding of lean terminology

Two answers were consistent in both responses, the elimination of waste and standardised work. As discussed in the literature review, standardisation of work tasks is the foundation of continuous improvement (Liker, 2004) and leads to increased value (Koskela, 1992) and reduced waste (Antony, 2011). The respondents citing standardisation were the development manager and project manager, indicating that understanding had at least penetrated to the tiers below the absolute top level of management. From here support can be further filtered downwards, an essential part of the lean implementation strategy (Alves et al., 2010; B. Emiliani, Stec, Grasso, & Stodder, 2003; Pekuri et al., 2012).

Mention of the elimination of waste could be seen as further evidence of the need or means by which the standardisation of work practices will benefit the organisation (Wolstenholme, 2012).
Respondent 1's inclusion of respect indicates a deeper understanding of the concept of lean. This term was not mentioned in the description and is therefore more likely to be the respondents own view.
Respect is one of the softer aspects and is included in the fourteen management principles of the Toyota Way and seen as an essential element in the lean working environment (Liker, 2004). It is also one of the cornerstones included in the literature review (conflict) as well as being an influential factor in the psychological security of engaged employees (Sirota et al., 2008)

5.5. Interviews

Originally, it was hoped that telephone interviews would be possible with managers from all participating organisations but after the poor response a different approach was needed. It was first anticipated that the contacts that were approached to take part would be contacted and requests made for participation in short telephone interviews, however, at the request of LCI Finland to refrain from contacting them, this approach was also abandoned. This left only one option, a member of the senior management at Skanska Finland who had previously agreed to a telephone interview, though for several weeks had failed to answer the emails requesting an appointment.
Eventually he did reply to the correspondence and a time was agreed.

5.6. Interview with Skanska, 30.11.2012

The interview with the member of senior management at Skanska was conducted on 30th November 2012 at 16.30 EET. The interviewee has a doctorate in Lean Construction from the University of Berkeley in California, USA and is currently Head of the Nordic Procurement Unit, covering Skanska's interests in Finland, Sweden and Norway. Skanska Finland is one of the smallest of Skanska's concerns, the USA being the biggest.
A selection of questions had been compiled subsequently aimed at gaining insight into the current cultural environment which exists within the organisation. However, at this late stage it was hoped that the response may also give some insight into the failure of the questionnaire as well as the lean culture within Skanska.

5.6.1. The interview

The interview took place on Friday evening outside the standard working hours of the company. The opportunity was taken to enquire about this and whether this was an indicator of the commitment and 'extra mile' he was prepared to go for his role in the company. He accepted this was probably the case and pointed out that it was not uncommon at all for him to be found working long days.
The interview proceeded with interviewer steering the topic from the question list.

5.6.1.1. How is the term lean referred to within your organisation?

The interviewee explained that at Skanska and Finland in general, the norm is to refrain from using the term 'lean'. When communicating on the external circuit i.e. with management experts such as the LCI etc. the term is used. Companies in Finland tend to prefer to give or descriptive name to the specific tools such as last planner and alliancing. Although he went on to state that even 'Last Planner' is not so frequently used. Instead Finns like to refer to the system generically as purely Integrated Project Design (IPD). He explained that this comes down to Finns preferring to do things their own way.

5.6.1.2. Which lean tools are in operation at Skanska?

The main focus at Skanska is on the Last planner (IPD). The company has worked in conjunction with Glenn Ballard, the creator of Last Planner, for several years
As far as alliancing was concerned, whilst popular with Skanska in the USA, it is a little incompatible with the Finnish construction sector. Difficulties concerning the implementation tend to come from contracting restrictions. There are only 3 types of contracts here for construction projects;

- YSE(1998), General Conditions for Construction Contracts
- KSE (1995), General conditions for Consulting
- RYHT (2000), General Procurement and Delivery Terms for Construction Projects

In Finland the law is very clear, in fact it is literally 'black and white', and this is where the problem lies. The letter of the law is so literal does not allow much for interpretation.

When new approaches are being implemented, such as ‘alliancing’, it becomes difficult to adapt the contracting limitations to suit the new relationship between participating companies.
Compared to the NEC forms of contract in place in the UK these Finnish varieties are very inflexible. For example Finnish legislation prevents mechanisms such as precedence so every instance of variety requires a new contract.

5.6.1.3. Where does the initiation come from in your organisation?

Mainly from ‘grass roots’ i.e. born on site. There is an observation that something needs to be changed and possibilities are investigated.
Some boardroom input does occur. Senior members return from overseas, quite often having witnessed new techniques and are keen to see them introduced here.
There is virtually no client influence however. As main contractors, Skanska are top of the chain and the implementation of lean is to improve their competitive edge. Clients tend to be content with the service they receive.
It was remarked that clients often feel that this criteria such as sustainability and green construction is an important aspect of a project but are reluctant to make any insistence regarding the criteria of the contract. There tends to be ‘a lot of talk but very little action’. He added that this could best be described as a failure to fully ‘buy in’ to these new concepts. A problem that is not necessarily contained to the organisational level, but can also be found at almost every level, right down to ‘grass roots’.

5.6.1.4. Lean gurus, do you have them?

Skanska recognises the importance of having specialist lean experts on-board. The company has worked with Glenn Ballard (the creator of the Last Planner System) for several years in his capacity as “lean guru” and the interviewee himself, having a doctorate in lean construction, could also fulfil this role.

5.6.1.5. How is training passed on to the workforce?

All employees (white collar) were given some instruction of the principles and methods of working with the lean mechanisms that were in use. Tuition was available through a range of media including online video courses, seminars (external and internal) and short training

camps. Blue collar employees were also offered some in-house training also. Foremen and supervisors, those who would represent the site at the planning meetings would be instructed prior to participation.
As far as the long term planning of training of future lean planners and implementers, there is no definitive plan in place at the moment.

5.6.1.6. How does Skanska regard the engagement of its workforce?

Skanska acknowledge the importance of engagement amongst employees and recognise the importance of the between the culture motivation and commitment of the workforce and the success of the lean model. They do not however have an active employee engagement policy in operation at this time.

5.6.2. Conclusion

The introduction of lean into Skanska has been systematic and steady. Experts have been recruited as gurus and the workforce is educated in the necessary methods of implementation. Sound tested models have been engaged such as Last Planner and less reliable ones, which still maintain compatibility issues in Finland, have been shelved for the time being.
Problems holding back aspects such as 'alliancing', which is used by the organisation in some of its other global concerns, have been identified for consideration. These include the rigid legal framework concerning contractual relations in Finland, and the failure of customers to 'buy in' to the new model.

CHAPTER 6: Analysis of questionnaires

Vangeest and Johnson (2012) propose that the value of data collected by surveying is "only as good as the methodology employed". With this in mind, and due to the poor response to the questionnaire, a thorough review of the literature concerning survey based data gathering was conducted and the process of delivery analysed, in order to determine the reasons for failure.
This research was designed around the process detailed in chapter 3.2. The hypotheses were to be proven or disproven via an extensive analysis of the data gathered through a questionnaire of employees from the Finnish construction industry, in particular those from companies already practicing lean management models.

