Effects of Lean Management on Exploration in SME's

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Firms have the choice between two types of innovations, namely exploitation and exploration. Both concepts require a different way of thinking and organizing and therefore are somehow contradicting, resulting in a tension that needs to be managed. Further both kinds of innovation compete for scarce resources. Literature mostly focuses on larger firms so far, but especially SME's, which are usually shorter on resources and advances firm structures, need more attention. One suitable way proposed to improve efficiency and structures is lean management. Outcomes of lean management are widely known and mainly associated with exploitation. Nevertheless, affects on exploration may be present. This paper explores potential links between lean management and exploration in SME's by conducting a qualitative research. Possible, mediating variables are derived from the literature and summarized in statements, which are analyzed with a sample of eight SME's located in the Netherlands. Outcomes of this paper show, that lean management indeed affects not only exploitation, but also exploration in SME's. The results do not always show a positive relationship and not all firms agreed on certain remarks. Notwithstanding, it is shown that firms cannot exclude possible affects of lean management on radical, explorative innovations from their overall view. Further the outcomes suggest that literature generally has been too restrictive and should take possible side-effects into consideration.

Supervisors: Dr. Matthias de Visser and Dr.ir. Sandor Löwik

Keywords
Lean Management, Innovation, Exploration, Exploitation, Small- and medium-sized enterprises

IBA Bachelor Thesis Conference, July 3rd, 2014, Enschede, The Netherlands.

1. INTRODUCTION

As commonly known, a firm can pursue different innovation strategies. These are exploration and exploitation. The concept of exploitation is mainly associated with increasing efficiency and exploration refers to looking for new opportunities and staying flexible in the long-run. The two concepts are fundamentally different (He & Wong, 2004) and compete for resources (March, 1991). The tension between exploration and exploitation, which is present due to different task demands (Raisch & Birkinshaw, 2008) and different, often competing requirements in firm design (Tushman, Reilly, & Charles III, 1996) needs to be managed. Usually firms seek to find a good way to manage the paradox by mixing the two concepts to benefit from both, since it provides better long-term performance (Gupta, Smith, & Shalley, 2006) and sales growth (He & Wong, 2004).

It requires a certain amount of resources to utilize both strategies. Especially for small- and medium-sized enterprises (SME's) this might be problematic due to their limitations in resource availability (Lubatkin, Simsek, Ling, & Veiga, 2006). Not only because the survival of a firm is a financial issue mostly, but also because "…, returns from exploration are systematically less certain…" (March, 1991, p. 73), firms may be expected to see exploitation as most important. In case of SME's this might be at the exclusion of exploration. Disproving this assumption, March (1991) stated that none of the concepts can be used alone and further says: "… maintaining an appropriate balance between exploration and exploitation is a primary factor in system survival and prosperity" (p. 71). The question arising is, how SME's can manage to pursue both innovation strategies with their limited resource availability.

One frequently-mentioned concept aiming for more efficient resource utilization is lean management. (I. a. Behrouzi & Wong, 2011; Drohomeretski, Gouvea da Costa, Pinheiro de Lima, & Garbuio, 2014; Shah & Ward, 2003) By implementing lean management, organizations can create a focus and expertise in eliminating any wasteful activities (Anand, Ward, Tatikonda, & Schilling, 2009). As already mentioned, efficiency improvements are part of exploitation, therefore lean management can be seen as promoting exploitation. Whereas this relationship is obvious, an effect of lean management on exploration cannot be logically established on the first sight. Nevertheless a relationship between lean management and explorative innovations might be possible.

For instance, lean management can affect work processes in R&D with a focus on work teams (Shah & Ward, 2003). Further, the empowerment of workers, another lean management technique (Demeter & Matyusz, 2011), can lead to increased exploration by inspiring employees to think and contribute. Additionally it may be possible that the problem of resource scarcity can be tackled by lean management (Koukoulaki, 2014), which can be seen as an interesting effect when it comes to exploration.

Hence, SME's utilizing effects and influences of lean management to a higher degree, may be expected to be better at coming up with explorative, radical innovations. Therefore, this paper answers the following question:

How do aspects of lean management affect exploration in SME's?

