

# The Effects of Lean Management on the Tension between Exploration and Exploitation in SMEs

Christian Alexander Borrèl  
University of Twente  
P.O. Box 217, 7500AE Enschede  
The Netherlands

c.a.borrel@student.utwente.nl

christian\_borrel@hotmail.com

The tension between exploitative innovation and explorative innovation is a result of a firm's need to be efficient on the short-term and flexible on the long-term. It has become increasingly important that a firm needs to pursue both innovation types to create sustainably superior performance. A lot of research has already been done on how larger firms can deal with this tension. However, still little is known on how SMEs, which are relatively constrained by its resources efforts and attention, can best deal with this tension. Moreover, this research did not focus on randomly selected SMEs but on SMEs engaged in lean management. This, because it is suggested that SMEs engaged in lean management will focus on increasing efficiency within the organization and along the value stream of its products by pursuing exploitative innovations. The aim of this research was therefore to find out what the effects of lean management are on an SMEs behavior in relation to the tension, and how an SME engaged in lean management can best achieve sustainably superior performance. This research conducted questionnaires and interviews at five SMEs engaged in lean management to test hypotheses derived from the current literature. The findings of this research suggest that the current literature is incomplete in the constraints that an SME faces in its decision on how to deal with this tension. In addition, the findings suggest that current literature is incorrect in generalizing entire SMEs engaged in lean management by exploitative characteristics. Furthermore, this research suggests how SMEs engaged in lean management can best achieve sustainably superior performance.

**Supervisors: Sandor Löwik and Petra Hoffmann**

## **Keywords**

Explorative innovation; Exploitative innovation; Contextual ambidexterity; Structural ambidexterity; Punctuated equilibrium; Lean management; SMEs

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## 1. INTRODUCTION

Explorative and exploitative innovations are two different innovation types, pursuing different activities, resulting in different performances, and helping a firm to achieve different goals. Explorative innovation activities are associated with flexibility, search, variation, experimentation, discovery, decentralization and loose cultures, whereas exploitative innovation activities are associated with efficiency, refinement, selection, improvement, centralization and tight cultures (Chang, Hughes and Hotho, 2011; He and Wong, 2004; Jansen, Tempelaar, van den Bosch and Volberda, 2009). In other words: exploitative innovation involves the exploitation of old certainties, whereas explorative innovation involves the exploring of new possibilities (March, 1991; He and Wong, 2004). In addition, it is important to know that explorative innovation activities generate larger performance variation as it experiences success and failure, whereas exploitative innovation activities generates a more stable performance (He and Wong, 2004; March, 1991). Furthermore, explorative innovations are said to provide a firm with long-term flexibility as it provides the firm with new products to diversify its product portfolio in the future, whereas the exploitative innovations are seen to provide a firm with short-term efficiency as it aims to improve the firm's current product portfolio.

However, a firm needs efficiency on the short-term to stay alive, whereas a firm needs flexibility on the long-term in order to survive. Due to this, there is a tension between the two different innovation types. Larger firms have relatively high resource availability to pursue both innovation types and assure the firm of short-term efficiency and long-term flexibility to let the firm stay alive on the short-term and survive in the long-term. Small and medium-sized enterprises (SMEs) are fundamentally different compared to larger firms, especially when looking at the resource availability (Chang et al., 2011). SMEs are relatively resource constraint, and are therefore found to have problems with pursuing both innovation types at the same time to become efficient on the short-term and flexible on the long-term. Because of that, SMEs pursue most of the time one of the two innovation types, which results in being either efficient on the short-term or flexible on the long-term. In addition to this, SMEs that are engaged in lean management are focused on increasing efficiency within the firm and along the value stream of its products. It can be said that SMEs engaged in lean management are therefore focused on pursuing exploitative innovation activities as those result in innovation that help the firm to increase efficiency and consequently become lean.

The tension between explorative and exploitative innovation activities has become increasingly important as it is suggested that a firm needs to learn how to reach a balance between the two types of innovation in order to achieve 'sustainably superior performance' (Chang et al., 2011; Raisch, Birkinshaw, Probst and Tushman, 2009; Jansen et al., 2009). Sustainably superior performance can only be achieved if a firm is successful in the short- and long-term, meaning that it needs to be efficient on the short-term and flexible on the long-term. The aim of this research is therefore to find out how SMEs that are engaged in lean management can deal with the tension between explorative and exploitative innovation activities, in order to be efficient on the short-term and flexible on the long-term. The research question is therefore:

*How can lean thinking SMEs deal with the tension between explorative and exploitative innovation activities, in order to achieve sustainably superior performance?*

Current literature has been focusing too much on how larger firms can deal with the tension. This research will focus solely on how SMEs can deal with the tension. Nevertheless, some research has already been done on how SMEs deal with the tension between exploration and exploitation, but not how lean management influences the decision on how to deal with the tension. The relevance of this research is that it will investigate the effects of lean management on an SMEs behavior in relation to the tension between exploration and exploitation in order to achieve sustainably superior performance. To investigate how an SME can pursue an innovation strategy to achieve sustainably superior performance, there are internal factors and external factors that need to be analyzed, as these are affecting a firm's decision on how to deal with the tension between exploration and exploitation. The internal factors are on its turn affected by the SMEs' engagement in lean management. **Figure 1** (see appendix 1) provides the conceptual framework for this research, of which the concepts will be reviewed in the following sections.

Based on the reviewed literature, hypotheses will be formulated and tested by means of a questionnaire and an interview conducted at five SMEs throughout the Netherlands. The hypotheses that will be formulated are based on contradictions in the current literature on how firms can deal with the tension between exploration and exploitation. Because of this, the hypotheses in this research are also contradicting to each other. The reason for this is that the aim of this research is not to test the hypotheses on themselves, but to look at the reasons why each of the cases is validating or invalidating the hypotheses and the reasons why. Therefore, the interviews are used as clarifications on the outcomes of the questionnaires. To concluded, the purpose of this research is to look for explanations why the current literature is contradicting on the concepts that are being reviewed, since no clear explanations are to be found in the current literature so far.

## 2. THE TENSION

Explorative and exploitative innovations are to be seen as two fundamentally different innovation activities that lead to firms focusing all their resources, efforts and attention on one form or the other (Chang et al., 2011; He and Wong, 2004), or balancing their resources, efforts and attention in such a way that both activities can be pursued simultaneously or through temporal cycling between the two different innovation types (Gupta, Smith and Shalley, 2006). If a firm wants to focus its resources efforts, and attention on one of the two innovation types, it will focus and specialize on either explorative or exploitative innovation activities within a single organizational innovation unit (i.e. *focus strategy*). However, a firm might want to balance its resources, efforts and attention to achieve sustainably superior performance (i.e. *balancing strategy*) (Chang et al., 2011; He and Wong, 2004).

A firm pursuing both innovation activities simultaneously is seen as 'ambidextrous' (Gupta et al., 2006; Raisch et al., 2009). This means that a firm exploits its existing products and technologies while at the same time explores for new products and technologies. Ambidexterity can take two forms: it can differentiate between exploration and exploitation tasks into distinct organization units (i.e. *structural ambidexterity*), or integrate exploration and exploitation tasks within the same organizational unit (i.e. *contextual ambidexterity*) (Raisch et al., 2009; Gibson and Birkinshaw, 2004). Nevertheless, He and Wong (2004) suggest that the benefits of an ambidextrous firm can be limited for two reasons. First, an ambidextrous firm pushing both innovation activities to extreme limits can result in the inability of managing both innovation activities

successfully. Second, an ambidextrous firm having very low levels of both innovation activities does not result in sustainably superior performance and should therefore not be regarded as ambidextrous.

In addition, a firm pursuing both innovation activities through temporal cycling between short bursts of exploration and long periods of exploitation is regarded as handling a '*punctuated equilibrium*' (Gupta et al., 2006; He and Wong, 2004). This means that a firm has long periods of exploiting its existing competencies and technologies that are interrupted by short periods of exploring new competencies and technologies. This temporal cycling needs one organizational unit to switch between periods of exploration and exploitation, and therefore switch between different circumstances surrounding the innovation activities. In order to switch between two innovation activities, the organizational unit needs to be flexible in adapting to changing circumstances.

### 3. AFFECTING FACTORS

The conceptual framework presented in **Figure 1** shows that the tension between exploration and exploitation is affected by internal and external factors. The internal factors are the company strategy and the internal organizational antecedents, and the external factors are the external environmental antecedents (Chang et al., 2011; Jansen, van den Bosch and Volberda, 2005; Jansen, van den Bosch and Volberda, 2006).

#### 3.1 Internal Factors

**Company strategy**, is the first internal factor affecting the tension between exploration and exploitation. Miles, Snow, Meyer and Coleman (1978) proposed that there are four strategic organizations, of which one should be seen as a failing strategy. These strategic organizations represent four company strategies which can be pursued. The four types of and their characteristics are:

1. *Defender*: This type of organization is characterized by stability, which is achieved by targeting a narrow market segment in which the organization tries to prevent competitors from entering by competitive pricing or offering high quality products (Miles et al., 1978). The success of a defender is depending on its technological efficiency, whereas the primary risk for a defender is its ineffectiveness to respond to a changing market. A defender devotes a lot of resources to produce and distribute its products as efficient as possible, implying that a defender mainly focuses on exploitative innovations to increase efficiency.

2. *Prospector*: This type of organization is characterized by flexibility, which is achieved by having the current and future product mix (Miles et al., 1978). The success of a prospector is depending on its ability to scan the environment in order to find and exploit new product or market opportunities, whereas the primary risk for a prospector is that of low profitability due to product or market failures and that of devoting too many resources to a certain opportunity at the cost of others. This implies that a prospector focuses mainly on explorative innovations to increase flexibility.

3. *Analyzer*: This type of organization is characterized by balancing the strengths of both the defender and prospector (Miles et al., 1978). The success of an analyzer is depending on its ability to move towards new products or markets after their viability is shown, while at the same time maintaining efficiency in its current stable markets. On the other hand, the primary risks of the analyzer are that of both inefficiency and ineffectiveness (Miles et al., 1978). This implies that an

analyzer needs to balance explorative and exploitative innovations to increase efficiency and flexibility.

4. *Reactor*: This type should however not be seen as an option since it is seen as a strategic failure that only arises when one of the other three strategies is pursued in the wrong way (Miles et al., 1978). The reactor strategy is unable to be pursued for a long time unless an organization exhibits a monopolistic environment, and will therefore eventually result in the pursuit of one of the other three strategies. Due to these reason, the reactor strategy does not imply the focus on one of the innovation types or a balance of both.

In addition to the company strategy, current literature suggests that the internal factors include the internal organizational antecedents (Chang et al., 2011; Jansen et al., 2005; Jansen et al., 2006). These antecedents are:

**Resource constraints**, which can be defined as the degree to which a firm is constrained by all its physical, human, and organization capital resources in order to come up with a strategy and implement it within the firm (Barney, 1991). In order to come up with a strategy and implement it, a firm needs resources such as assets, capabilities, information, knowledge, etc. (Barney, 1991). All the activities that a firm pursues are competing for the firm's resources, logically seen the more activities a firm is pursuing, the more resources it will need and the higher the firm is constrained by its resources.

**Culture strength**, can be defined as either a loose or tight culture (Chang et al., 2011). Culture strength is based on the extent to which values and ideas are shared within firms, and is therefore characterized by the degree of employee '*consensus*' (van den Berg and Wilderom, 2004). In other words: culture strength is the degree to which employees within firms share the same values and ideas.

**Centralization**, refers to the way in which power is distributed among positions within firms and to which extent decision-making is concentrated within the firm (Chang et al., 2011). This antecedent reflect itself in the amount of delegation of decision-making authority happens within organizations, and the extent to which employees are involved in decision-making (Jaworski and Kohli, 1993).

**Connectedness**, which refers to the amount of direct contact employees within a firm have with each other in order to work together (Chang et al., 2011). This direct contact can be formal or informal, and happen within departments or across departments (Jaworski and Kholi, 1993).

**Formalization**, refers to the extent to which rules and procedures are written down and formalized within firms (Jansen et al., 2006). These rules define roles, authority relations, communications, norms and sanctions, and procedures within firms (Jaworski and Kholi, 1993).