6.1. Failure of the questionnaire

The deadline for the return of all questionnaires had been set for Friday 16th of November 2012, thus giving two full working weeks for respondents to participate. A reminder was issued in the middle of the second week and, due to a 'zero' response rate, the deadline was deferred for a further week. Even after this extended period the responses totalled only three, and it became apparent that this would need to be addressed.

In order to assess the value of the poor response to the survey in this study it is necessary to dissect the process and evaluate the methodology used. After which conclusions can be draw as to the true meaning of the failure.

The aim of this part of the study is to identify the causes of the failure and determine if these reasons are in fact valuable to the original aims of the research.

This extended literature review addresses the methodology used in the data gathering through means of the questionnaire. It covers validity and reliability of this chosen technique and compares alternative approaches. Questionnaire construction procedures are also discussed in order to identify possible weak points.

Finally the distribution process is scrutinised and a plan for optimum delivery of questionnaire surveys was created.

6.2. Analysis of the literature concerning questionnaires

This section discusses the key elements contained within questionnaires and analyses their importance and vulnerability to failure.

6.2.1. Reliability and validity

McCullough (2011) illustrates the problem of unreliable data in the paid survey sector, and suggests test questions in order to eliminate bad responses. In one case by simply requiring participants to tick answer '3' from a choice of 1-4, 13% were eliminated for incorrectly answering. Further down the line another 61% failed through blatantly lying. By not paying enough attention or the reluctance to comply (lack of commitment) can invalidate or cause failure to a questionnaire. (McCullough, 2011)

6.2.2. Response rates

Survey response is offered as a type of social exchange and is dependant of three critical factors; rewards, costs and trust (Dillman, 2011).

- Rewards include all aspects which the respondent expects to get back in exchange for their participation. This can include insight from the final analyses of the data, financial recompense or just the feeling of having contributed to something bigger or useful.
- Costs are what is given up by the participant in order to realise the rewards, including time and inconvenience.
- Trust is the faith in the long term promise that the rewards will outweigh the costs.

(Dillman, 2011)

The response rate of return from a questionnaire can be calculated as follows:

$$\frac{the\ number\ of\ completed\ questionnaire}{the\ number\ of\ people\ contacted} = the\ response\ rate$$

The response rate of questionnaire can be as critical to the validity as the volume of response itself as a low rate will not allow for generalisations to be made (Vangeest & Johnson, 2012). Different medium of administration will typically return different response rates.
The University of Texas (2011) outline a several guidance points to increasing the response of online questionnaires:

- Request participation in advance to sending questionnaire.
- State the purpose of the survey and the reasons for participation
- Declare the terms of confidentiality
- Allow enough time for prospective respondents to complete the survey
- Provide clear instructions on how to complete questions
- Make the survey clear by design, space sections on different pages, etc.
- Send reminders during the response period
- Offer incentives, such as gift certificates, coupons, etc. and/or offer to share the results of the study

These points were scrutinised further to try and assess where the failures derived, and what measures could be implemented in future studies to reduce this type of failure.

6.2.2.1. Incentives

Incentives can significantly improve the response rate of a survey (Hare, Price, Flynn, & King, 1998) and they do not need to be huge sums of money. In fact they can be as little as

$0.25 in order to show significant improvements (James & Bolstein, 1990) though the greater the value, the higher the quality of answers.

In stark contrast to this, it can sometimes be the case that incentives can in fact dissuade respondents from taking part. Sax, Gilmartin, and Bryant (2003) noticed a 14% decrease in respondents over web-based questionnaire without incentives. This phenomenon is supported by Coogan and Rosenberg (2004) who found that younger age groups may be induced with feelings of goodwill towards the survey through small monetary incentives and participation increased, while older age groups tended to be more insulted and participation dropped.

James and Bolstein (1990) agree that incentives are not necessarily beneficial. They maintain that so long as the target group is sufficiently well-educated and the topic is of great interest to them, then a satisfactorily high response rate can be achieved.

6.2.2.2. Follow up letters

Follow up letters, or reminders, also play an important role in boosting the response rate (Cobanoglu, Warde, & Moreo, 2001; Hare et al., 1998) and should be sent along with replacement questionnaires (James & Bolstein, 1990)

James and Bolstein (1990) cite studies indicating incentives to be significant only where no follow-up reminders are sent out (Kephart and Bressler, 1958), and also where the response continue to increase proportionately after the third follow up (Goodstadt, Chung, Kronitz, and Cook, 1977).

6.2.2.3. Conclusion

Offering incentives (monetary or non-monetary) and adopting a policy of follow-up correspondence both have the potential to yield an increase in response, though the inclusion of both techniques will likely produce the best results. (James & Bolstein, 1990). The conflicting evidence has one common element, the inclusion of these techniques will at worst, have no significant effect, while at best will significantly improve response.

6.2.3. Medium of survey administration

Survey type data collection can be administered in four ways; web, paper, face to face and telephone based. In order to reach the greater audience it may be necessary to utilise any one, or a combination of some or all of them (Dillman, 2011).

6.2.3.1. Web-based

It is generally accepted that web based survey techniques are cheaper to facilitate and provide time savings over postal dependant versions (Cobanoglu et al., 2001; Dillman, 2011; Zhang, 2000)

Cobanoglu et al. (2001) concluded from their study into mail, fax and web surveys, that whilst web based methods were far superior to mail varieties in terms of response time, fax surveys were superior still. The average response time for web surveys was 5.97 days, as opposed to 4 days for fax and 16.46 for postal versions.

Whilst the web-based approach has several great advantages, it also has some potential shortcomings for consideration. One of these would be the risk of increasing bias due to unique factors concerning the web-based approach. For example internet access may not be equal over a range of social groups. (Zhang, 2000) or not even available at all to some (Sax et al., 2003)

Security and data integrity are listed by Sax et al. (2003) as also being key to participation. Respondents are often suspicious of online forms of administration and hold concern regarding confidentiality issues, especially where subjects surrounding employment are discussed.

Consideration should be taken regarding the access target respondents have to the internet and how often they will be able to access the survey. The internet is becoming more widely used every year but longer response times can be expected depending on certain demographics (Cobanoglu et al., 2001; Sax et al., 2003)

6.2.3.2. Paper-based

'Paper and pencil' surveys are generally regarded as being the means to retrieve the greater response rate as opposed to online varieties (Sax et al., 2003) but their delivery is a factor which often reduces their effectiveness. Where respondents are responsible for returning them by post there is a tendency for lower response rates and slower response times (Zhang, 2000) though this does not necessarily indicate that this method is less fruitful (Sax et al., 2003)

Sax et al (2003) found that paper based surveys to yield better responses to web based, though the greatest of all was obtained from the inclusion of both options. When this is the case, up to 80% would choose web-based over paper format (Zhang, 2000)

6.2.3.3. Face-to-face and telephone interviews

There is a lot of literature comparing the benefits of face-to-face interviewing techniques for questionnaire led data gathering, the bulk of which depicts face-to-face method as being superior. The main reason for this seems to be the lack of visual cues and non-verbal pointers available to telephone interviewers (Aquilino, 1994). Also playing their part are the aspects of lower response rates and shorter participation times, resulting in less 'richness' in the content (Novick, 2008).