Until now, literature about how SME's can handle exploration explicitly and on lean management in SME's in general is lacking. Scholars have discussed lean management and its concepts extensively. Advantages and outcomes are widely accepted and effects on exploitative activities can be found in many papers. Nevertheless, the literature is incomplete in different fields. First, lean management is rarely discussed for SME's, which are different in comparison to larger firms and therefore need to be considered differently under certain circumstances (Chang & Hughes, 2012). Second, lean management is almost exclusively discussed as a concept promoting exploitative actions and innovations. Even though this link is obvious and describes the main aim of lean management, side effects on the firm and its explorative innovations cannot be excluded from the overall picture. Therefore, this paper adds value to the great picture of lean management in the field of small- and medium-sized firms and explorative innovation and tries to start closing this gap in the literature.

Since this paper elaborates on certain effects of lean management, which can also have influences in addition to known outcomes, this topic is also interesting for practitioners. Whether a concept or practice has positive or negative side-effects, is important in many decision-making processes and therefore needs to be kept in mind by managers. Current literature and instructions do not take exploration into account sufficiently. Thus, the topic of this paper is of value for anyone engaged in lean management implementation and serves as a starting point for further discussions.

2. INNOVATION STRATEGIES

For grasping all aspects of this paper, it is important to understand the two different types of innovation and their classification. In order to get a better understanding about the trade-off and different requirements between these two innovation types, the tension between exploration and exploitation and different concepts of balancing them (as a way to benefit from both) are described in this section. Exploration and exploitation and their differences are elaborated first. Afterwards, the concepts of *ambidexterity* and *punctuated equilibrium* as the two possibilities of managing the tension are defined.

2.1 The different Types of Innovation

As commonly known, innovations can be divided into two types, namely exploration and exploitation. This differentiation is necessary, since the two types require a different type of thinking, such as commitment vs. thoughtfulness, narrowness vs. breadth and cohesiveness vs. openness (March, 1996).

The differentiations scholars make are manifold. For instance, O'Reilly III and Tushman (2008) say that "Exploitation is about efficiency, increasing productivity, control, certainty, and variance reduction. Exploration is about search, discovery, autonomy, innovation and embracing variation." (p. 189) Further, exploitation is associated with refinement, choice, production, selection, implementation, execution (March, 1991), convergent thinking, commercial thinking (Andriopoulos & Lewis, 2009) and the past of the organization (Smith & Tushman, 2005). On the contrary, additional key words of exploration are risk taking, experimentation, flexibility (March, 1991), novelty (Andriopoulos & Lewis, 2009) and the future of the organization (Smith & Tushman, 2005). In sum, it can be said that exploitation is about focusing on short-term competitiveness through efficiency and commercialization of incremental improvements, whereas exploitation concerns the flexibility and adaptability of the organization through variation and novelty, usually expressed by more radical processes or product changes (Andriopoulos & Lewis, 2009; Smith & Tushman, 2005).

According to March (1991) both concepts needs to be managed, even though they conflict. One way to manage the tension caused by the different approaches needed is ambidexterity,

which is a concept describing the way an organization can handle two conflicting actions simultaneously (I. a.Birkinshaw & Gupta, 2013; Chang & Hughes, 2012; O'Reilly III & Tushman, 2008). The second possibility would be a punctuated equilibrium where long phases of exploitation are interrupted by short phases of exploration (I. a.Gupta et al., 2006; Mudambi & Swift, 2011; Romanelli & Tushman, 1994). Both concepts are defined in the following two sections.

2.2 Ambidexterity

Generally, ambidexterity can describe a firm's ability to manage any two opposed things, which are in conflict, at the same time (Gibson & Birkinshaw, 2004; O'Reilly III & Tushman, 2008). Nevertheless, the term ambidexterity is mostly used to describe a dynamic capability in dealing with the conflict between exploration and exploitation innovation (O'Reilly III & Tushman, 2008). For instance Lubatkin et al. (2006) state: "…ambidextrous firms are capable of exploiting existing competencies as well as exploring new opportunities with equal dexterity" (p. 647). Additionally, O'Reilly III and Tushman (2008) argue that "ambidexterity suggests that under certain well-specified circumstances, it may be possible for organizations to pursue both exploration and exploitation" (p. 202). The need for ambidexterity is grounded on the presence of tensions between exploration and exploitation, which are present due to different task demands (Raisch & Birkinshaw, 2008) and different, often competing requirements in firm design. (Tushman et al., 1996) Even though the two innovation strategies are competing for scarce resources, both are essential and need to be managed simultaneously (He & Wong, 2004; March, 1991).