**Routinization**, which refers to the extent in which tasks can be sequenced so they need little attention and become consistent (Jansen et al., 2005). Whitey, Daft and Cooper (1983) add to this that routinization is characterized by repetitious tasks, and have lower levels of unexpected events.

**Risk aversion**, referring to the amount of risk that management is willing to take (Jaworski and Kholi, 1993). A higher degree of risk aversion means that management is not willing to take risky actions, but rather take safe actions. A lower degree of risk aversion therefore means that management is willing to take risky actions that might result in higher performance (He and Wong, 2004).

**Adaptability**, which can be defined as the extent to which a firm is able to adjust its strategic plan to adjust to changing circumstances (Barringer and Bluedorn, 1999). A firm with high adaptability is flexible in adapting to changing circumstances, whereas low adaptability means that a firm is more standardized and focused on efficiency (Benner & Tushman, 2003; Jansen et al., 2009).

### 3.2 External Factors

The external factors are according to the current literature the external environmental antecedents (Chang et al., 2011; Jansen et al., 2005; Jansen et al., 2006). These antecedents are:

**Environmental dynamism**, refers to the rate of change within the market and the degree of instability of the external environment surrounding the firm (Jansen et al., 2006). In dynamic environments technological conditions change fast and therefore products become quickly obsolete (Chang et al., 2011). The external dynamic environment of a firm is characterized by technological turbulence and market turbulence (Jaworski and Kohli, 1993).

**Environmental competitiveness**, which can be defined as the amount of intense competition a firms faces in the eternal environment surrounding the firm (Jansen et al., 2006). In high competitive environments, a firm is constantly trying to improve its products and processes to maintain its position in relation to competitors (Chang et al., 2011).

## 4. INNOVATION STRATEGIES

Based on the literature, the internal and external factors will now be linked to the focusing and balancing innovation strategies. The findings are explained in the following sections, and summarized in **Table 1** (see appendix 1).

### 4.1 Focus Exploration

A firm with a focused innovation strategy on exploration will have a *loose inherent culture* (Jansen et al., 2009), a *low degree of centralization* of decision-making (Chang et al., 2011; Jansen et al., 2006; Jansen et al., 2009), a *high degree of connectedness* that facilitates knowledge and idea sharing among employees (Chang et al., 2011; Jansen et al., 2006; Jansen et al., 2005), a *low degree of formalization* (Jansen et al., 2006; Jansen et al., 2005) and a *low degree of routinization* since this increases the scope for opportunities and new knowledge acquisition (Jansen et al., 2005), *low risk aversion* since exploration is associated with risk-taking (He and Wong, 2004), a *high degree of adaptability* as exploration is associated with experimenting and discovering that result in constantly changing environmental circumstances (Jansen et al., 2009), a *high dynamic environment* encouraging the firm to come up with new products (Chang et al., 2011; Jansen et al., 2006), and *low environmental competitiveness* as there is not a market for the explorative innovations yet (Chang et al., 2011; Jansen et al., 2006). In addition, this strategy focuses solely on explorative activities, which indicates that the firm faces *low resource constraints*, since all of the firm's resources can be devoted to exploration activities. At last, the prospector strategy fits the best with this focusing innovation strategy.

### 4.2 Focus Exploitation

A firm with a focused innovation strategy on exploitation will have a *tight inherent culture* (Jansen et al., 2009), a *high degree of centralization* of decision-making (Chang et al., 2011; Jansen et al., 2006; Jansen et al., 2009), a *high degree of connectedness* as it helps to build knowledge and idea sharing among employees (Chang et al., 2011; Jansen et al., 2006; Jansen et al., 2005), a *high degree of formalization* that facilitates the

exploitation of knowledge more efficient and easier (Jansen et al., 2006; Jansen et al., 2005), a *high degree of routinization* that facilitates the ease of transforming new knowledge into existing tasks (Jansen et al., 2005), *high risk aversion* because this strategy focuses only on exploiting existing competencies and technologies that do not carry a lot of risk with them as they are already known to the firm (He and Wong, 2004), *low adaptability* as exploitative activities are associated with increasing efficiency and refinement that do not result in highly changed circumstances (Jansen et al., 2009), a *low dynamic environment* as the firm focus on exploiting its existing products (Chang et al., 2011; Jansen et al., 2006), and *high environmental competitiveness* as the firm continuously tries to reduce costs and refine its products in order to stay competitive (Chang et al., 2011; Jansen et al., 2006). In addition, this strategy focuses solely on exploitative activities, which indicates that the firm faces *low resource constraints*, since all of the firm's resources can be devoted to exploitative activities. At last, the defender strategy fits the best with this focused innovation strategy.

### 4.3 Structural Ambidexterity

A firm handling a balancing innovation strategy in the form of structural ambidexterity has *multiple loosely integrated sub-units*. The exploratory units are small and have a *loose culture*, *high connectedness of processes* and *decentralized decision-making*, whereas the exploitation units are larger and have a *tight culture*, *high connectedness of processes* and *centralized decision-making* (Raisch et al., 2009; Gupta et al., 2006). Tasks are divided into the right organizational unit in order to develop the right contexts for exploration and exploitation. For the exploration unit this means *low formalization* and *low routinization*, whereas the exploitation unit has *high formalization* and *high routinization*. Further, since both units pursue different innovation activities associated with different degrees of risk, it can be stated that the exploration is associated with risky activities and has therefore *low risk aversion*, whereas the exploitation unit is associated with relatively certain activities and has therefore *high risk aversion* (He and Wong, 2004). In addition, the exploration unit needs *high adaptability* in order to adapt to changing circumstances that are the result of experimenting and discovering, whereas the exploitation unit has *low adaptability* as it does not need to adapt to highly changing circumstances.

However, if we have to look at the firm as a whole, it can be stated that there has to be *tight culture* present as the exploration unit is explicitly separated and can therefore have its own inherent culture. Overall, there has to be *low centralization* as the exploration unit needs freedom to operate within the firm and have to possibility to interact with all employees for idea sharing, which indicates *high connectedness*. In addition, there has to be *high formalization* because all activities need to be recorded as the firm is pursuing both innovation activities simultaneously which could otherwise result in chaos. Further, there is *high routinization* within the firm due to the fact that only the exploration unit has almost no routinization in its activities. Next to this, the exploratory unit is explicitly separated to pursue risk-related activities, leaving the firm as a whole having *high risk aversion*. As the firm as a whole needs to be able to adapt to changing circumstances due to exploratory innovations, there needs to be *high adaptability*. Further, the overall firm faces a *high dynamic environment* and *high competitiveness* since it tries to meet every change in customer demand by either explorative or exploitative innovations that are vulnerable for competition (Jansen et al., 2006). Furthermore, the firm is pursuing both

explorative and exploitative innovation activities that lead to *high resource constraints*. At last, the analyzer strategy fits the best with this balancing innovation strategy.

#### 4.4 Contextual Ambidexterity

A firm handling a balancing innovation strategy in the form of contextual ambidexterity has a *single business unit* with the behavioral capacity to simultaneously demonstrate high alignment and *high adaptability* across the entire business unit (Gibson and Birkinshaw, 2004). When a supportive organizational context is created, individuals within the business unit will engage in both exploration and exploitation activities, resulting in contextual ambidexterity, and consequently face *high resource constraints*. Gibson and Birkinshaw (2004) state that discipline, stretch, support, and trust are four “*behavior-framing attributes*” leading to the creation of a supportive organizational context. These attributes lead to a *loose inherent culture* as every individual must be willing to voluntarily cooperate within the unit, as well as the freedom needed for individuals to take initiatives within the unit. Further, *low centralization* of decision-making and a *low formalization* can be found as higher placed managers are given priority to provide guidance and help, rather than exercising authority (Gibson and Birkinshaw, 2004). A *high degree of connectedness* can be found as there is strived for a collective identity within the business unit, as well as a *high degree of routinization* as every position in the unit is filled by the individual with the required capabilities to best contribute to the routines of this position (Gibson and Birkinshaw, 2004). In addition, there is *low risk aversion* since both innovation activities are pursued, which can result into a lack of a specific goal and focus that lead to the misplacement of resources and therefore over exploration, leaving less focus and placement of resources over to pursue exploitation of existing products and services (Oskam, 2009). In addition, a *high dynamic environment* and *high competitiveness* are present as the firm tries to meet every change in customer demand by adapting and aligning to the situation by either explorative or exploitative innovations that are vulnerable for competition (Jansen et al., 2006). At last, the analyzer strategy fits the best with this balancing innovation strategy.

#### 4.5 Punctuated Equilibrium

A firm handling a balancing innovation strategy in the form of punctuated equilibrium has a *single business unit* that needs to switch between short periods of exploration and long periods of exploitation. In order to accomplish this, a *loose culture* must be present as the two innovation activities require a different focus and routines (Gupta et al., 2006). There is a *high degree of centralization* of decision-making, *high adaptability*, and *high formalization* as switching requires the entire organizational unit to switch and maximally exploit the opportunities of the exploitation or exploration period, which can be done most effectively if switching runs smoothly by close coordination. Since the organizational unit switches between periods of exploration and exploitation, *low resource constraints* are faced by the organization as only one type of innovation activity is pursued at the time. Additionally, there is a *high degree of connectedness* which increases the likelihood of maximally exploiting opportunities of each period (Gupta et al., 2006; Jansen et al., 2006). Further, *low routinization* is possible as the business unit switches between explorative and exploitative periods which both require different routines. Next to this, the organizational unit can switch to exploitation if an exploratory period becomes too risky, indicating that there is *high risk aversion*. At last, a *high dynamic environment* and *high competitiveness* are present as the business unit switches

between two different environments periodically, making the innovation activities even more vulnerable for external parties to catch up with the new innovations as the work is laid down periodically to pursue the other innovation activities (Gupta et al., 2006). At last, the analyzer strategy fits the best with this balancing innovation strategy.

#### 4.6 Innovation Strategies for SMEs

Concluding from above, a firm can deal with the tension between explorative and exploitative innovation activities in multiple ways as summarized in **Table 1**. Chang et al., (2011) state that the problem is that the current literature has been focusing too much on larger firms, which have substantial resources to pursue both explorative and exploitative innovations simultaneously (i.e. *structural ambidexterity* or *contextual ambidexterity*) or through temporal cycling (i.e. *punctuated equilibrium*). In other words: larger firms do not face resource constraints like SMEs, and can therefore pursue both explorative and exploitative innovation activities simultaneously. Larger firms have substantial resources to differentiate exploration and exploitation within separate organizational units, and provide these units with all the resources they need to pursue its activities.

For SMEs this is different, as they are facing more resource constraints as larger firms (Chang et al., 2011). In reality, most SMEs do not have enough resources (e.g. financial capital and human capital) to pursue both innovation activities like larger firms. This, because exploration and exploitation are two fundamentally different innovation activities characterized by different organizational routines and competing for the scarce resources, efforts, and attention of an SME (Gupta et al., 2006; March, 1991; Chang et al., 2011). Because of this, it might be difficult for an SME to pursue both innovation activities at the same time and consequently creating a balance between the two. An SME can therefore choose to specialize and focus on one of them (i.e. *a focus strategy*), handing over the task of achieving a balance between the two innovation activities to the “social system” (Gupta et al., 2006). Meaning that a focus on either exploration or exploitation can be balanced by the social system due to the fact that there will be other firms in the market focusing on the other innovation type. In other words: when two firms in the social system focus on different innovation types, they will consequently create a balance between the two innovation types.

Yet, an SME may want to achieve sustainably superior performance, which can be achieved by balancing its resources, efforts, and attention in order to pursue both activities simultaneously or through temporal cycling (i.e. *a balancing strategy*) (Gupta et al., 2006). Gupta et al. (2006) state that developing organizational routines to simultaneously pursue both innovation activities is difficult. In addition, one can imagine that devoting an organization its resources, attention, and efforts to exploitation consequently means fewer resources, attention, and efforts that can be devoted to exploration (and vice versa). Due to these reasons, it will be very difficult for an SME to pursue a balancing strategy in the form of structural ambidexterity or contextual ambidexterity. However, temporal cycling between the two innovations activities requires an SME to switch between different organizational routines. This switching between periods of exploration and exploitation requires an SME to be flexible in adapting to changing circumstances such as different organizational routines. According to Nooteboom (1994), SMEs are said to be internally flexible in adapting to changing circumstances. In addition to this, SMEs’ resources, efforts, and attention do not have to be divided because only one innovation activity is pursued at the

time. For these reasons, an SME can also pursue a 'balance' strategy in the form of punctuated equilibrium.