Whilst there is much acceptance of existence of these factors, there is also considerable data to suggest that despite these restrictive potential, telephone interviews do not yield any less quality data (Carr & Worth, 2001). In fact Hopper (1992) claims that telephone techniques can often lead to respondents opening up a little more and disclosing thing they may not feel comfortable doing in a face-to-face environment..

Face-to-face and telephone interviews are seen as the ultimate in qualitative data gathering though, as opposed to the indirect methods like web and paper based approaches.

6.2.3.4. Conclusion

The tendency of web-based surveys to yield less response than paper based may be partly attributed to the fact that less time and resources have been invested into the development of techniques to promote web survey response (Kaplowitz, Hadlock, & Levine, 2004).

Sax et al. (2003) indicate that from their experience, web based questionnaires can easily give the miscomprehension of being longer and bulkier than the paper equivalent. One comparative study included a four page paper version which correlated to a thirty two screen web version.

Conclusions can be drawn that the optimum questionnaire format should be dependant of the bespoke nature of the environment they are to be introduced to. Qualitative surveys would benefit best from a paper or web based approach, whilst the richest qualitative data is often best sought through personal interview methods such as face-to-face and telephone conversation.

Incentives are altogether dependant on the target group. They need not be of great value though they may prove to have no effect at all on the outcome of the exercise.

6.2.4. Construction of questions

The physical construction of the survey can be of great importance to its success. Questions have several variable components, dependent on the type of response the researcher is aiming to retrieve. They can be objective or subjective, open-ended or close, leading, loaded or purposefully misleading. Leading and loading questions should be avoided if validity is to be maintained.

Response formats as with question types, may also take on several forms. Dichotomous answers (yes or no) have a tendency to lack in elaboration and therefore relevancy (Texas, 2011) Alternatives include multiple response (tick all that apply), Likert scale (equally-spaced intervals, usually 3 to 9 choices) and graphical rating (can mark any point on a continuous scale).

When constructing questionnaires it is also important to take into consideration the relevance of the questions to the actual study. Assumptions made about certain prequalification can render some approached unusable in the final analyses. Dual questioning can also make questions misleading and less valid.

Structure of questionnaires should be clear and comprehensible with attention being given to arrangement and flow.

6.2.5. Construction and format of survey

Questions and the arrangement of them into sections can be done in such a way as to create trust, increase reward, reduce social costs and enthusiasm from respondents, which can, in turn, increase both the response rate as well as the quality of data received (Dillman, 2011). In addition, Downes-Le Guin et al (2012) expand these social costs and burdens to be dependent on survey length, topic salience, cognitive burden (from badly written questions) and the general frequency of survey requests in that particular target area. (Bruce & Chambers, 2002) also comment on the implications of badly written surveys, emphasising the need to appropriate proper planning, preparation and attention to detail.

6.3. Analysis of the methodology

The medium of data gathering was felt to be seriously limited due to the language barrier encountered in researching behaviour in a foreign country (Finland). Face-to-face questionnaires and interviews would rely on English language being used, and may dissuade

a large part of the target group and taint the validity. Instead a written document was compiled, in Finnish language.

Distribution was considered possible by one of two methods, postal or web-based. The web based approach was chosen due to it being inexpensive to target such a vast potential audience.

A request for participation was issued at the beginning of the study, via e-mail and in English language. After a poor response, further requests were made via the LCIF and this time in Finnish. The purpose of the study and its perceived importance were outlined and confidence in its success was highlighted through discussions with LCIF as well as though the positive response to the pilot studies.

The criteria for the completion included quite a lengthy response time of two weeks (extended to three weeks), clear instruction and the promise of complete anonymity to participants, all in line with the recommendations outlined in the extended literature review of questionnaire success.

The questionnaire itself had been carefully compiled, with consideration to length and ease of understanding given. The format, completion time and ease of understanding were given consideration through the pilot study, were participants were asked to give consideration to: Clarity of the instructions, clarity and quality of the questions, which needed most consideration, the scales and type of questions used, their measurability and the length of the questionnaire. The response from the pilot studies did indicate a feeling that there were a lot of questions to get through but comments also indicated that all of them were relevant and would yield valuable data. It was therefore decided only to remove two from the final version.

Likert scale was used for the majority of questions so as to provide a quick, consistent and simple format so not to discourage respondents too much by the length of the survey.

Open ended questions were restricted to just one. Again, this was intended to encourage more participation whilst allowing for more questions.

Once completed, requests including web links were sent out to contacts along with cover letters explaining instruction, the purpose of the study, details of rewards for participation and a declaration of confidentiality.

Reminders were sent out mid-way through the second week, though structured plan was made for reminding participants.

6.4. Conclusion

The analysis of the methodology in comparison to the literature available would indicate that (according to the literature) most of the criteria for success had been met, with the exception of one or two points.
Participation could have been confirmed well in advance, and before distribution of the survey. A failure to gain support may have been an indicator for realignment of the whole study.
More time should not have been important, according to the literature, though the realisation of the failure did manifest beyond the point of no return, indicating that contingencies should have been planned in case of such an event.
Alternative means of delivery would have incurred an expense which was just not available in this research. Further study may benefit from financial funding for this aspect.

- Time was short due to late start, in turn due to closure of industry for the summer.
- Questionnaire may be best distributed via post, though the means to determine the prospective or willing audience would be something to be determined through web means.

The response rate of those who viewed the survey indicated an overall high return rate, and therefore not warrants reducing the number of questions contained. Perhaps the reason for contacts failing to pass on the request to employees was influenced by the high content though. Without approaching those contacts it is difficult to assess this question.
A further study may benefit from face-to-face contact for the purpose of securing participation.

CHAPTER 7: CONCLUSIONS

From the outset of the data analysis part of the research it was obvious that due to the poor response rate, the validity of any findings and conclusions would be somewhat dubious at best. That being said, indicators were noted for the benefit of speculation and the recommendation of further study. The software used in collecting data did provide an indication of how many persons viewed the survey and from a total of four viewings, 3 responses were received. A 75% response rate is regarded as being in excess of sufficient for data validity, even if the total response (three) is not. This indicates that further attempts using the same method could be justified.

From the analysis of the survey response it was possible to determine a strong indication that there is a direct relationship between lean commitment and employee engagement in the Finnish construction industry.

Certain aspects and criteria had different emphasis for different respondents but the overall levels were conclusive.

Increased levels of commitment to lean were reflected in the levels of engagement though it was not possible to ascertain whether it was engagement which increased lean, or vice versa. For this it would have been necessary to investigate and compare organisation which had not already introduced a lean model. This could be recommended as the topic for future research.

Though levels of engagement appeared to be the same in both males and females (in contrast to the predictions of Truss et al (2006), the level of commitment to the introduction of the lean philosophy into the organisation was found to be higher in the female respondents. It was also noted that out of twelve requests sent to companies, ten of the contacts were male and two were female. Of the responses received, only one was male and two were female. This could be seen as a 100% return from females against only 10% from males. It could be concluded from this aspect that in order to successfully introduce lean mechanisms, female management should be introduced first. Recommendations for further study may include investigation of these findings.