Scholars have identified two different kinds of ambidexterity, namely *structural ambidexterity* (also architectural ambidexterity) and *contextual ambidexterity*. On the one hand, structural ambidexterity means that different types of innovation are conducted in different units or groups and is usually associated with dual structures and strategies with a clear differentiation between exploration and exploitation (Gupta et al., 2006). On the other hand, "contextual ambidexterity is the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit" (Gibson & Birkinshaw, 2004, p. 209)

2.3 Punctuated Equilibrium

The alternative to balancing exploration and exploitation simultaneously is a punctuated equilibrium. A punctuated equilibrium describes the process of switching between exploitation during stable periods to exploration during the time of unstable conditions and disruption (Mudambi & Swift, 2011; Romanelli & Tushman, 1994). Similarly, Gupta et al. (2006) state that a punctuated equilibrium is a temporal differentiation, whereas ambidexterity is an organizational differentiation. Interestingly, Mudambi and Swift (2011) found that R&D expenditure volatility in punctuated equilibrium is positively related to firm growth, but the relationship is weaker for diversified firms.

3. DEFINITION OF LEAN MANAGEMENT

The first attempts in becoming a lean thinking firm were taken by Toyota from the 1950's onwards (Morris & Lancaster, 2006); at this time, the term *lean* was not used, yet. Later, the terms *lean production* and *lean manufacturing* were used by scholars and practitioners. During the 1990's, it was argued that the concept of lean may be more sophisticated and widespread, therefore *lean management* or *lean industry* (Warnecke & Hüser, 1995) were proposed terms.

This paper uses the term *lean management* (Sometimes referred to as *lean*), but makes no explicit distinction between the different terminologies for three reasons. First, this paper takes a holistic view and does not only look at production or manufacturing, but at all entities of the firms, which is important since exploration can take place at different fields throughout the organization. Second, a differentiation between different entities is hard to make, because the implementation of lean management at different corporate and complexity levels requires similar prerequisites as for example an appropriate culture (Martínez-Jurado & Moyano-Fuentes, 2014). Third, this paper looks at the firm itself and does not include its surroundings; therefore *lean industry* would be too broad.

3.1 Elimination of waste

One element which is discussed extensively is the elimination of waste. For example Behrouzi and Wong (2011) stated: "Particularly, managers have attempted to enhance productivity and eliminate waste through lean manufacturing techniques" (p. 388). Waste is mainly defined as non-value adding activities (Koukoulaki, 2014), but also can be excess inventory or capacity (Shah & Ward, 2007). The aim of the reduction of wasteful activities or practices is an efficient system "… which uses less of every resource to produce the same (or even more) amount of products…" (Behrouzi & Wong, 2011, p. 289), in the end, this can lead to improvements in competitiveness (Drohomeretski et al., 2014). In order to achieve higher efficiency and a reduction of waste, concepts as just-in-time (Behrouzi & Wong, 2011; Koukoulaki, 2014), reduction of human effort, stocks, delivery time and production space (Staats, Brunner, & Upton, 2011), work teams and cellular manufacturing (Shah & Ward, 2003) are named most in literature.

3.2 Continuous improvement

A second key point of lean management often named in the existing literature is continuous improvement. It can be seen as a fundamental foundation of lean (Drohomeretski et al., 2014) or as an aim firms try to achieve through initiatives such as lean (Voss, 2005). Koukoulaki (2014) links the elimination of waste and continuous improvements and states that "… work processes are designed to eliminate waste (muda) through the process of continuous improvement (Kaizen)" (p. 200). Yet, others see continuous improvement only as one activity out of many associated with lean (Demeter & Matyusz, 2011). It can be concluded that different scholars have different ideas about the exact role continuous improvement plays, but widely agree that continuous improvement is an important part of lean management.