To conclude, due to scarce resources, efforts, and attention of an SME, it can choose to pursue a focus strategy on either exploration or exploitation. In addition, due to an SMEs 's flexibility in adapting to changing circumstances (i.e. organizational routines), an SME can pursue a balance strategy *punctuated equilibrium*, taking away the problem of scarce resources, efforts, and attention as only one innovation activity is pursued at the time. Hypothesis one is therefore formulated as follows:

**HYPOTHESIS 1** = *An SME that is constrained by its resources, efforts, and attention, is likely to pursue a focus strategy on exploration or exploitation, or a balance strategy in the form of punctuated equilibrium.*

## 5. LEAN

Since this research will focus on SMEs engaged in '*lean management*', it is important to first of all stress out what this concept is. What is suggested is that lean should be seen as a philosophy instead of as a process, since lean is a way of thinking, whereas processes are the mechanism to action the way of thinking (Bhasin and Burcher, 2006). The goal of lean thinking is therefore: "do more and more with less and less – less human effort, less equipment, less time, and less space – while coming closer and closer to providing customers exactly what they want" (Womack and Jones, 1996). This is supported by Dahlgaard and Dahlgaard-Park (2006), who state the objective of lean production is to eliminate waste, which can be over production, waiting, transportation, inappropriate processing, inventory, unnecessary motions, and defects (Bhasin and Burcher, 2006).

Womack and Jones (1996) summarized the five main principles for reducing waste and thinking lean to provide "a way to specify value, line- up value-creating actions in the best sequence, conduct these activities without interruption whenever someone requests them, and perform them more and more effectively" (Womack and Jones, 1996). The five principles are:

**1. Precisely specify value by specific product.** Value can only be defined by the customer, if it is expressed in terms of a specific product that meets specific requirements at a specific time for a specific price. Specifying value accurately is the critical starting point to determine what really is needed and what can be regarded as waste.

**2. Identify the value stream for each product.** Identifying the value stream for each product helps to identify all value adding activities needed to create and produce a specific product, and helps to identify waste that occurred along the value stream due to different interacting organizations.

**3. Make value flow without interruptions.** This flow consists of making the remaining value-adding activities, after waste activities are identified and eliminated, flow. The problem in today's organization is that there is a believe that work should be organized around departments which results in cues that should be seen as waste. A lean alternative to this problem is to develop a lean strategy throughout the organization which requires a rearrangement of the entire organization, including the rearrangement of departments, functions and careers. If *flow* is introduced correctly, a firm can significantly reduce throughput time, physical production, and order processing.

**4. Let the customer pull value from the producer.** This means that you don't push your possibly 'unwanted' products onto the customer, but you let the customer pull the exactly demanded products from you. This allows an organization to respond immediately to changing customer demands if the value stream flows and value is specified accurately. As a result, the organization can ignore sales forecasts and eliminate high levels of inventories that should be regarded as waste.

**5. Pursue perfection.** Perfection seems to occur due to reduction in effort, time, space, costs, and mistakes to offer the exactly demanded products. However, there will always be ways to improve and reduce more waste that occur along the value stream due to changing demands and changing technologies.

The first four principles interact with each other in a virtuous circle, in order to strive towards the fifth principle *perfection* (Womack and Jones, 1996). Therefore, when all of the five principles are understood and tied together, the organization understands that lean thinking is an ongoing, constantly changing and evolving process. This is supported by Pettersen (2009), who states that there is no clear definition capturing all the elements of lean, as it is a concept that involves a wide variety of practices and strategies that are constantly changing and developing. In its strive towards perfection, '*transparency*' along the value stream is very important, as it allows all organizations involved in the value stream to cooperate and discover better ways to create value and eliminate waste. Such an ongoing cooperation between all organizations involved in a value stream is called a '*lean enterprise*', and requires regulated behavior to assure that all organizations stay cooperative in order to reduce as much waste as possible (Womack and Jones, 1996).

### 5.1 Lean Implementation

For this research it is important to measure the extent to which firms are engaged in lean management. Shah and Ward (2007) developed an instrument existing of 10 factors to measure the state of lean implementation in firms. Out of these 10 factors, three are supplier related, one is customer related, and six are internally related. Altogether, "these 10 factors constitute the operational complement to the philosophy of lean production and characterize 10 distinct dimensions of a lean system" (Shah and Ward, 2007). The 10 factors are described as:

**1. Supplier feedback (SUPPFEED):** "provide regular feedback to suppliers about their performance".

**2. JIT delivery by suppliers (SUPPJIT):** "ensures that supplier deliver the right quantity at the right time in the right place".

**3. Supplier development (SUPPDEVT):** "develop suppliers so they can be more involved in the production process of the focal firm".

**4. Customer involvement (CUSTINV):** "focus on a firm's customers and their needs".

**5. Pull (PULL):** "facilitate JIT production including kanban cards which serves as a signal to start or stop production".

**6. Continuous flow (FLOW):** "establish mechanisms that enable and ease the continuous flow of products".

**7. Set up time reduction (SETUP):** "reduce process downtime between product changeovers".

**8. Total productive/preventive maintenance (TPM):** "address equipment downtime through total productive maintenance and thus achieve a high level of equipment availability".

**9. Statistical process control (SPC):** “ensure each process will supply defect free units to subsequent process”.

**10. Employee involvement (EMPINV):** “employees’ role in problem solving, and their cross functional character”.

Shah and Ward (2007) add to this that a successful implementation of lean into firms requires the firm to devote efforts and attention along several factors at the same time. Additionally, sustainably competitive advantage is created when all factors are implemented correctly into the organization, which will be difficult to imitate by competitors (Shah and Ward, 2007).

## 5.2 Innovation Strategies for Lean SMEs

Concluding from above, the lean thinking philosophy can be understood as removing any kind of activities that are regarded as waste, in order to assure that only value-adding activities remain to make the value stream for each accurately specified product flow, and consequently strive towards perfection by cooperating transparently with all other organizations involved in the value stream. In other words: the lean thinking philosophy focuses on increasing efficiency within organizations and along the value stream of products. Since exploitative innovation activities are associated with increasing efficiency within products and organizational processes (Jansen et al., 2009), it can be stated that a lean thinking SME striving towards perfection will pursue exploitative innovation activities. This is supported by Chen and Taylor (2009), who state that the continuous improvement initiative in lean thinking has a positive effect on exploitative innovations, whereas the waste reduction initiative in lean thinking has a negative effect on exploration activities. Furthermore, the first and fourth principle of a lean thinking organization assure that any unwanted product or product features that should be regarded as waste are eliminated, in order to provide the customer with the exactly demanded product. Improving the product to meet the exact demanded product should be seen as exploitative innovations (Chen and Taylor, 2009). In addition, the study by Lewis (2000) is supporting the argument by revealing that the more successful an organization is in implementing the lean principle, the more ‘focus’ is placed on exploitation activities at the cost of exploration activities. Additionally, the more successful a lean thinking SME is in implementing lean into the organization, the more it will focus on exploitative innovations to increase customer satisfaction (Chen and Taylor, 2009). Based on these supporting arguments, the right innovation strategy to be pursued for a lean thinking SME is a focus strategy on exploitative innovations. Hypothesis two is therefore formulated as follows:

**HYPOTHESIS 2 =** *A lean thinking SME is likely to pursue a focus strategy on exploitative innovation activities, in order to increase efficiency within the organization and along the value stream of its products.*

Pius, Esam, Rajkumar and Geoff (2006) state that the benefits of a successful implementation of lean are productivity improvement, increasing resources availability, a willingness to learn and strive towards perfection, and technology development. Productivity improvement and technology development are to be seen as two results of a focus strategy on exploitative innovations, and therefore supporting hypothesis two. However, the other two benefits not related to hypothesis two and are therefore interesting to be looked at. Increasing resources availability is interesting as resources availability is the main constraint that makes an SME focus on either exploration or exploitation, or on both through a punctuated equilibrium. Nevertheless, if an SME is successful in

implementing lean into the organization and therefore increasing its resources availability, it can use these increased resources to pursue a balance strategy in the form of structural ambidexterity or contextual ambidexterity. In other words: successful lean implementation leads to increasing efficiency within firms that results in more financial resources available for other purposes such as innovation. So, this increase in resources can be used to pursue exploration simultaneously to exploitation in the same organizational unit for innovation (i.e. *contextual ambidexterity*), or to establish a separate organizational unit to pursue exploration next to the organizational unit that pursues exploitation (i.e. *structural ambidexterity*). Hypothesis three is therefore formulated as follows:

**HYPOTHESIS 3 =** *A lean thinking SME is likely to pursue a balance strategy in the form of structural ambidexterity or contextual ambidexterity, as a results of increased resource availability.*

A willingness to learn and strive towards perfection indicates that a firm is willing to strive towards lean enterprises by cooperating with all other parties involved in the value stream of the products. This is possible to achieve if the SME, its suppliers, and its customers are willing to be transparent to each other. The higher the transparency, the closer all the parties involved in the value stream of the products are to forming lean enterprises. These lean enterprises are to be seen as the base for exploitative innovations, as their main goal is to solve problems and reduce waste along the value stream of the products and processes. However, lean enterprises can also be seen as the base for explorative innovation based on two reasons. First of all, if the parties involved in the value stream encounter problems or waste that can only be solved or reduced by explorative innovations, they can cooperate with each other to pursue explorative innovations that can solve the problem or reduce the waste. Second, if the parties involved in the value stream encounter a change in customer demand that can only be met by an explorative innovation, they can cooperate with each other to pursue explorative innovations and consequently meet the change in customer demand. For these reasons, a lean thinking SME might see the forming of lean enterprises also as the base for explorative innovations, and therefore pursue a balance strategy in the form of structural or contextual ambidexterity. Hypothesis four is therefore formulated as follows:

**HYPOTHESIS 4 =** *A lean thinking SME is likely to pursue a balance strategy in the form of structural ambidexterity or contextual ambidexterity, as a results of transparent cooperation with its suppliers and customers to form lean enterprises that can also be the base for explorative innovations.*

## 6. METHOD

### 6.1 Sample

The sample of this research exists out of five cases, of which each case represents a company in the Netherlands that was selected based on four criteria. At first, the company had to be an SME, meaning that its number of employees could not exceed 250 employees with a permanent contract. Company 2 was therefore still considered an SME, due to the fact that almost half of its employees do not have a permanent contract. Second, the company had to be engaged in lean management. Third, the company had to be a production company, meaning that it produces a product and not only provide services. Fourth, the company has to be innovating on its products and

production processes. The characteristics of each company are represented in **Table 3** (see appendix 1).

## 6.2 Measures

Based on the conceptual framework presented in **Figure 1**, a questionnaire (see appendix 3) was constructed to evaluate the internal factors (company strategy and internal organizational antecedents), the external factors (external environmental antecedents), the tension (orientation on exploration and exploitation), and lean management (ten factors of lean). The company strategy was measured by the scale of Conant, Mokwa and Varadarajan (2006). Resource constraints were measured by the two item scale of Norhia and Gulati (1996). Adaptability was measured by the scale of Barringer and Bluedorn (1999), and culture strength was measured by the scale of Kotter and Heskett (1992). Centralization, connectedness, risk aversion, and environmental competitiveness were measured by the scales of Jaworski and Kohli (1993). Formalization was measured by the scale of Desphandé and Zaltman (1982), routinization by the scale of Whitey et al. (1983), and environmental dynamism by the scale of Baum and Wally (2003). The orientation on exploration and exploitation were measured by the scale of Lubatkin, Simsek, Ling and Veiga (2006). The 10 factors of lean implementation were divided under three categories, being: supplier-related (three factors), customer-related (one factor), and internally-related (six factors). Each category was first measured separately by the scale of Shah and Ward (2007), after which the mean of the three categories was calculated to measure the total lean implementation. Additionally, the questionnaire evaluated 31 lean tools for each SME to control for the 10 factors of lean implementation. The reason for controlling the 10 factors of lean implementation was to find out whether the SME is really engaged in lean management by implementing lean tools into the organization. If an SME did not implement any of the lean tools, they could have still scored high on the scale of Shah and Ward (2007), but should not be seen as an SME engaged in lean management.