In order to facilitate a reasonably lean culture it is necessary to commit to a regime of continuous improvement and commitment. Both interviewees indicated a problem with commitment or ‘buying-in’ from the members of the industry in Finland.

The failure of the questionnaire was a little difficult to determine as it was not possible to contact those who took part (or didn’t) at the request of LCI Finland. The successful piloting would suggest that the problem could lay with the attitude of respondents or the intermediate

contacts. The three responses that were received all came from higher management personnel indicating that perhaps the request to pass the survey down the line to lower level employees had been misunderstood, limiting the potential response to the twelve contact persons only. Hofstede's (1983) categorisation of Finland being an individualistic nation may have some bearing of the lack of response. This type of culture requires commitment to a bigger picture and if participation does not promise the necessary return of investment then it is likely that cooperation will be withdrawn.

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APPENDIX A: Questions for survey (categorised)

Cornerstones of lean	what to measure?	Question
Leadership	Commitment from management	I believe that management support the implementation of lean within the company.
	Long-term outlook	I believe that the company can achieve improvements through the use of Lean.
	Management support	Management encourage the development of employees.
		Management is supportive when problems arise that are beyond my control.
		Employees are made to feel comfortable discussing problems regarding work practices with management.
		I have been supported in developing new skills required work in a lean environment
	Guidance	Management listen to the input of employees and value their opinions
People	Chemistry	I enjoy working as part of a team
		I am a good team player
	Understanding	
	Quality personnel	We have all the necessary skillsets within our team
	Selection (building teams)	My department functions well as a team
		It is common for employees in my department to solve problems together as a team.
	Social Skills	I enjoy the company of my colleagues.
		I socialise with my colleagues outside the workplace.
	Collaboration	My colleagues are supportive when problems arise with my work.
		I sometimes ask the advice of colleagues concerning my own work
	other actors	Partner companies (suppliers, sub-contractors, engineers

		etc.) can be relied on to fulfil their commitments on time.
		Partner companies can be relied on to fulfil their commitments to a satisfactory quality.
		Partner companies feel they can rely on us to complete work on time.
Trust	Contracts	I believe partner companies, such as suppliers and subcontractors, have the necessary skills and understand to promote lean concepts within our projects..
		Partner companies are competent in their operations
	Behaviour	I sometimes ask the advice of colleagues concerning my own work
		I am comfortable discussing problems regarding work practices with my colleagues.
		I feel I can rely on my colleagues to fulfil their roles effectively.
		The company has an employee engagement/sustainability plan which I am aware of.
Competence (lean)	Understanding of lean	Could you offer 3 - 5 words which you associate with lean practices?
	Training	I could perform my duties better if given more training
		I have been supported in developing new skills required work in a lean environment
		I am overqualified to perform my assigned role.
	Lean champion	I believe that management demonstrate a good understanding of lean construction and how it should work.
		I believe that management have the ability to successfully implement the use of lean tools.
	Involvement (employee)	Management transfer adequate decision making responsibility onto employees in order for them to perform their duties independently.
		I am comfortable with the level of responsibility I am

		expected to handle in my work.
Motivation	Rewards	I believe that introducing lean principles to the organisation will benefit me personally.
	Results (low-hanging fruits)	My salary is in line with the industry average (or higher) for my position.
		My work is stimulating.
	Customer value	Problems at work have been reduced since the introduction of the lean management system
		I believe that the company can achieve improvements through the use of Lean.
	Outside influence	I sometimes attend training that is not useful in my work
Conflictual harmony	Reliability	Employees are sometimes left waiting for work to be completed by others before I can begin my work.
		I sometimes miss my own deadlines.
	Trust (interpesonnel)	I am comfortable discussing my mistakes with colleagues at work
	Respect	Management treat employees with respect.
		There is a sense of competition between members of our team.
		There is a degree of competition between our team and other departments within the organisation.
		I believe this competition within the organisation is healthy.
	Security	Have you ever witnessed any abuse or harassment towards any employees at work (yourself included)?
	Resolution	I am familiar with the conflict resolution procedure within the company.
		I would feel comfortable approaching my superiors regarding conflict between myself and other employees.
		I feel safe at work.
Acceptance of change	Commitment	I would be happy to change the team I work with as part of the company development.
	Buying-in	I am interested in working with the lean system

	Understanding	I am happy to learn new skills in order to help implement the new system.
	Belief	I believe that the company can achieve improvements through the use of Lean.
		I believe lean techniques will improve the success of the organisation.
Drivers of engagement	**what to measure?**	**Question**
Satisfaction	Satisfaction with presonal lives	I always use up my full quota of annual leave.
	Challenging work	I am overqualified to perform my assigned role.
	Involvement in decisions	Management listen to the input of employees and value their opinions
		Management transfer adequate decision making responsibility onto employees in order for them to perform their duties independently.
Enthusiasm	Shared goals	I believe that the company can achieve improvements through the use of Lean.
		I believe that management support the implementation of lean within the company.
	Fairness	I am unhappy with my level of salary.
		Management treat employees with respect.
		If I do work overtime, I am satisfied with the level of compensation I receive.
	Acheivement at work	I believe that I contribute to the success of the company
	Camraderie	I sometimes ask the advice of colleagues concerning my own work
		I enjoy the company of my colleagues.
		I socialise with my colleagues outside the workplace.
		I enjoy going to work.

		Some of my colleagues put in less effort to their work than me.
		My work is stimulating.
Awareness (Why)	understanding of needs (company)	I understand why the organisation needs to adopt the new lean management system
		I believe that the company can achieve improvements through the use of Lean.
		I understand that some procedures used in the organisation are wasteful and inefficient use of resources
Understanding (how)	Where are you going	Do you understand what changes need to be made in the organisation?
		Could you offer 3 - 5 words which you associate with lean practices in your organisation?
	How are you getting there?	Do you understand how these changes are going to be implemented?
		I could perform my duties better if given more training
Motivation	Responsible for success	I believe that I contribute to the success of the company
	Connection to the organisation	I plan to continue my career within the company for at least a further 2 years.
	Incentives	My salary is in line with the industry average (or higher) for my position.
		My annual leave is in line with the industry average for my position
		I feel that the performance bonus scheme works well.
		I am satisfied with the additional benefits included in my package
	Recognition	My contribution to the project is valued by my colleagues.
		My contribution to the project is valued by senior management.
		I am given enough recognition for my work.

		My work is meaningful.
		There is the opportunity for promotion within the company.
	Improvement	What single change would you make in your working life?
Commitment & Loyalty	Belief in the bigger picture (buying in?)	I would recommend employment within the company to a friend.
	Going the extra mile Satisfaction	I frequently work more than the hours agreed in my contract.
		I would be prepared to work more overtime hours if needed.
		I sometimes complete work at home in order to meet deadlines.
		I feel that I often 'go the extra mile' in order to complete my tasks.
	Looking ahead	I believe my position is secure for the long term (up to 5 years).
		Management are interested in my well-being

APPENDIX B: Introduction letter (English)

The positive effects of employee engagement on the implementation of a lean culture within construction organisations in Finland

Research Survey

I am conducting research on the implementation of lean[1] methodology in the construction sector and its links to employee engagement. I hope to retrieve sufficient data concerning organisational culture from selection of organisations to prove or disprove my initial hypotheses that:

a) The implementation of lean culture has a positive effect on the promotion of employee engagement within the organisation, and
b) Engaged employees promote the implementation of lean culture within the organisation.