3.3 Quality

The third most widely mentioned part of lean management is quality, which is usually measured in customer satisfaction. Already Womack, Jones, and Roos (1990) named lean management as a better way of making things. According to Staats et al. (2011), lean aims to deliver high quality products at the lowest price. The same opinion is represented by Demeter and Matyusz (2011) who state that the objective of lean is to "… satisfy the customer needs on the highest possible level…" (p. 154). As said by Staats et al. (2011), efficiency and low-price quality are occurring simultaneously in lean firms, whereas customer satisfaction may also be achieved as an outcome of the elimination of waste (Demeter & Matyusz,

2011). Further, Behrouzi and Wong (2011) found scholars, who linked customer satisfaction with continuous improvement.
To summarize, literature most widely names the same or similar concepts and agrees on the main characteristics regarding lean management. Nevertheless, disagreement of the exact correlations is present. Some state that the different characteristics named above take place simultaneously, whereas others think of them as different steps causing or influencing each other. An appropriate term capturing the reasons for lean is used by Chen, Li, and Shady (2010) who say that lean can improve a firm's *overall competitiveness*.
One definition proposes: "*Lean production is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability*" (Shah & Ward, 2007, p. 791) Since this paper takes an internal view on companies and in order to account for all characteristics found, it is based on the following, altered definition:

Lean Management is an integrated system whose main objective is to improve competitiveness through continuous improvements in eliminating waste and quality.

4. RESEARCH DESIGN

The aim of this research is to find information on *lean management* and *explorative innovation* and the *relationship* between these two factors in *SME's*. For this purpose this paper uses literature from which statements are derived (See **5. Effects of Lean Management on Exploration**). For the evaluation and analysis of the proposed statements and to find further propositions from professional practitioners, a qualitative data research is conducted. Basically, two methods are possible. Besides qualitative research, also quantitative research can be conducted. On the one hand, quantitative data research looks for statistically significant relations (Gläser & Laudel, 2010, p. 27). This kind of research usually uses big samples for evaluating known hypothesis and theories (Brüsemeister, 2008, p. 19 and 26). It therefore has a more deductive nature. On the other hand, qualitative research usually generates hypotheses and theories based on qualitative data (Brüsemeister, 2008, p. 26) and has a more inductive nature. Since qualitative research is about gaining insights on beliefs and behavior (Draper, 2004) through direct communication, it is more suitable for this paper, because it tries to find connections and practices and cannot be based on extensive literature.
The advantage of using statements is that they function as guidelines and key points during the interviews which are conducted. During the conversation they ensure flow and lead the interview into the right direction. The statements should capture today's literature and propose possible links between lean management and exploration by looking at different aspects of lean management which may play a role.
A possible downside of statement-guided interviews is the decreased freedom of answers given. Through statements, propositions or hypotheses, interviewees can be led to certain answers resulting in biased outcomes. To overcome this issue, additional questions about the examined topic are asked, resulting in answers unrelated to the statements. On the basis of these answers and additional messages, all direct outcomes of the statements are inspected and discussed further, increasing the validity of this research.

4.1 Sample

This paper uses a sample of eight firms in total (See **Table 1**). Each company is located in the Netherlands and is chosen on the basis of several, equally important criteria. The first criterion is the size of the firm. That means that each company has to be an SME, which is defined as a firm with a maximum of 250 employees. In order to be sure that certain structures are in place, SME's with less than 20 employees are not considered. Secondly, lean management is a criterion. Each case of this sample has not only lean management implemented, but also experience with its effects. Third, companies in this sample have to be engaged in manufacturing, for the reason that lean is said to have the main influence in production. Lastly, the structure of the company plays a role. Only firms which develop and innovate their own products are considered.