The questionnaire was sent to the five participants and evaluated, of which the results can be found in **Table 4** (see appendix 1). The scored company strategy for each SME is shown in **Table 4** as D (Defender), P (Prospector), A (Analyzer), R (Reactor). All scores of items with a 5-point scale or a 7-point scale were rounded off to one decimal. Based on the scale of each item, each score was given a - / - / + / + + of which the results can be found in **Table 4**. In case that an item scored exactly on the boundary of e.g. a + and a + + by scoring a 5,5 for a 7-point scale item, the item was given a + +.

**5-point scale items** were given: a - - for a score between 1,0 – 2,0 ; a - for a score between 2,0 – 3,0 ; a + for a score between 3,0 – 4,0 ; a + + for a score between 4,0 – 5,0.

**7-points scale items** were given: a - - for a score between 1,0 – 2,5 ; a - for a score between 2,5 – 4,0 ; a + for a score between 4,0 – 5,5 ; a + + for a score between 5,5 – 7,0.

Based on the findings in **Table 4**, a score card was filled in for the antecedents of each company. The template of this score card for antecedents is shown in **Table 2** (see appendix 1). In these score cards, items scoring a - / - - were translated as scoring low or loose, whereas items scoring a + / + + were translated as scoring high or tight. Based on the current literature, **Table 1** shows for all five innovation strategies whether the items are low/high or loose/tight. Based on the translated scores of low or loose and high or tight, **Table 1** could partly be filled in for each SME. The filled in score cards (i.e. *Table 1* and *Table 2*) for each company can be found in

appendix 2, where the scored items are highlighted yellow. Based on these score cards, the most fitting innovation strategy for each SME could already be guessed, based on what the literature proposes.

The questionnaires were used as a preparation for the interviews that were conducted at all five SMEs. The interviews were conducted to ask the participants questions in relation to the findings of the questionnaires in comparison to what the current literature proposes. During these interviews, participants were first of all asked whether innovation is pursued in a single organizational unit for exploration and/or exploitation, or in separate organizational units for exploration and exploitation. In addition, the five innovation strategies were explained and the participants were asked which strategy fits the best with the organization. The results of these questions can be found in **Table 4**, and are for each SME highlighted red in the filled in score cards.

The hypotheses will be tested by looking at the cases that are validating the hypotheses based on the results in **Table 4**. In addition, statements from the interviews will be used to support why certain hypotheses are validated. After this, those cases that are invalidating the hypotheses will be analyzed and the reasons why. The reasons why those cases are invalidating the hypotheses will be looked for in **Table 4**, statements from the interviews, and in the filled in score cards.

## 7. RESULTS

Based on the results found in the questionnaires and interviews (**Table 4**), the hypotheses will now be tested one by one. Testing will be done by looking at the amount of cases that are validating the hypotheses. In addition, supportive statements from the interviews will be used (including the time of the statement in the interview), as well as the scores from the questionnaires (**Table 4**).

Hypothesis one (*An SME that is constrained by its resources, efforts, and attention, is likely to pursue a focus strategy on exploration or exploitation, or a balance strategy in the form of punctuated equilibrium*) is validated by three cases (company 3, 4, and 5) as can be seen in **Table 4**. Company 3 is handling an innovation strategy in the form of punctuated equilibrium, which is supported by: “We are pursuing both exploration and exploitation. We mainly focus on incremental product innovations, and from time to time we have meetings to think of new things we can do” (09:16). Company 4 and 5 are both pursuing a focus strategy on exploitation, which is supported by their identical statements: “the second innovation strategy, a focus on exploitation, fits the best with our organization” (24:42 and 18:46). So, hypothesis one is validated by three cases that are pursuing the right innovation strategy for an SME as proposed by the current literature, whereas the hypothesis is invalidated by two of the cases (company 1 and 2).

Hypothesis two (*A lean thinking SME is likely to pursue a focus strategy on exploitative innovation activities, in order to increase efficiency within the organization and along the value stream of its products*) starts by looking at which SMEs are regarded as lean thinking. Based on the scores for total lean implementation and implemented lean tools in **Table 4**, it can be concluded that there are three lean thinking SMEs (company 1, 2, and 3). Despite the fact that company 1 has only implemented the JIT lean tool, it should still be seen as lean thinking due to the following statements: “The reason why we implemented lean is that our entire organization is built around the JIT principle” (52:52), and: “The effects of lean in our company is our right to exist” (1:05:54). Nevertheless, looking



at the pursued innovation strategies of these three cases (**Table 4**), none of them is validating hypothesis two. The two cases that would be supporting hypothesis two based on their innovation strategies are company 4 and 5. However, these companies are not regarded as lean thinking based on the results in **Table 4**, which is supported by company 4 in the following statement: “We strive towards forming lean enterprises, however this is not yet where we are with our organization as we are still in the starting phase of lean” (51:55), whereas a supportive statement for company 5 is “We are in the beginning phase of implementing lean into the organization, the lean culture is not there yet” (34:38). Therefore, none of the cases is validating hypothesis two.

Hypothesis three (*A lean thinking SME is likely to pursue a balance strategy in the form of structural ambidexterity or contextual ambidexterity, as a result of increased resource availability*) again starts with concluding which SMEs are regarded as lean thinking. Concluding from above, these are company 1, 2, and 3. The next step to validate this hypothesis is to conclude whether the lean thinking SMEs are pursuing a balance strategy in the form of structural or contextual ambidexterity. Looking at **Table 4**, it can be concluded that company 1 and 2 are pursuing a balance strategy in the form of contextual ambidexterity. For company 1 this is supported by: “Yes, we pursue both explorative and exploitative innovation in this single R&D unit” (27:50). For company 2 this is supported by: “There is no separation of exploration and exploitation in different units, this happens both within the same unit” (17:01). The last step to validate hypothesis three for company 1 and 2, is to see whether the reason for pursuing a balance strategy in the form of contextual ambidexterity is their increased resource availability as a result of being a lean thinking SME. Company 1 and company 2 both state identically “The increases in turnover, profit, and employees are a result of both lean and innovation” (1:08:38; 56:20). In addition to this, company 1 states that “The reinvesting of profit into the organization is used for further lean implementation and for both radical and incremental innovation” (1:10:30), and company 2 states that “The money that comes back into the organization is used for innovation” (57:20). Therefore, hypothesis three is validated by two cases (company 1 and 2), and invalidated by three cases (company 3, 4, and 5).

Hypothesis four (*A lean thinking SME is likely to pursue a balance strategy in the form of structural ambidexterity or contextual ambidexterity, as a result of transparent cooperation with its suppliers and customers to form lean enterprises that can also be the base for explorative innovations*) starts again by looking which SMEs are regarded as lean thinking and following a balance strategy in the form of structural ambidexterity or contextual ambidexterity. Concluding from above, this holds for company 1 and 2. In order to validate this hypothesis, the forming of lean enterprises that can be the base for explorative innovation activities should be the reason for pursuing a balance strategy in the form of contextual ambidexterity. The forming of lean enterprises is based on the degree of lean implementation that is supplier-related and customer-related, of which the scores (**Table 4**) are supportive for both companies. In addition, the forming of lean enterprises that can also be the base for explorative innovations are to be seen as the reason for these cases to pursue a balance strategy in the form of contextual ambidexterity. For company 1, “Radically new products are developed through communication in our supply chain” (29:46) is supporting that lean enterprises can be the base for explorative innovation. For company 2, “Radically new ideas come from research, people, and suppliers” (19:50) and “Our innovation department visit

organizations in possible new markets to see what problem these market face and how these problems can be solved” (22:09) are both supporting that lean enterprises can be the base for explorative innovation. At last, both companies also agreed upon the fact that forming lean enterprises by being cooperative and transparent with suppliers and customers can also result in incremental innovations. So, hypothesis four is validated by two cases (company 1 and 2) and invalidated by three cases (company 3, 4, and 5).

## 8. DISCUSSION

In this section there will be looked at those cases that are not validating the hypotheses and the reasons why. The reasons why are to be looked for in the score cards, **Table 4**, and in the statements from the interviews. Additionally, reasons will be compared to see whether certain cases provide the same reasons for invalidating the hypotheses.

The first hypothesis that looks at the innovation strategies an SME is likely to pursue as a result of its constraints is invalidated by two cases (company 1 and 2), who are both pursuing a balance strategy in the form of contextual ambidexterity. The main reason why company 1 is pursuing this strategy is that it serves two market segments that are characterized by different sensitivity levels towards innovation. This is supported by: “Explorative innovations are mainly meant for the industrial market due to their sensitivity for explorative innovations, whereas the exploitative innovations are mainly meant for the conservative painter market” (23:20). For company 2, the main reason to pursue this balance strategy are that “In the past, we thought innovation was developing something totally new, however, nowadays we see innovation as using our existing technologies in new markets. In addition, we see innovations as improving our existing technologies in our existing markets over the years” (08:05). This indicates that both SMEs are pursuing a balance strategy in the form of a contextual ambidexterity, due to the fact that they are serving different market segments simultaneously that demand different kind of innovations, and therefore invalidating hypothesis one. This indicates that the assumptions of the current literature for hypothesis one are incomplete. This research found out that besides the fact that an SME is constrained by resources, efforts, and attention, an SME is also constrained by market conditions in its decision on how to deal with the tension between exploration and exploitation. These market conditions can be linked to the company strategies proposed by Miles et al. (1978). For instance, they state that an analyzer has to be efficient in its current stable markets while at the same time be able to move towards new products or markets, indicating that an analyzer is serving different market segments that are characterized by different sensitivity levels towards innovation. Therefore, it is suggested that an SMEs decision on how to deal with the tension between exploration and exploitation is also constrained by its company strategy, and consequently its market conditions.

The second hypothesis that looks at the innovation strategy a lean thinking SME is likely to pursue in order to increase efficiency is invalidated by all five cases. The assumptions of the current literature for this hypothesis are that an SME can best pursue a focus strategy on exploitation, as this helps the SME to increase efficiency within the firm and along the value stream(s) of its product(s). Based on the current literature, this focus on exploitation proposes that the SME has a tight culture, high centralization, and high formalization (**Table 1**). However, the current literature generalized that these characteristics need to be present in the entire organization. This research found out that that lean thinking SMEs (company

1 and 3) differentiate these characteristics within the SME. Company 1 stated during the interview: "Formalization is low in R&D, whereas the production, quality, sales, etc. are characterized by high formalization" (35:45). Company 3 stated during the interview: "There is a relatively tight culture throughout the company as a whole, but the innovation team is characterized by a relatively loose culture that exhibits knowledge and idea sharing" (27:00). Due to these statements, it can be suggested that the current literature is not completely right in generalizing an entire organization. This research found that in reality lean thinking SMEs are creating two different cultures within the organization, in order to facilitate the innovation unit of the firm with an open mind-set which is needed to pursue innovation activities. With different cultures is meant that a lean thinking SME can indeed be characterized by the exploitative characteristic of having a tight culture, high centralization, and high formalization. However, the innovation unit of a lean thinking SME can be characterized by a loose culture, low centralization, and low formalization to facilitate innovation activities. For these reasons, it is suggested that the current literature is not completely right about generalizing an entire lean thinking SME by exploitative characteristics, as this research found out that in reality lean thinking SMEs can also exhibit another set of characteristics besides the exploitative ones, in order to facilitate the innovation unit with an open mind-set needed to pursue its activities.

The third hypothesis that looks at the innovation strategies a lean thinking SME is likely to pursue due to an increase in resources availability is invalidated by three cases (company 3, 4, and 5). Company 3, which is regarded as a lean thinking SME, is invalidating this hypothesis because it is pursuing a balance strategy in the form of a punctuated equilibrium. However, company 3 is also experiencing increased resource availability as a result of successful lean implementation as stated in the interview: "Yes, due to lean we have increased efficiency that lead to more financial resources available to pursue exploration activities also" (51:58). This suggest that a lean thinking SME that experiences increased resources availability due to successful lean implementation cannot only pursue a balance strategy in the form of contextual ambidexterity as suggested by the current literature, but also in the form of a punctuated equilibrium (company 3). Therefore, the assumptions of the current literature for hypothesis three are incomplete. This research found that an increase in resource availability as a result of successful lean implementation does not necessarily have to result in the pursuit of both innovation types simultaneous (i.e. *contextual ambidexterity*), because a firm's company strategy and consequently its market conditions are also found to be affecting its decision to pursue both innovation types or not. Meaning that if an SME has no different market segments demanding different kind of innovations, it has no need to pursue contextual ambidexterity, and can therefore better pursue a punctuated equilibrium to further exploit its products and processes, while still experiencing increased resources availability which can be used to pursue explorative innovation activities from time to time (i.e. *punctuated equilibrium*).