I had hoped that you could help me in my data collection by passing on the online questionnaire to a number of employees within your organisation, asking them to provide an honest and thorough response.

Your company's participation in this study may go some way in helping to improve your organisation as well as the construction industry in general.

I am hoping to gather information from all aspects of the construction process including but not limited to foremen, office personnel, engineers, supervisors and management.

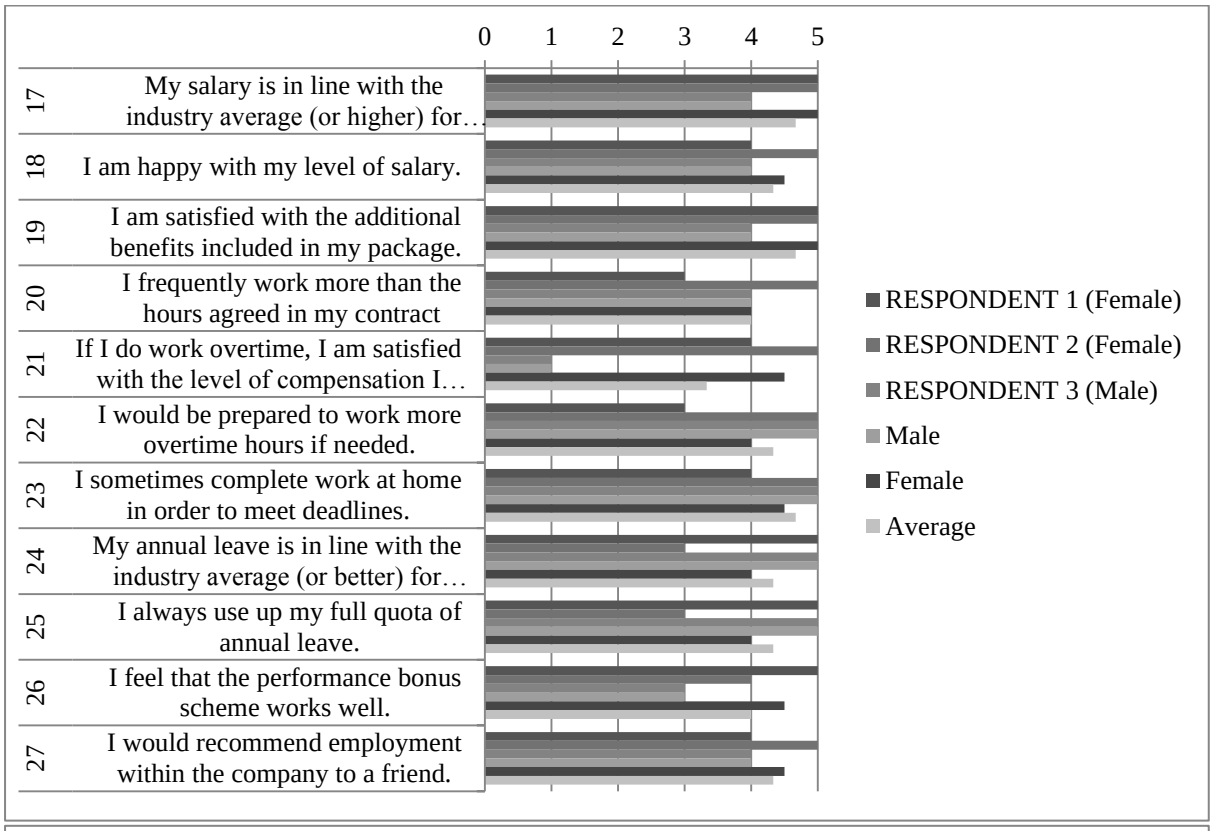
The findings of my report will be made available to your organisation after completion. Any incriminating details will be withheld and approval from you will be requested before publication.

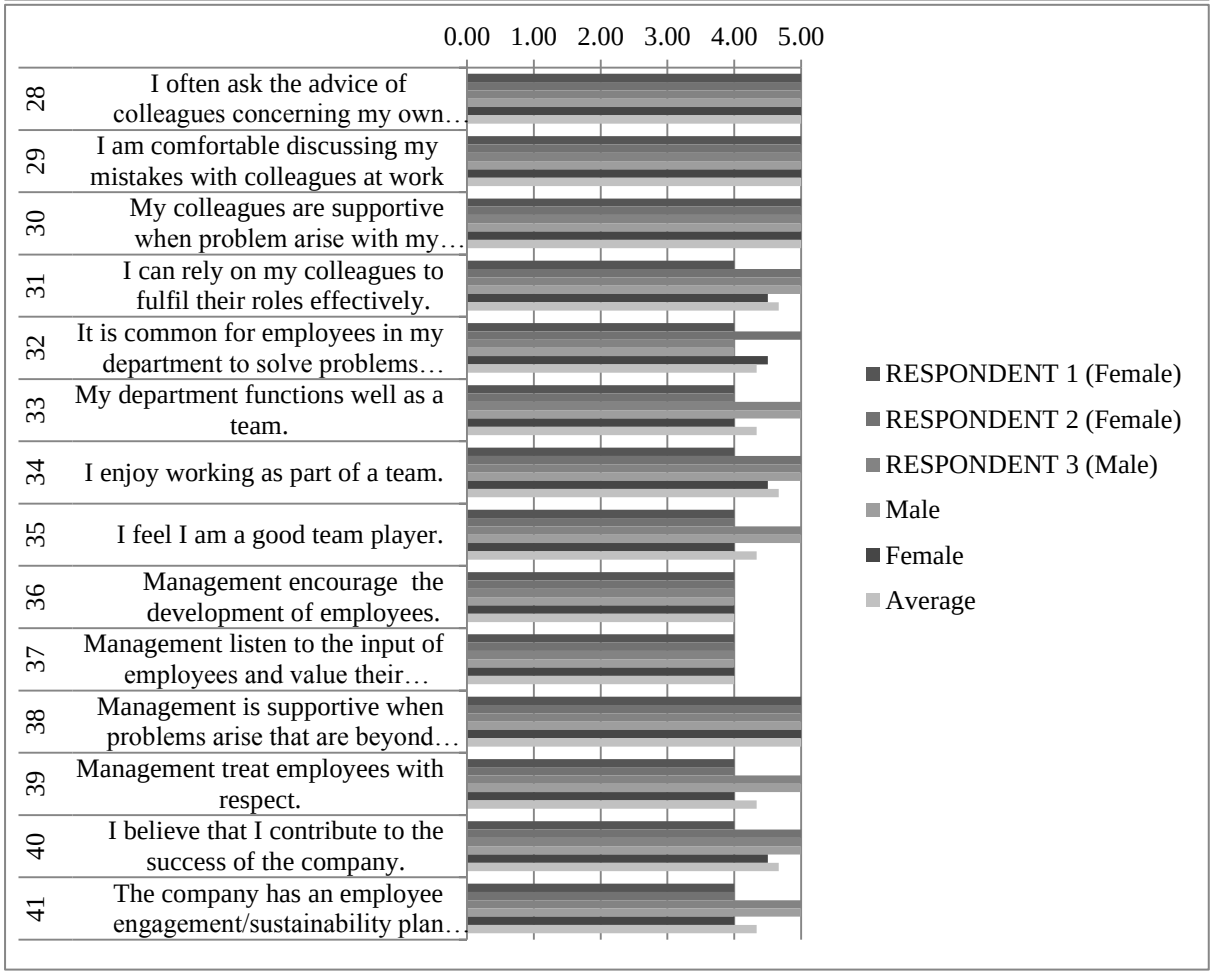
You may also assure your employees that all participants of this survey will remain 100% anonymous. The survey data collection service does not attach e-mail sources, IP addresses nor URL roots to the responses.