4.2 Measures

Prior to the interviews, a main part of this qualitative research, the companies get a questionnaire (See **Appendix**). The questionnaire is built for former work and is constructed for the evaluation of internal and external factors of the organization, the tension between exploration and exploitation, and lean management. Many components from the questionnaire are not crucial for this paper, nevertheless the fact that the questionnaire is needed for other papers and comparisons, makes them necessary. Only four factors are used in this paper. (1) The *company strategy* plays a role, since it may influence how companies weight exploration. The company strategy could be *Defender*, *Prospector*, *Analyzer* or *Reactor* (Miles, Snow, Meyer, & Coleman, 1978). This is measured on a scale by (Conant, Mokwa, & Varadarajan, 1990). (2) The *degree of exploration and exploitation* is measured on a 7-point-scale by Lubatkin et al. (2006) rounded to one decimal. (3) The *degree of lean implementation* is measured on a 5 point scale by Shah and Ward (2007). (4) For the analysis of lean tools, the questionnaire proposes 31 lean tools. For the analysis the total number of *lean tools known and implemented* is important, followed by the *degree of implementation of tools* on a 5-point scale, where the total score (If the company checked "1" on a certain tool, this is not counted, since "1" equals no implementation) is divided by the total number of lean tools (31 tools).
Besides the data from the questionnaire, the firms were asked for their *innovation strategy* during the interviews. This can either be *focus exploitation*, *focus exploration*, *contextual ambidexterity*, *structural ambidexterity* or *punctuated equilibrium*. The rounded scores and results of the questionnaires and the innovation strategy are summarized in **Table 2**.

The interviews are conducted in all eight firms following the same structure and topics. Answers and quotes from the interviews are used to evaluate the statements emerged from the literature. Since literature does not examine the relationship of lean management and exploration sufficiently, this paper follows a more explorative approach and tries to find new answers and viewpoints on the relationship. Additionally to questions regarding the statements, interviewees are questioned on lean management and exploration more generally and to give their opinions on effects of lean management on exploration and radical improvements.

5. EFFECTS OF LEAN MANAGEMENT ON EXPLORATION

As stated above, exploration and exploitation should not be considered separately to the exclusion of the other. Managing both, either through ambidexterity or a punctuated equilibrium, is vital for any company. As mentioned by March (1991), an exploitation focus, without considering exploration to a

sufficient extent, can have negative impacts on the survival of an organization. Further, Andriopoulos and Lewis (2009) say that "… exploratory efforts help continuously renew and expand a firm's knowledge base, but without exploitation that knowledge may not be utilized fully (e.g., recombined in varying ways across projects or product iterations). In essence, the two modes of innovation are mutually reinforcing." (p. 708)
Even though many studies recommend certain ways of structuring and organizing conditions, "… such prescriptions do not apply directly to SME's" (p. 12), due to different conditions (Chang & Hughes, 2012). Usually, the balance between exploration and exploitation is secured by appropriate control systems (McCarthy & Gordon, 2011). More, the authors explained that different combinations of control mechanism can temporary lead to different balances, either low balanced ("Low balanced ambidexterity is when a firm's level of exploitation is significantly lower than that of exploration, and vice versa" (McCarthy & Gordon, 2011, p. 254)) or high balanced ("…high balanced ambidexterity is when a firm has similar moderate levels of both exploration and exploitation" (McCarthy & Gordon, 2011, p. 254)). As with other solutions, these mechanism may be inhibited by *limited resources* in an SME (Cao, Gedajlovic, & Zhang, 2009; Taylor & Taylor, 2014), which forces SME's to use resource as efficient as possible with preferably no waste.
As defined in **3.1 Elimination of Waste**, lean management is associated with the elimination of waste. Waste can be further divided into (1) *unnecessary spent money* and (2) *lost time*. In terms of money, theory about lean management suggests practices which are tackling problems caused by e.g. *work-in-progress*, *excessive inventory*, *overproduction* and *unnecessary equipment setups* and *repairs* (Chen et al., 2010; Demeter & Matyusz, 2011; Ismail, Ghani, Ab Rahman, Deros, & Haron, 2014). With regards to time, lean management theories suggest for example *JIT-practices* and *workflow optimization* (Demeter & Matyusz, 2011; Ismail et al., 2014; Lyons, Vidamour, Jain, & Sutherland, 2013). Therefore it can be assumed that lean management can contribute to exploration by increasing resource availability for explorative innovation practices.
It is important to divide between money and time, since they represent two different types of resources which are differently influenced by several lean management tools and practices. Whereas some tools and practices focus on flow, speed or value adding work (time-related), others have a higher influence on stock level or mistake proofing (money related). Different firms can be expected to utilize different types of tools and techniques, therefore a differentiation between money and time can deliver a more accurate outcome of this research.
Based on this argumentation, the following two statements are postulated:

Statement 1*: Through lean management, an SME saves money, which can be spent on exploration*

Statement 2*: Through lean management, employees in an SME save time, which can be spent on exploration*