Additionally, company 4 and 5 are also invalidating hypothesis three because they are pursuing a focus strategy on exploitation and are not regarded as lean thinking SMEs due to the fact that both companies are still in the starting phase of implementing lean into the organization, which can be concluded from their lean implementation scores in **Table 4** and from the interviews. It is of interest that company 4 and 5 both stated during the interviews: "We did not experience an increase in profit and turnover due to lean implementation" (1:01:55; 57:30). On the

other hand, company 1, 2, and 3 all stated during the interviews: "The increase in profit and turnover is related to both lean and innovation" (1:08:38; 56:20; 50:10). This indicates that a lean thinking SME (company 1, 2, and 3) will experience an increase in profit and turnover as a result of successful lean implementation, which are to be seen as increased resource availability that can be used to pursue explorative innovation activities besides the already pursued exploitative innovation activities. This indicates that a successful implementation of lean into an SME can result in the transition of going from a focus strategy on exploitation towards a balance strategy in the form of contextual ambidexterity or punctuated equilibrium, as a result of increased resource availability. However, as explained before, this choice is depending on the company strategy and consequently the market conditions of the SME.

The fourth hypothesis that looks at the innovation strategies a lean thinking SME is likely to pursue due to the forming of lean enterprises that can also be the base for explorative innovations is invalidated by one relevant case, being company 3. This company is also regarded as a lean thinking SME, but pursuing an innovation strategy in the form of punctuated equilibrium. Nevertheless, the explorative innovations of this SME are also developed by transparent cooperation with suppliers and customers, as found in the interview: "This radically new production process was developed by cooperating with our customers, suppliers, and an external party" (20:42). In addition, the scores in **Table 4** on supplier-related and customer-related lean implementation are also supporting the forming of lean enterprises for company 3. Therefore, it can be stated that company 3 also forms lean enterprises that can be the base for explorative innovation. This indicates that the current literature is incomplete in its assumptions for hypothesis four. This research found out that the forming of lean enterprises that can also be the base for explorative innovation can also be the reason for pursuing an innovation strategy in the form of a punctuated equilibrium, besides the proposed innovation strategies of the current literature (i.e. *structural ambidexterity* and *contextual ambidexterity*).

The practical implications of this research are as follows. A manager of an SME that wants to implement lean into the organization should first of all pursue a focused innovation strategy on exploitative innovations that help to increase efficiency within the firm and along the value stream of its products. This focused strategy on exploitation helps the manager to successfully implement lean into the organization, and consequently become a lean thinking SME. Once the SME is regarded as lean thinking, the increased efficiency will result in an increase in turnover and profit. If this increase in turnover and profit is reinvested into the organization, the SME will experience an increase in resources availability which can be used to pursue explorative innovation activities next to the already pursued exploitative innovation activities. As a result of this, the manager can transition its innovation strategy from a focus on exploitation towards contextual ambidexterity or punctuated equilibrium. This choice for the manager is depending on whether the SME serves different market segments that are characterized by different levels of sensitivity for innovations, and therefore demanding different kind of innovations. If this is the case, the manager can best transition its innovation strategy towards contextual ambidexterity, as the simultaneous pursuit of both exploration and exploitation provide the SME with the required innovations to serve its different market segments. On the other hand, if the SME does not serve different market segments with different sensitivity levels for innovation, the manager can best transition the innovation strategy towards a punctuated equilibrium. This,

because it helps to SME to further exploit its products and processes, while in the meantime still experiencing increased resources availability which can be used to pursue explorative innovation activities from time to time. Nevertheless, the successful implementation of lean into the organization and along the value stream of its products will also result in the formation of lean enterprises, as a result of transparent cooperative behavior between the SME, its suppliers, and its customers. These lean enterprises are for the manager to be seen as an additional reason to transition its innovation strategy towards contextual ambidexterity or punctuated equilibrium, as a lean enterprise is to be seen as the base for both explorative and exploitative innovative innovations. However, the manager's decision to transition its innovation strategy towards contextual ambidexterity or punctuated equilibrium is not affected by the forming of lean enterprises, as this goes hand in hand with both of these balanced innovation strategies.

## 9. LIMITATIONS & FUTURE RESEARCH

Several limitations to this research deserve attention and provide guidance for future research. First of all, this research only investigated the hypotheses by looking at a sample size of five SMEs throughout the Netherlands. Second, the SMEs were selected by their company size, which was determined by the number of employees with a permanent contract. Third, the participants for this research were randomly selected and all fulfilling different positions within their organization. For these reasons, the results of this research are limited and cannot be taken for granted for all SMEs. However, the results of this research show some interesting findings on how SMEs engaged in lean management can best deal with the tension between exploration and exploitation, and on how lean thinking SMEs can achieve sustainably superior performance. In addition, this research showed that the current literature might be incomplete in its assumptions about the constraints an SME faces in its innovation strategy decision. Further, this research showed that lean thinking SMEs could exhibit different characteristics in its innovation unit besides the exploitative characteristics in the rest of the firm, indicating that the current literature might not be completely right about generalizing lean thinking SMEs by only exploitative characteristics. Because of these findings, future research might conduct a similar research but with a substantial amount of carefully selected participants fulfilling similar position within their organization, to possibly increase the validity of the findings in this research. Such future research might also include other firm characteristics such as turnover, profit, sales, production capacity, etc. to determine the size of an SME.

## 10. CONCLUSION

What can be concluded from this research is that a lean thinking SME can best pursue a balanced innovation strategy in the form of contextual ambidexterity or punctuated equilibrium, in order to achieve sustainably superior performance. However, an SME that is willing to become lean thinking should first pursue a focused innovation strategy on exploitation, as this will help the SME to increase efficiency within the organization and along the value stream(s) of its product(s). If the SME becomes lean thinking by successfully implementing lean into the organization, it will experience an increase in turnover and profit, which can be seen as an increase in resources availability if this is reinvested into the organization. This increase in resources availability will give the SME the opportunity to transition its focused innovation strategy on exploitation towards a balanced innovation strategy in the form of contextual ambidexterity or punctuated equilibrium. The

transition to either one of the balanced innovation strategies is suggested to be influenced by the market conditions a SME faces as a result of its choice in company strategy. Therefore, an SME can best transition towards contextual ambidexterity if it serves different market segments that demand different innovations as a result of different sensitivity levels towards innovations. On the other hand, an SME can best transition towards punctuated equilibrium if it does not serve different market segments with different sensitivity levels. In addition, cooperative transparent behavior to form lean enterprises as the base for exploitative and explorative innovations can also be seen as an additional reason for a lean thinking SME to transition its innovation strategy into a balanced strategy in the form of contextual ambidexterity or punctuated equilibrium. At last, this research found that an innovation unit of lean thinking SMEs might exhibit different characteristics as compared to the rest of the organization, and therefore indicating that lean thinking SMEs cannot be generalized as an entire organization with exploitative characteristics.

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## Appendix 1:

**Table 1: The internal and external factors for each innovation strategy**

<b>Internal / External Factors</b>	<b>Exploration</b>	<b>Exploitation</b>	<b>Structural Ambidexterity</b>	<b>Contextual Ambidexterity</b>	<b>Punctuated Equilibrium</b>
<b>Unit(s)</b>	Single Unit	Single Unit	Multiple Units	Single unit	Single unit
<b>Company Strategy</b>	Prospector	Defender	Analyzer	Analyzer	Analyzer
<b>Resource constraints</b>	Low	Low	High	High	Low
<b>Culture strength</b>	Loose	Tight	Tight	Loose	Loose
<b>Centralization</b>	Low	High	Low	Low	High
<b>Connectedness</b>	High	High	High	High	High
<b>Formalization</b>	Low	High	High	Low	High
<b>Routinization</b>	Low	High	High	High	Low
<b>Risk aversion</b>	Low	High	High	Low	High
<b>Adaptability</b>	High	Low	High	High	High
<b>Environmental Dynamism</b>	High	Low	High	High	High
<b>Environmental Competitiveness</b>	Low	High	High	High	High

**Table 2: Scoring card for the antecedents based on + / + + and - / - -**

<b>Innovation strategy</b>	<b>Resource constraints</b>	<b>Culture Strength</b>	<b>Centralization</b>	<b>Connectedness</b>	<b>Formalization</b>	<b>Routinization</b>	<b>Risk aversion</b>	<b>Adaptability</b>	<b>Environmental Dynamism</b>	<b>Environmental Competitiveness</b>
<b>Exploration</b>	- / - -	- / - -	- / - -	+ / + +	- / - -	- / - -	- / - -	+ / + +	+ / + +	- / - -
<b>Exploitation</b>	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	- / - -	- / - -	+ / + +
<b>Structural Ambidexterity</b>	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +
<b>Contextual Ambidexterity</b>	+ / + +	- / - -	- / - -	+ / + +	- / - -	+ / + +	- / - -	+ / + +	+ / + +	+ / + +
<b>Punctuated Equilibrium</b>	- / - -	- / - -	+ / + +	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +