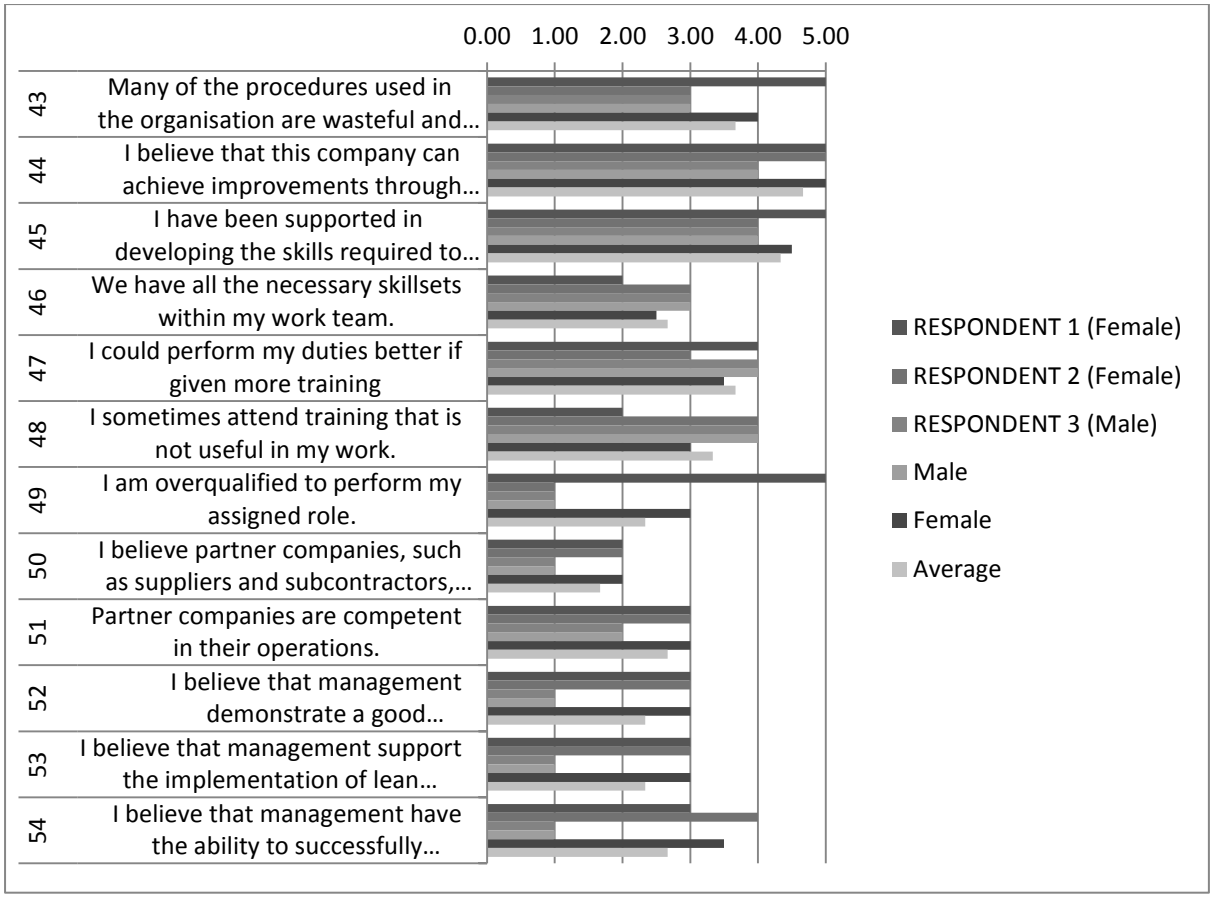
As my research involves no external funding I am unable to offer payment for individual participation, however I am offering a €50 lottery prize to one participant drawn at random from the list of responses. Respondents may refer to the final question for details.

Many thanks for your help and co-operation.