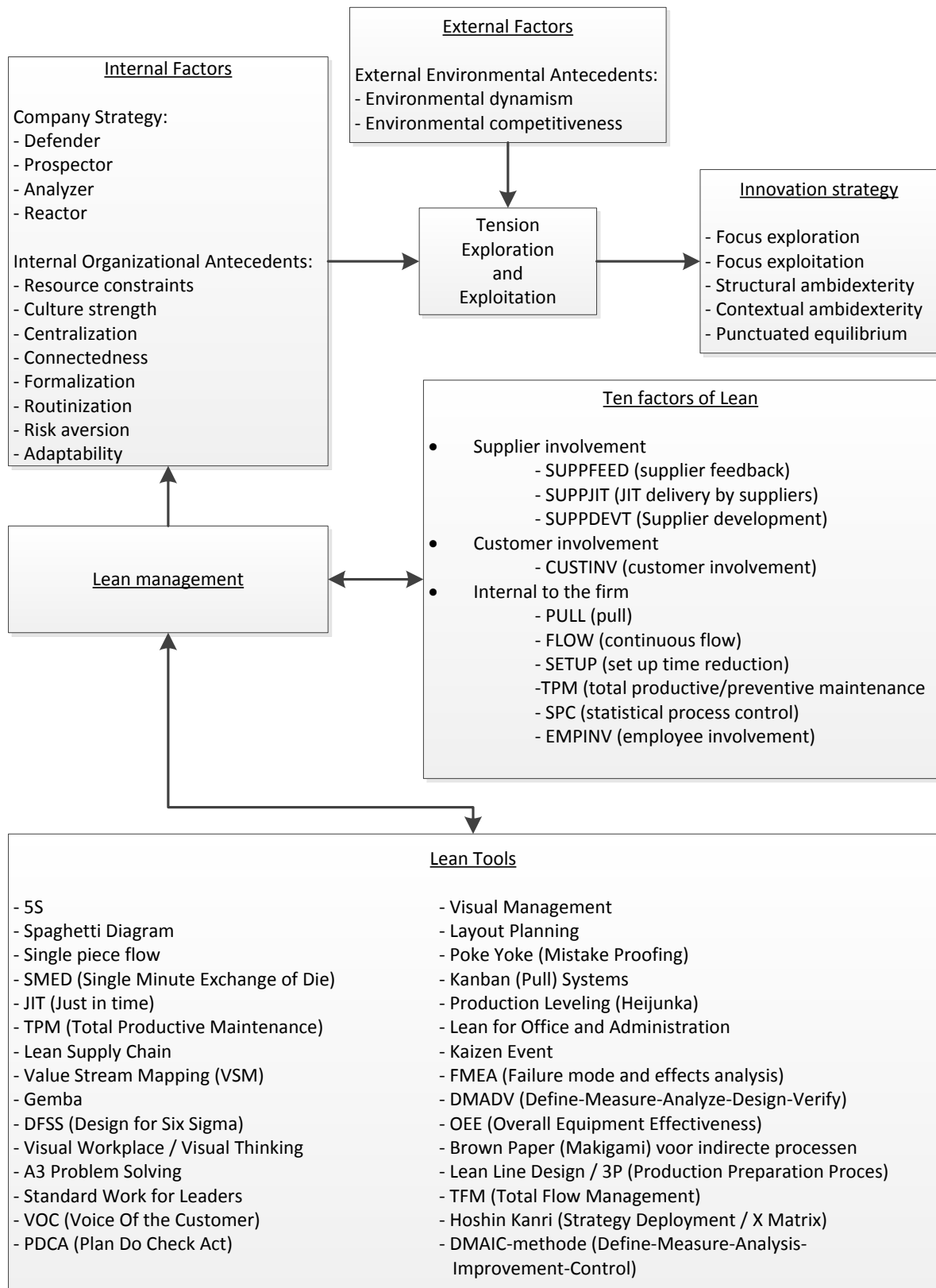
**Table 3: Sample characteristics**

<b>Case</b>	<b>Industry (of the company)</b>	<b>Company Size (# of employees)</b>	<b>Position Respondent</b>
<b>Company 1</b>	Water-based Paint (Wood Processing, Wood Joinery and Painters)	27	Managing Director
<b>Company 2</b>	Automotive & Medical (Hydraulics for cabriolets, truck cabins, hospital beds, and scan tables)	375	Continuous Improvement Manager
<b>Company 3</b>	Trailers (Professional trailers up to 3500kg, excluding caravans, trailers for horses, trailers for boats)	75	General Manager
<b>Company 4</b>	Cylinders (Dredging ships, engineering, construction crane, etc.)	100	Operations Manager
<b>Company 5</b>	High-tech (Medical, analytical, biomedical, optical, maritime)	120	C.U.R.A. Manager

**Table 4: Company scores based on the questionnaire and interview**

Company Name		Internal Factors									External Factors		Lean Implementation				Tension		Lean tools			Innovation strategy
		Company Strategy	Resource Constraints	Culture Strength	Centralization	Connectedness	Formalization	Routinization	Risk Aversion	Adaptability	Environmental Dynamism	Environmental Competitiveness	Supplier related	Customer related	Internal related	Total	Degree of Exploration	Degree of Exploitation	Score Lean Tools	Lean Tools known	Lean Tools Implemented	
Scores	Company 1	P	4	2,7	2,0	6,3	5,2	5	2,8	2,6	3,2	3,7	3,4	4,8	2,9	3,7	5,5	5,3	0,2	1	1	Contextual Ambidexterity
	Company 2	A	3,5	5,0	4,8	6,3	5,6	4,8	4,8	3,4	4,4	4,2	3,1	4,4	3,9	3,8	5,7	5,7	4,4	31	31	Contextual Ambidexterity
	Company 3	D	1,5	4,0	4,8	6,3	5,0	5,8	4,6	5,4	4,4	5,3	3,2	4,2	3,7	3,7	6,0	6,3	2,4	31	19	Punctuated Equilibrium
	Company 4	D	4,0	5,0	5,8	5,5	4,6	6,0	4,6	4,0	3,2	3,2	2,3	2,2	1,8	2,1	4,2	4,2	1,1	20	16	Focus Exploitation
	Company 5	D	3,5	5,3	2,8	5,0	4,8	5,0	4,2	2,8	4,4	4,2	2,6	3,6	2,0	2,7	5,7	5,8	1,4	31	9	Focus Exploitation
Translated Scores	Company 1	P	++	-	--	++	+	+	-	-	-	-	+	++	-	+	++	+	--	1	1	Contextual Ambidexterity
	Company 2	A	+	+	+	++	++	+	+	-	+	+	+	++	+	+	++	++	++	31	31	Contextual Ambidexterity
	Company 3	D	--	+	+	++	+	++	+	+	+	+	+	++	+	+	++	++	-	31	19	Punctuated Equilibrium
	Company 4	D	++	+	++	++	+	++	+	+	-	-	-	-	--	-	+	+	--	20	16	Focus Exploitation
	Company 5	D	+	+	-	+	+	+	+	-	+	+	-	+	-	-	++	++	--	31	9	Focus Exploitation

All items are measured on a 7-point scale, except for the following items: Company Strategy, Resource Constraints, Lean Implementation, Lean Tools.



**Figure 1: The Conceptual Framework**



## Appendix 2:

### Scoring cards: Company 1

Innovation strategy	Resource constraints	Culture Strength	Centralization	Connectedness	Formalization	Routinization	Risk aversion	Adaptability	Environmental Dynamism	Environmental Competitiveness
Exploration	- / - -	- / - -	- / - -	+ / + +	- / - -	- / - -	- / - -	+ / + +	+ / + +	- / - -
Exploitation	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	- / - -	- / - -	+ / + +
Structural Ambidexterity	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +
Contextual Ambidexterity	+ / + +	- / - -	- / - -	+ / + +	- / - -	+ / + +	- / - -	+ / + +	+ / + +	+ / + +
Punctuated Equilibrium	- / - -	- / - -	+ / + +	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +

Internal / External Factors	Exploration	Exploitation	Structural Ambidexterity	Contextual Ambidexterity	Punctuated Equilibrium
Unit(s)	Single Unit	Single Unit	Multiple Units	Single unit	Single unit
Company Strategy	Prospector	Defender	Analyzer	Analyzer	Analyzer
Resource constraints	Low	Low	High	High	Low
Culture strength	Loose	Tight	Tight	Loose	Loose
Centralization	Low	High	Low	Low	High
Connectedness	High	High	High	High	High
Formalization	Low	High	High	Low	High
Routinization	Low	High	High	High	Low
Risk aversion	Low	High	High	Low	High
Adaptability	High	Low	High	High	High
Environmental Dynamism	High	Low	High	High	High
Environmental Competitiveness	Low	High	High	High	High

Scoring cards: Company 2

Innovation strategy	Resource constraints	Culture Strength	Centralization	Connectedness	Formalization	Routinization	Risk aversion	Adaptability	Environmental Dynamism	Environmental Competitiveness
Exploration	- / - -	- / - -	- / - -	+ / + +	- / - -	- / - -	- / - -	+ / + +	+ / + +	- / - -
Exploitation	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	- / - -	- / - -	+ / + +
Structural Ambidexterity	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +
Contextual Ambidexterity	+ / + +	- / - -	- / - -	+ / + +	- / - -	+ / + +	- / - -	+ / + +	+ / + +	+ / + +
Punctuated Equilibrium	- / - -	- / - -	+ / + +	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +

Internal / External Factors	Exploration	Exploitation	Structural Ambidexterity	Contextual Ambidexterity	Punctuated Equilibrium
Unit(s)	Single Unit	Single Unit	Multiple Units	Single unit	Single unit
Company Strategy	Prospector	Defender	Analyzer	Analyzer	Analyzer
Resource constraints	Low	Low	High	High	Low
Culture strength	Loose	Tight	Tight	Loose	Loose
Centralization	Low	High	Low	Low	High
Connectedness	High	High	High	High	High
Formalization	Low	High	High	Low	High
Routinization	Low	High	High	High	Low
Risk aversion	Low	High	High	Low	High
Adaptability	High	Low	High	High	High
Environmental Dynamism	High	Low	High	High	High
Environmental Competitiveness	Low	High	High	High	High

Scoring cards: Company 3

Innovation strategy	Resource constraints	Culture Strength	Centralization	Connectedness	Formalization	Routinization	Risk aversion	Adaptability	Environmental Dynamism	Environmental Competitiveness
Exploration	- / - -	- / - -	- / - -	+ / + +	- / - -	- / - -	- / - -	+ / + +	+ / + +	- / - -
Exploitation	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	- / - -	- / - -	+ / + +
Structural Ambidexterity	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +
Contextual Ambidexterity	+ / + +	- / - -	- / - -	+ / + +	- / - -	+ / + +	- / - -	+ / + +	+ / + +	+ / + +
Punctuated Equilibrium	- / - -	- / - -	+ / + +	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +

Internal / External Factors	Exploration	Exploitation	Structural Ambidexterity	Contextual Ambidexterity	Punctuated Equilibrium
Unit(s)	Single Unit	Single Unit	Multiple Units	Single unit	Single unit
Company Strategy	Prospector	Defender	Analyzer	Analyzer	Analyzer
Resource constraints	Low	Low	High	High	Low
Culture strength	Loose	Tight	Tight	Loose	Loose
Centralization	Low	High	Low	Low	High
Connectedness	High	High	High	High	High
Formalization	Low	High	High	Low	High
Routinization	Low	High	High	High	Low
Risk aversion	Low	High	High	Low	High
Adaptability	High	Low	High	High	High
Environmental Dynamism	High	Low	High	High	High
Environmental Competitiveness	Low	High	High	High	High

Scoring cards: Company 4

Innovation strategy	Resource constraints	Culture Strength	Centralization	Connectedness	Formalization	Routinization	Risk aversion	Adaptability	Environmental Dynamism	Environmental Competitiveness
Exploration	- / - -	- / - -	- / - -	+ / + +	- / - -	- / - -	- / - -	+ / + +	+ / + +	- / - -
Exploitation	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	- / - -	- / - -	+ / + +
Structural Ambidexterity	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +
Contextual Ambidexterity	+ / + +	- / - -	- / - -	+ / + +	- / - -	+ / + +	- / - -	+ / + +	+ / + +	+ / + +
Punctuated Equilibrium	- / - -	- / - -	+ / + +	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +

Internal / External Factors	Exploration	Exploitation	Structural Ambidexterity	Contextual Ambidexterity	Punctuated Equilibrium
Unit(s)	Single Unit	Single Unit	Multiple Units	Single unit	Single unit
Company Strategy	Prospector	Defender	Analyzer	Analyzer	Analyzer
Resource constraints	Low	Low	High	High	Low
Culture strength	Loose	Tight	Tight	Loose	Loose
Centralization	Low	High	Low	Low	High
Connectedness	High	High	High	High	High
Formalization	Low	High	High	Low	High
Routinization	Low	High	High	High	Low
Risk aversion	Low	High	High	Low	High
Adaptability	High	Low	High	High	High
Environmental Dynamism	High	Low	High	High	High
Environmental Competitiveness	Low	High	High	High	High

Scoring cards: Company 5

Innovation strategy	Resource constraints	Culture Strength	Centralization	Connectedness	Formalization	Routinization	Risk aversion	Adaptability	Environmental Dynamism	Environmental Competitiveness
Exploration	- / - -	- / - -	- / - -	+ / + +	- / - -	- / - -	- / - -	+ / + +	+ / + +	- / - -
Exploitation	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	- / - -	- / - -	+ / + +
Structural Ambidexterity	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +	+ / + +
Contextual Ambidexterity	+ / + +	- / - -	- / - -	+ / + +	- / - -	+ / + +	- / - -	+ / + +	+ / + +	+ / + +
Punctuated Equilibrium	- / - -	- / - -	+ / + +	+ / + +	+ / + +	- / - -	+ / + +	+ / + +	+ / + +	+ / + +

Internal / External Factors	Exploration	Exploitation	Structural Ambidexterity	Contextual Ambidexterity	Punctuated Equilibrium
Unit(s)	Single Unit	Single Unit	Multiple Units	Single unit	Single unit
Company Strategy	Prospector	Defender	Analyzer	Analyzer	Analyzer
Resource constraints	Low	Low	High	High	Low
Culture strength	Loose	Tight	Tight	Loose	Loose
Centralization	Low	High	Low	Low	High
Connectedness	High	High	High	High	High
Formalization	Low	High	High	Low	High
Routinization	Low	High	High	High	Low
Risk aversion	Low	High	High	Low	High
Adaptability	High	Low	High	High	High
Environmental Dynamism	High	Low	High	High	High
Environmental Competitiveness	Low	High	High	High	High

## Appendix 3:

### The Questionnaire:

Deze questionnaire dient voorafgaand aan het interview te worden ingevuld en geretourneerd. De questionnaire bestaat uit acht verschillende delen die de positie van uw bedrijf goed weergeven binnen het kader van ons onderzoek.

Kort gezegd is het doel van ons onderzoek om te kijken naar: de effecten van Lean Management op innovatie (radicale/incrementele) binnen maakbedrijven (MKB's).

Graag verzoeken wij u de questionnaire zo spoedig mogelijk in te vullen en te retourneren, zodat wij nog enige tijd voorafgaand aan het interview hebben om de resultaten van de questionnaire te analyseren. Op deze wijze kunnen wij het interview daaropvolgend effectief uitvoeren.

Retourneer de ingevulde questionnaire naar:

[christian\\_borrel@hotmail.com](mailto:christian_borrel@hotmail.com)

### LET OP!!!

Bij het invullen van de questionnaire is er geen goed/fout antwoord. Geef daarom het antwoord wat als eerst in u opkomt bij de desbetreffende stelling.

Lees daarnaast goed op welke schaal de stelling beantwoord moet worden, omdat elke deel een andere schaalverdeling kent. De indeling van de questionnaire is als volgt:

- Deel 1: De mate van exploratie / exploitatie.
- Deel 2: De externe omgeving.
- Deel 3: De interne omgeving (*centralization, culture strength, risk aversion, routinization, formalization, connectedness*).
- Deel 4: De interne omgeving (*adaptability*).
- Deel 5: De resources.
- Deel 6: De strategie.
- Deel 7: De mate van "Lean" implementatie.
- Deel 8: De "Lean Tools".

Indien u de questionnaire **digitaal** wilt invullen, zet een 'X' in het vakje van uw antwoord, en maak in deel 7 de juiste stelling die het beste bij het bedrijf past **rood**.

Indien u de questionnaire **uitprint en inscant**, zet een 'X' in het vakje van uw antwoord, en omcirkel in deel 7 de juiste letter van de stelling die het beste bij het bedrijf past.

Indien u vragen heeft over de questionnaire kunt u contact opnemen met:

Christian Borrèl:

Tel: 06-83531229

Mail: [christian\\_borrel@hotmail.com](mailto:christian_borrel@hotmail.com)

**Deel 1: De mate van exploratie / exploitatie.**

<p>Voor elk item, beantwoord zoals dit geldt voor u en uw organisatie: 1 = Zeer mee oneens, 2 = Mee oneens, 3 = Beetje mee oneens, 4 = Noch mee eens/oneens, 5 = Beetje mee eens, 6 = Mee eens en 7 = Zeer mee eens.</p>	1. Zeer mee oneens	2. Mee oneens	3. Beetje mee oneens	4. Noch mee eens / oneens	5. Beetje mee eens	6. Mee eens	7. Zeer mee eens
Ons bedrijf verplicht zich tot het verbeteren van kwaliteit en het verlagen van kosten							
Ons bedrijf zoekt naar nieuwe technologische ideeën door 'outside the box' te denken							
Ons bedrijf verbetert continu de betrouwbaarheid van zijn producten en diensten							
Het succes van ons bedrijf is gebaseerd op ons vermogen om nieuwe technieken en methoden te verkennen							
Ons bedrijf creëert producten, diensten of methoden die innovatief zijn voor het bedrijf							
Ons bedrijf verhoogt het automatiseringsniveau in de operationele processen							
Ons bedrijf zoekt naar creatieve manieren om aan klantwensen te voldoen							
Ons bedrijf onderzoekt continu de tevredenheid van zijn bestaande klanten							
Ons bedrijf verfijnt wat het aanbiedt om bestaande klanten tevreden te houden							
Ons bedrijf betreedt pro-actief nieuwe markt segmenten							
Ons bedrijf bedient zijn bestaande klantenbestand zo maximaal mogelijk							
Ons bedrijf richt zich actief op nieuwe klantgroepen							

**Deel 2: De externe omgeving.**

<p>Voor elk item, beantwoord zoals dit geldt voor u en uw organisatie: 1 = Zeer mee oneens, 2 = Mee oneens, 3 = Beetje mee oneens, 4 = Noch mee eens/oneens, 5 = Beetje mee eens, 6 = Mee eens en 7 = Zeer mee eens.</p>	1. Zeer mee oneens	2. Mee oneens	3. Beetje mee oneens	4. Noch mee eens / oneens	5. Beetje mee eens	6. Mee eens	7. Zeer mee eens
De concurrentie in onze sector is moordend.							
Ons bedrijf moet regelmatig producten en methoden veranderen om concurrenten bij te blijven.							
Er zijn veel 'promotie oorlogen' in onze industrie.							
Producten/diensten raken snel verouderd in onze bedrijfstak.							
Alles dat een concurrent kan aanbieden, kan door anderen gemakkelijk worden gekopieerd.							
Acties van concurrenten zijn vrij eenvoudig te voorspellen. <b>(REVERSED)</b>							
Prijskoncurrentie is een kenmerk van onze industrie.							
Klantenwensen zijn vrij eenvoudig te voorspellen in onze bedrijfstak. <b>(REVERSED)</b>							
Men hoort bijna iedere dag wel van een nieuwe concurrerende manoeuvre.							
Technologie verandert snel in onze bedrijfstak.							
Onze concurrenten zijn relatief zwak.							



**Deel 3: De interne omgeving** (*centralization, culture strength, risk aversion, routinization, formalization, connectedness*).

<p>Voor elk item, beantwoord zoals dit geldt voor u en uw organisatie: 1 = Zeer mee oneens, 2 = Mee oneens, 3 = Beetje mee oneens, 4 = Noch mee eens/oneens, 5 = Beetje mee eens, 6 = Mee eens en 7 = Zeer mee eens.</p>	1. Zeer mee oneens	2. Mee oneens	3. Beetje mee oneens	4. Noch mee eens / oneens	5. Beetje mee eens	6. Mee eens	7. Zeer mee eens
In deze organisatie kan weinig actie ondernomen worden, totdat een leidinggevende een besluit goedkeurt.							
Onze medewerkers praten regelmatig over de manier van doen en de stijl van het bedrijf.							
Een persoon die snel zijn eigen beslissingen wil nemen zou in deze organisatie snel ontmoedigd worden.							
In ons bedrijf is er ruimschoots gelegenheid om informeel een praatje te maken met collega's.							
Het management is naar mening dat hogere financiële risico's de moeite waard zijn voor hogere beloningen. <b>(REVERSED)</b>							
Er zijn schriftelijke functieomschrijvingen voor alle functies binnen ons bedrijf.							
De taken binnen ons bedrijf zijn van dag tot dag hetzelfde							
Zelfs kleine zaken moeten worden goedgekeurd door iemand hogerop.							
Het management voert alleen plannen uit als ze er erg zeker van zijn dat ze zullen lukken.							
Een werknemer moet bij bijna alles eerst de directeur vragen voordat hij actie onderneemt.							
De prestaties van alle medewerkers van ons bedrijf worden schriftelijk vastgelegd.							
Het bedrijf heeft haar waarden kenbaar gemaakt door middel van een credo en doet een serieuze poging om het personeel deze te laten volgen.							

<p>Voor elk item, beantwoord zoals dit geldt voor u en uw organisatie: 1 = Zeer mee oneens, 2 = Mee oneens, 3 = Beetje mee oneens, 4 = Noch mee eens/oneens, 5 = Beetje mee eens, 6 = Mee eens en 7 = Zeer mee eens.</p>	1. Zeer mee oneens	2. Mee oneens	3. Beetje mee oneens	4. Noch mee eens / oneens	5. Beetje mee eens	6. Mee eens	7. Zeer mee eens
Medewerkers hier zijn gemakkelijk toegankelijk voor elkaar.							
Het management neemt graag grote financiële risico's. <b>(REVERSED)</b>							
In principe bestaat het werk van medewerkers binnen ons bedrijf uit het uitvoeren van zich herhalende werkzaamheden.							
Medewerkers worden nauwelijks gecontroleerd op het naleven van voorschriften. <b>(REVERSED)</b>							
Voor elke beslissing die een werknemer neemt, moet hij de goedkeuring hebben van zijn leidinggevende.							
Het bedrijf wordt beheerd volgens een beleid voor de lange termijn en oefent een ander beleid uit dan die van de huidige directeur.							
De taken binnen ons bedrijf zijn niet eentonig. <b>(REVERSED)</b>							
Leidinggevend en ontmoedigen medewerkers om werk gerelateerde zaken met anderen te bespreken dan met hem/haar. <b>(REVERSED)</b>							
In onze organisatie, moedigt het management de ontwikkeling van innovatieve producten en/of diensten aan, goed wetend dat sommige zullen mislukken. <b>(REVERSED)</b>							
Het werk in ons bedrijf is routine.							
Voorschriften en procedures nemen een centrale plaats in binnen ons bedrijf.							
Medewerkers in ons bedrijf voelen zich op hun gemak om elkaar in te schakelen als dat nodig is.							
Het management wil "op veilig spelen".							
Medewerkers in ons bedrijf doen veelal hetzelfde werk op dezelfde manier.							
Welke situatie zich ook voordoet, er zijn altijd procedures beschreven om met die situatie om te gaan.							

**Deel 4: De interne omgeving (*adaptability*).**

**LET OP!!!!**

Schaalwijziging

Hoe moeilijk is het voor uw bedrijf om strategische plannen aan te passen voor elk van de volgende situaties: 1 = Zeer moeilijk, 2 = moeilijk, 3 = redelijk moeilijk, 4 = Noch moeilijk/makkelijk, 5 = redelijk makkelijk, 6 = makkelijk, en 7 = Zeer makkelijk.	1. Zeer moeilijk	2. Moeilijk	3. Redelijk moeilijk	4. Noch moeilijk / makkelijk	5. Redelijk makkelijk	6. Makkelijk	7. Zeer makkelijk
Het opkomen van een nieuwe technologie.							
Veranderingen in de economische situaties.							
Het toetreden van nieuwe concurrenten in de markt.							
Veranderingen in de regelgeving van de overheid.							
Veranderingen in klanten behoeften en- voorkeuren.							
Aanpassingen in strategieën van leveranciers.							
Het zich voordoen van een onverwachte kans.							
Het zich voordoen van een onverwachte bedreiging.							
Politieke ontwikkelingen die uw industrie beïnvloeden.							

**Deel 5: De resource gedwongenheid.**

**LET OP!!!!**

Schaalwijziging

<b>Voor elk item, beantwoord zoals dit geldt voor u en uw organisatie: De schaal varieert van 1 = Geen effect op de output, tot 5 = De output zal verlagen met 20% of meer.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Neem aan dat als gevolg van een plotselinge ontwikkeling, 10% van de tijd van alle mensen die werkzaam zijn in uw bedrijf, moet worden besteed aan werk die geen verband houdt met de taken en verantwoordelijkheden van uw bedrijf. Hoe serieus zal uw output van uw bedrijf worden beïnvloed in het komende jaar?					
Neem aan dat als gevolg van een gelijkwaardige ontwikkeling, de jaarlijkse operationele begroting van uw bedrijf met 10% vermindert. Hoe sterk zal het werk van uw bedrijf worden beïnvloed in het komende jaar?					

## Deel 6: De bedrijf strategie.

Hieronder staan 11 groepjes van 4 stellingen. U wordt gevraagd om bij elk groepje de letter van de meest passende stelling te omcirkelen, of de gehele stelling **rood** te kleuren indien u de questionnaire digitaal invult.