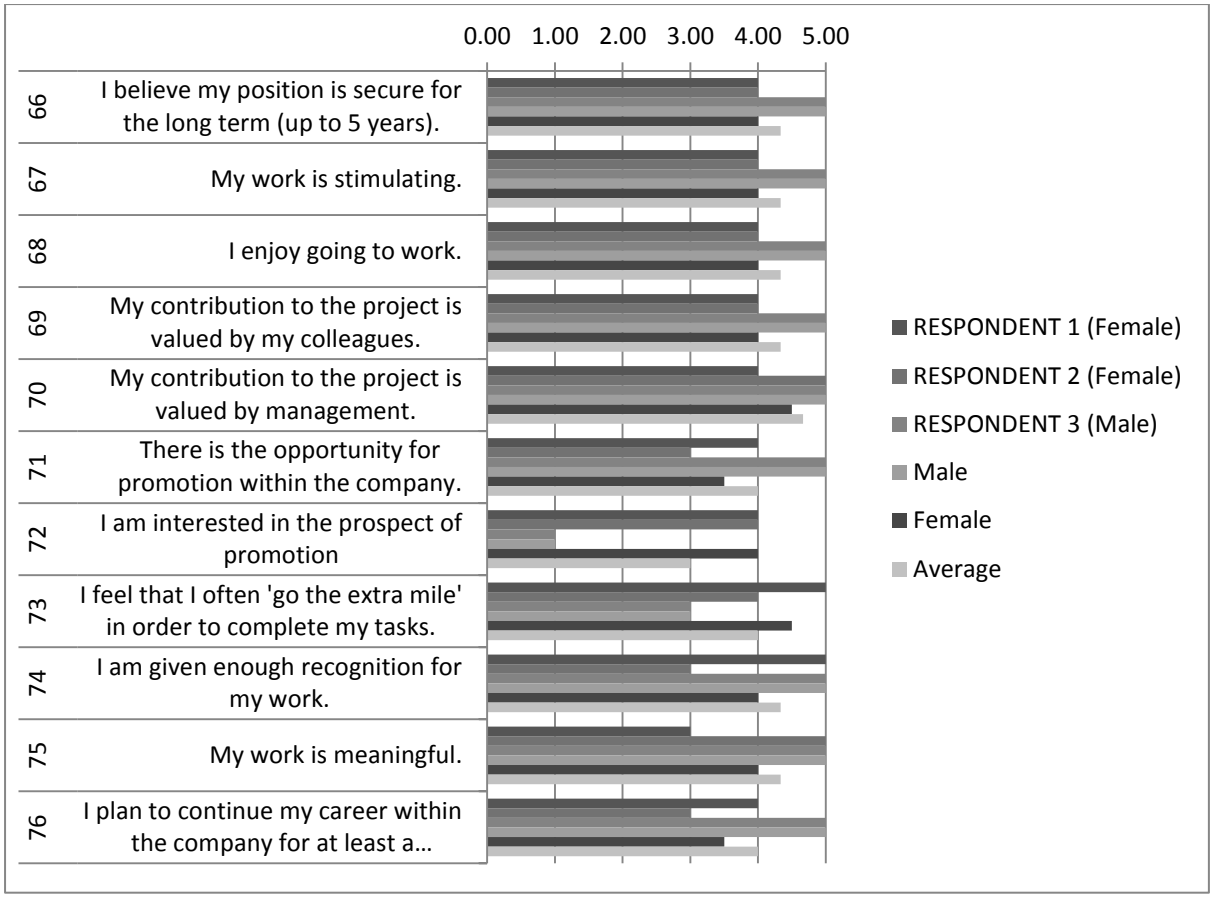
APPENDIX C: Questionnaire response data

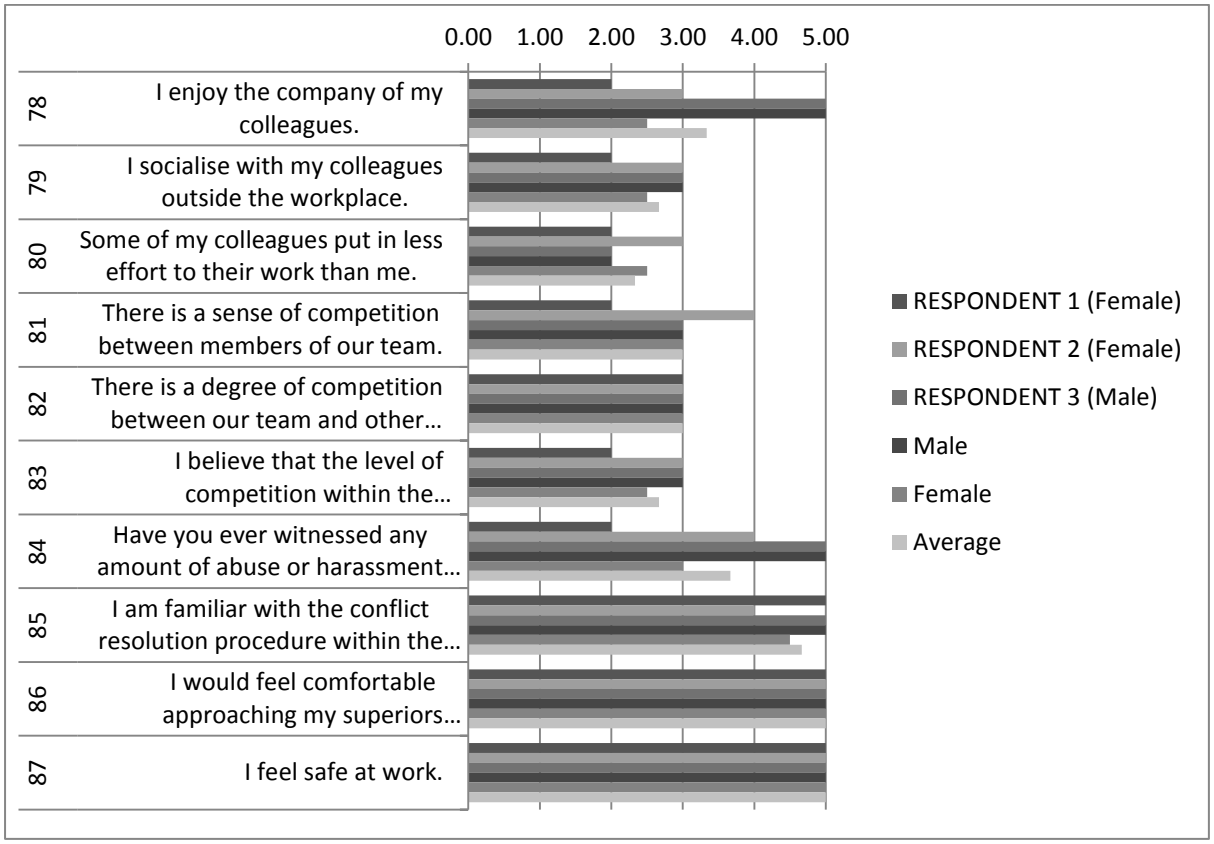


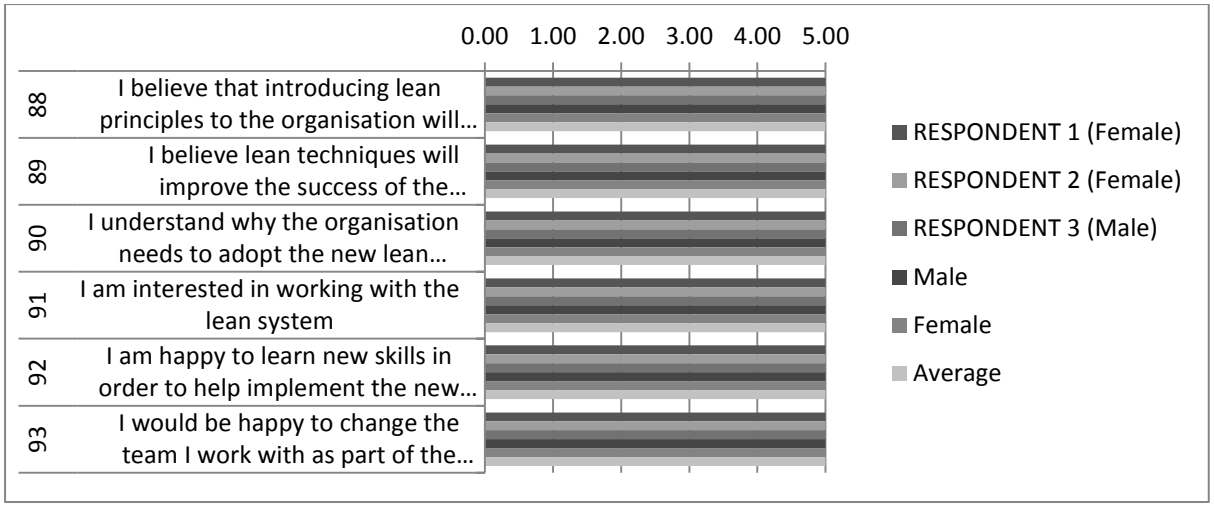



0.00 1.00 2.00 3.00 4.00 5.00
43 Many of the procedures used in the organisation are wasteful and…
44 I believe that this company can achieve improvements through…
45 I have been supported in developing the skills required to…
46 We have all the necessary skillsets within my work team.
47 I could perform my duties better if given more training
48 I sometimes attend training that is not useful in my work.
49 I am overqualified to perform my assigned role.
50 I believe partner companies, such as suppliers and subcontractors,…
51 Partner companies are competent in their operations.
52 I believe that management demonstrate a good…
53 I believe that management support the implementation of lean…
54 I believe that management have the ability to successfully…
RESPONDENT 1 (Female)
RESPONDENT 2 (Female)
RESPONDENT 3 (Male)
Male
Female
Average


0.00 1.00 2.00 3.00 4.00 5.00
55 Management transfer adequate decision making responsibility…
56 I am comfortable with the level of responsibility I am expected to…
57 I am comfortable discussing problems regarding work…
58 Employees are made to feel comfortable discussing problems…
59 Employees are sometimes left waiting for work to be completed…
60 I occasionally miss my own deadlines.
61 Partner companies (suppliers, sub-contractors, engineers etc.) can…
62 Partner companies can be relied on to fulfil their commitments to…
63 Partner companies feel they can rely on us to complete work on…
64 Management is supportive when problems arise
65 Management are interested in my wellbeing.
RESPONDENT 1 (Female)
RESPONDENT 2 (Female)
RESPONDENT 3 (Male)
Male
Female
Average


0.00 1.00 2.00 3.00 4.00 5.00
66 I believe my position is secure for the long term (up to 5 years).
67 My work is stimulating.
68 I enjoy going to work.
69 My contribution to the project is valued by my colleagues.
70 My contribution to the project is valued by management.
71 There is the opportunity for promotion within the company.
72 I am interested in the prospect of promotion
73 I feel that I often 'go the extra mile' in order to complete my tasks.
74 I am given enough recognition for my work.
75 My work is meaningful.
76 I plan to continue my career within the company for at least a…
RESPONDENT 1 (Female)
RESPONDENT 2 (Female)
RESPONDENT 3 (Male)
Male
Female
Average


0.00 1.00 2.00 3.00 4.00 5.00
78 I enjoy the company of my colleagues.
79 I socialise with my colleagues outside the workplace.
80 Some of my colleagues put in less effort to their work than me.
81 There is a sense of competition between members of our team.
82 There is a degree of competition between our team and other…
83 I believe that the level of competition within the…
84 Have you ever witnessed any amount of abuse or harassment…
85 I am familiar with the conflict resolution procedure within the…
86 I would feel comfortable approaching my superiors…
87 I feel safe at work.
RESPONDENT 1 (Female)
RESPONDENT 2 (Female)
RESPONDENT 3 (Male)
Male
Female
Average


0.00
1.00
2.00
3.00
4.00
5.00
88
I believe that introducing lean principles to the organisation will…
89
I believe lean techniques will improve the success of the…
90
I understand why the organisation needs to adopt the new lean…
91
I am interested in working with the lean system
92
I am happy to learn new skills in order to help implement the new…
93
I would be happy to change the team I work with as part of the…
RESPONDENT 1 (Female)
RESPONDENT 2 (Female)
RESPONDENT 3 (Male)
Male
Female
Average

APPENDIX D: Telephone interview questions

Lean

1) Do you use the term lean?
    a. How do you refer to it then?
2) How do you understand lean? Could it be put into one or two sentences?
3) What is the most important aspect of a lean culture? Where do you focus?
    a. Harmony of the individual
    b. Team building (internally)
    c. Collaboration (between partners)
    d. Planning
    e. Continual improvement
    f. Other
4) Which lean tools have you tried? To what success?
    a. Last Planner, Alliancing, 5s, Visualisation, Built in quality, Other
5) Where did the initiation come from?
    a. Board level, Senior management, Middle management, External, client stipulation
6) Lean gurus/champions and change agents, do you have your own or contract outsiders?
7) Do you provide initial training or on-going training?
8) How is training facilitated? Is it internal or external? Is it always optional?
    a. Handpicked as per need, i.e. by lean champions
    b. Employees choose
    c. Departmental participation
    d. Other
9) Do you bring in outsiders? Based on their specific lean experience?

Engagement

1) How do you view employee engagement within your organisation?
    a. Is it important
    b. Is there an engagement policy
    c. Are you satisfied that it is enough?
2) How do you promote trust within your organisation?

3) How transparent is the organisation? Internally and externally
    a. Wages? (is there equality)
    b. Holidays?
    c. Profits?
4) Extra-curricular activities? Social functions?
    a. Team building exercises?
    b. Pikkujoulu? (Christmas party)
    c. Social functions?
5) Motivation, what mechanisms are in place?
    a. Bonus?
        i. Performance related bonus scheme?
        ii. Profit share?
    b. Career development?
        i. Career path training, working towards employee's goals rather than org's?
        ii. Promotion?
        iii. Loyalty pay scale?
    c. Recognition
        i. Is there a formal scheme for recognition, ie annual awards, etc.
    d. Employee feedback system?
6) Competition within the company/department
    a. Who
    b. Is it encouraged or should there be no losers? Only winners
7) Fairness and grievance
    a. Is there a common grievance regarding the introduction of the Lean System
    b. Employee turnover/absenteeism?

APPENDIX E: Follow up questions regarding the survey

1. Distribution
    a. Did you feel the initial contact worked well?
    b. Did it take a second attempt to get your attention?
2. Layout of the questionnaire
    a. Did the presentation of the survey look professional?
    b. Was the percentage completion bar a good thing?
    c. Was the language understandable and proper?
3. Introduction page
    a. Did you find the cover page to be clear and understandable?
    b. Did it include all necessary information?
    c. Were the instructions clear?
    d. Did you feel the response period was long enough?
    e. Did the criteria fit with your company? i.e. use of Last Planner & Alliancing in last 6 months.
4. Questions
    a. Did you feel any of the demographic questions were unnecessary?
    b. Did you feel uncomfortable answering any of the questions
    c. Did you feel the scale system worked well with the questions?
    d. Did the open-ended question about lean terms work?
    e. Did you feel there too many questions?
5. Participation
    a. Did it take longer than you anticipated?
    b. Did taking part inconvenience you in any way?
        i. If yes, why did you continue until the end?
    c. Did you forward or recommend to others?
    d. Was the incentive lottery understandable?
    e. Did you think the lottery was a good idea?
6. And finally
    a. Do you feel the survey was missing anything?
    b. Could you offer any suggestions to improve future success?
    c. Do you have any other comments you could make?

APPENDIX F: Correspondence with LCI Finland

RE: Research dilemma

From: **Maila Herrala** (Maila.Herrala@oulu.fi)
Sent: 23 November 2012 08:34:28
To: Michael Wolstenholme (mickwooly@hotmail.com)

Hi Mick,

I'm sorry, but I don't think I can help you with this. I discussed this matter with my colleagues and we agreed that it is not very good idea for you to start calling our company contacts, especially because you are not employed by our university and this project. Sorry.

And now, I'm running out of power and time to help you :(. Next week is my last week at the university.

How many answers have you got? Not enough I guess.

Did you consider making just an extensive literature review for your dissertation? Would that be acceptable?

Maila