**LET OP!!!!**

**Ga hierbij uit van de huidige situatie (dus niet de gewenste situatie).**

---

### 1. De producten en diensten die wij leveren aan onze klanten zijn het beste te beschrijven als:

- producten en diensten die over de hele linie innovatief zijn, continu veranderen en een breder aanbod bieden
  - producten en diensten die vrij stabiel zijn in bepaalde markten, maar innovatief zijn in andere markten
  - producten en diensten die goed gepositioneerd zijn, relatief stabiel en duidelijk gedefinieerd in de markt
  - producten en diensten die in een fase van verandering verkeren, en vooral een reactie zijn op kansen en bedreigingen vanuit de markt of omgeving
- 

### 2. Onze organisatie heeft het imago in de markt als een bedrijf dat:

- minder, maar exclusieve producten en diensten aanbied van hoge kwaliteit
  - nieuwe ideeën en innovaties overneemt, maar alleen na een gedegen analyse
  - reageert op kansen of bedreigingen in de markt om zijn positie te behouden of te verbeteren
  - de reputatie heeft innovatief en creatief te zijn.
- 

### 3. De hoeveelheid tijd die onze organisatie besteedt aan het volgen van marktveranderingen en trends kan het beste beschreven worden als:

- veel: we zijn continu bezig met het volgen van marktontwikkelingen
  - minimaal: we besteden echt niet veel tijd aan het volgen van marktontwikkelingen
  - gemiddeld: we besteden een redelijke hoeveelheid tijd aan het volgen van marktontwikkelingen
  - nu en dan: op sommige momenten besteden we veel tijd, en op andere momenten bijna geen tijd aan het volgen van marktontwikkelingen
- 

### 4. De toe- of afname in vraag die we hebben ervaren zijn het meest waarschijnlijk toe te schrijven aan:

- onze aanpak om ons te concentreren op het verder ontwikkelen van die markten die we reeds bedienen
  - onze aanpak om te reageren op spanningen in de markt door het nemen van weinig risico
  - onze aanpak om actief nieuwe markten te betreden met nieuwe concepten en programma's
  - onze aanpak om actief meer te investeren in onze bestaande markten, en tegelijkertijd nieuwe producten en diensten over te nemen na een zorgvuldige beoordeling van hun potentie.
- 

### 5. Eén van de meest belangrijkste doelen in onze organisatie is onze betrokkenheid en toewijding aan:

- het beheersen van de kosten
  - het zorgvuldig analyseren van kosten en opbrengsten, het beheersen van kosten, en het selectief ontwikkelen van nieuwe producten en diensten of het betreden van nieuwe markten
  - het zeker stellen van de beschikbaarheid en toegang tot mensen, middelen en uitrusting die nodig zijn om nieuwe producten, diensten en markten te ontwikkelen
  - het zorgdragen voor verweer tegen kritische bedreigingen door het nemen van elke actie die daarvoor benodigd is
- 

### 6. De competenties (vaardigheden) van onze leidinggevendenden kunnen het beste gekarakteriseerd worden als:

- analytisch: door hun vaardigheden kunnen ze zowel trends identificeren, als nieuwe producten, diensten of markten ontwikkelen
  - gespecialiseerd: hun vaardigheden zijn geconcentreerd rond één of enkele specifieke gebieden
  - breed en ondernemend: hun vaardigheden zijn divers, flexibel en stelt hen in staat om veranderingen te bewerkstelligen
  - adaptief: hun vaardigheden zijn gerelateerd aan de korte termijn vraag in de markt
-

**7. Het belangrijkste dat onze organisatie beschermt tegen concurrenten is dat we:**

- a. bekwaam zijn in het zorgvuldig analyseren van opkomende trends en alleen die trends overnemen die bewezen potentie hebben
  - b. bekwaam zijn in het buitengewoon goed doen van een beperkt aantal zaken
  - c. bekwaam zijn in het reageren op trends, ook als deze slechts een bescheiden potentieel hebben als ze opkomen
  - d. bekwaam zijn in het doorlopend ontwikkelen van nieuwe producten, diensten en markten
- 

**8. Ons management heeft de neiging om zich te concentreren op:**

- a. het behouden van een veilige financiële positie door het beheersen van kosten en kwaliteit
  - b. het analyseren van marktkansen en het selecteren van alleen die kansen met bewezen potentie, alsmede het behouden van een veilige financiële positie
  - c. activiteiten of bedrijfsfuncties die de meeste aandacht vragen, gegeven de kansen of problemen waar we momenteel mee geconfronteerd worden
  - d. het ontwikkelen van nieuwe producten en diensten en het uitbreiden naar nieuwe markten en marktsegmenten
- 

**9. Onze organisatie bereidt zich op de toekomst voor door:**

- a. het identificeren van de best mogelijke oplossingen voor die problemen of uitdagingen die onmiddellijke aandacht vereisen
  - b. het identificeren van trends en marktkansen die kunnen resulteren in de ontwikkeling van concepten of programma's die nieuw zijn voor onze industrie of nieuwe markten bereiken
  - c. het identificeren van die problemen, die wanneer ze verholpen zijn, het huidige productaanbod en marktpositie behouden en vervolgens verbeteren
  - d. het identificeren van die trends in de industrie waarvan concurrenten hebben bewezen dat deze lange-termijn potentie hebben, en ondertussen het oplossen van problemen die te maken hebben met ons huidige productaanbod en klantenbehoeften
- 

**10. De structuur van onze organisatie is:**

- a. functioneel: dat wil zeggen georganiseerd in afdelingen –marketing, financiën, personeelszaken, etc.
  - b. product of marktgeoriënteerd
  - c. voornamelijk functioneel (afdelingen), maar met een product- of marktstructuur voor nieuwe of grote afnemers en markten
  - d. continu veranderend om ons in staat te stellen om kansen te grijpen en problemen op te lossen, als deze zich voordoen
- 

**11. De procedures die in onze organisatie gebruikt worden om onze prestaties te beoordelen, het beste omschreven worden als:**

- a. gedecentraliseerd en gericht op het stimuleren van betrokkenheid van veel medewerkers
- b. sterk gericht op die prestatie-indicatoren die directe aandacht behoeven
- c. in hoge mate gecentraliseerd en voornamelijk de verantwoordelijkheid van het hogere management
- d. gecentraliseerd in gevestigde product- en marktgebieden, en meer gedecentraliseerd in de nieuwere product- en marktgebieden

**Deel 7: De mate van “Lean” implementatie.**

**LET OP!!!!**

Schaalwijziging

<p>Voor elk item, beantwoord zoals dit geïmplementeerd is in uw organisatie: 1 = Geen Implementatie, 2 = Weinig implementatie, 3 = Beetje implementatie, 4 = Veel implementatie, en 5 = Volledige implementatie</p>	1. Geen implementatie	2. Weinig implementatie	3. Beetje implementatie	4. Veel implementatie	5. Volledige implementatie
We hebben regelmatig nauw contact met onze leveranciers					
Onze leveranciers zijn direct betrokken bij de ontwikkeling van nieuwe producten.					
Onze leveranciers zijn contractueel verplicht om jaarlijkse kosten te reduceren.					
Elke dag wordt tijd besteed aan geplande onderhoudsactiviteiten aan apparatuur.					
Productie wordt 'getrokken' (Pulled) door de verzending van gereede producten.					
Wij zijn bezig om de instel tijden in onze fabriek te verlagen.					
Medewerkers op de werkvloer spannen zich in voor product/proces verbetering.					
Wij maken gebruik van visgraat diagrammen om oorzaken te vinden voor kwaliteitsproblemen.					
Wij hebben regelmatig nauw contact met onze klanten.					
Onze fabriek lay-out is gebaseerd op product families.					
Wij hebben een formeel leverancier certificatie programma.					
Wij maken gebruik van statistische technieken voor het verminderen van proces variatie.					
Wij geven onze leveranciers feedback op kwaliteit en leverprestatie.					
Onze klanten delen regelmatig informatie over de huidige en toekomstige vraag met de afdeling marketing.					
Wij onderhouden al onze apparatuur regelmatig.					
Wij bespreken belangrijke kwesties met onze belangrijkste leveranciers op topmanagement niveau.					

<p><b>Voor elk item, beantwoord zoals dit geïmplementeerd is in uw organisatie: 1 = Geen Implementatie, 2 = Weinig implementatie, 3 = Beetje implementatie, 4 = Veel implementatie, en 5 = Volledige implementatie</b></p>	1. Geen implementatie	2. Weinig implementatie	3. Beetje implementatie	4. Veel implementatie	5. Volledige implementatie
Onze klanten geven ons feedback op kwaliteit en leverprestatie.					
Wij maken gebruik van een 'pull' productie systeem.					
Apparatuur is gegroepeerd om een continu 'flow' van product families te produceren.					
Medewerkers op de werkvloer zijn essentieel voor probleemoplossende teams.					
Onze belangrijkste leveranciers beheren onze voorraad.					
Grafieken die fout percentages weergeven worden gebruikt op de werkvloer.					
Onze klanten zijn direct betrokken bij het huidige en toekomstige productaanbod.					
We onderzoeken de mogelijkheden van onze processen voorafgaand aan productlancering.					
Onze belangrijkste leveranciers zijn gevestigd dichtbij onze fabriek(en).					
Wij streven naar langdurige relaties met onze leveranciers.					
Onze medewerkers oefenen vaardigheden om de insteltijden van machines te verlagen.					
Producten worden ingedeeld in groepen met gelijkwaardige verwerkingseisen.					
Onderhoudsverslagen van apparatuur worden actief gedeeld met onze productiemedewerkers.					
Wij evalueren leveranciers op basis van de totale kosten en niet op kosten per product.					
We gebruiken Kanban, Squares, of Containers als signalen voor productiebeheersing					
Werknemers op de werkvloer krijgen cross-functionele training.					
Onze belangrijkste leveranciers, leveren aan ons op basis van Just In Time (JIT).					



<p>Voor elk item, beantwoord zoals dit geïmplementeerd is in uw organisatie: 1 = Geen Implementatie, 2 = Weinig implementatie, 3 = Beetje implementatie, 4 = Veel implementatie, en 5 = Volledige implementatie</p>	1. Geen implementatie	2. Weinig implementatie	3. Beetje implementatie	4. Veel implementatie	5. Volledige implementatie
Wij nemen actieve maatregelen om in elke categorie het aantal leveranciers te verminderen.					
Onze klanten zijn actief betrokken bij het huidige en toekomstige productaanbod.					
Productie op werkstations wordt 'getrokken' door de actuele vraag van het volgende werkstation					
Producten worden ingedeeld in groepen met vergelijkbare routing.					
We hebben lage insteltijden van machines in ons bedrijf.					
Bij veel apparatuur/processen op de werkvloer passen wij momenteel statistische procesbeheersing (SPC) toe.					
De werkvloer voert continu ideeën en suggesties aan.					
Wij houden uitstekende verslagen bij van alle aan apparatuur gerelateerd onderhoudsactiviteiten.					

**Deel 8: De “Lean Tools”.**

**LET OP!!!!**

Schaalwijziging

<p>Voor elke “Lean Tool”, beantwoord zoals dit geïmplementeerd is in uw organisatie: : 1 = Geen Implementatie, 2 = Weinig implementatie, 3 = Beetje implementatie, 4 = Veel implementatie, en 5 = Volledige implementatie. Indien u de “Lean Tool” niet kent: 6 = “Lean Tool” onbekend.</p>	1. Geen implementatie	2. Weinig implementatie	3. Beetje implementatie	4. Veel implementatie	5. Volledige implementatie		6. “Lean Tool” onbekend
5S							
Time & motion study							
Visual management							
Visual workplace / Visual thinking							
Spaghetti diagram							
Layout planning							
Single piece flow							
Poke Yoke (Mistake proofing)							
SMED (Single Minute Exchange of Die)							
Kanban (Pull) systems							
JIT (Just-In-Time)							
Production leveling (Heijunka)							
TPM (Total Productive Maintenance)							
Lean for office and administration							
Lean supply chain							
Kaizen event							
Value Stream Mapping (VSM)							
Brown paper (Makigami) for indirect processes							
FMEA (Failure Mode and Effect Analysis)							

<p>Voor elke “Lean Tool”, beantwoord zoals dit geïmplementeerd is in uw organisatie: : 1 = Geen Implementatie, 2 = Weinig implementatie, 3 = Beetje implementatie, 4 = Veel implementatie, en 5 = Volledige implementatie. Indien u de “Lean Tool” niet kent: 6 = “Lean Tool” onbekend.</p>	1. Geen implementatie	2. Weinig implementatie	3. Beetje implementatie	4. Veel implementatie	5. Volledige implementatie		6. “Lean Tool” onbekend
DMAIC (Define-Measure-Analysis-Improvement-Control)							
DMADV (Define-Measure-Analyze-Design-Verify)							
DFSS (Design For Six Sigma)							
OEE (Overall Equipment Effectiveness)							
Gemba							
A3 Problem solving							
Lean line design / 3P (Production, Preparation, Proces)							
Standard work for leaders							
TFM (Total Flow Management)							
VOC (Voice Of the Customer)							
Hoshin Kanri (Strategy deployment / X-matrix)							
PDCA (Plan-Do-Check-Act)							