As defined earlier, lean management is suggested as a set of tools or a way of thinking to improve efficiency through the elimination of waste, among others (I. a.Behrouzi & Wong, 2011; Drohomeretski et al., 2014; Koukoulaki, 2014). On the first sight, this is related to exploitation. Still, different tools linked to lean management may enhance the process of exploration. Tools can be certain ways of thinking or practices. Usually these practices follow a predefined structure or strive towards a special aim. Examples of those tools are *PDCA*, *DMAIC*, *VOC* and *DMADV*. In *PDCA* (Plan - Do - Check - Act) the checking phase can be especially important for radical changes. A checking phase during the design process, in addition to the usual checking, ensures higher standards in the development of new products, which may decrease the need for redesigns. Therefore the overall process of radical innovations can be speeded up. Similar to this checking phase, is the measurement phase of *DMAIC* (Define - Measure - Analyze - Improve - Control). Especially the *VOC*-concept (Voice of the Customer), which is sometimes, but not always, seen as a part of DMAIC, captures the importance of the market needs in exploration. Because, as commonly known, many innovations are "pulled" by consumers or customers. The same phase can be found in *DMADV* (Define - Measure - Analyze - Design - Verify). In addition, this concept takes design and verification into account, which can play an important role in explorative innovations.
On top of these tools, the *Kaizen* approach ("The goal of Kaizen is to involve every employee in thinking up small improvement ideas on a regular basis" (Chen et al., 2010, p. 1071)) can contribute to explorative innovations. According to Lyons et al. (2013) "attempting to release the talents and creativity of people is a ubiquitous lean driver and ambition" (p. 478). Thus, lean can promote factors contributing to the process of exploration.
Not only the individual tools and approaches can promote exploration, the overall aim and outcome of lean management may also advance exploration. A focus on *workflow control* (Demeter & Matyusz, 2011; Ismail et al., 2014), *lower variability* in tasks (Shah & Ward, 2007) and *implementation of changes* as part of lean (Ismail et al., 2014) may speed up the tasks of R&D or engineering departments. If employees from units, departments or teams linked to exploration are able to speed up their processes, explorative innovation can be finalized quicker.
Based on this argumentation which indicates that lean process structures can also promote exploration, the following statement is proposed:

Statement 3*: By implementing lean management throughout the whole organization, the new process structures can improve the process of taking explorative actions, which enable the SME to come up with more radical innovations.*

McCarthy and Gordon (2011) highlight that the balance between explorative and exploitative innovations is not as static as other scholars imply; instead it is a dynamic problem. This is caused by the shifting environmental conditions over time. Shifting environments obviously need different approaches. Kim and Rhee (2009) say that managers need to "… pay more attention to the internal variety of their organizations" (p. 36), in order to balance the two types of innovation. But instead of increasing staff turnover as the solution, individual skills, knowledge, learning and sharing should be encouraged (Kim & Rhee, 2009).
Besides the clearly exploitative approaches and techniques of lean management, it can also be seen as a socio-technical system (Shah & Ward, 2007), which includes the notion of people and their individuality. Further, techniques as *Kaizen* demand employees to learn continuously and keep their eyes open for improvements. This encouragement can be seen as *promoting skills*, *knowledge* and *learning*, which in turn enhances organizational *variety*. According to the argumentation by McCarthy and Gordon (2011) stated above, this boosts the firm's ability to manage not only exploitation, but also exploration. Additionally to the fact that employees are used to thinking and improving instead of only executing, such employee involvements as part of lean can even strengthen the *creative thinking* (Lyons et al., 2013).

This effect obviously is possible in every kind of organization. Nonetheless, it can be expected to be prevailing in SME's due to their specific characteristics. Antony, Kumar, and Madu (2005) identified SME-specific factors as for instance a *culture of learning and change*, *lower standardization* and *informal working relationships*. Logically, these factors can be associated with the creativity- and variety-enhancing processes described above.
According to literature lean management seems to have positive effects on exploration, especially in SME's. Hence the following statement is put forward:

***Statement 4**: Lean management encourages employees in SME's to think and learn, which leads to more new ideas for explorative innovations*

6. RESULTS

The answers given during the interviews are used to evaluate the four statements derived from the literature. In addition to the direct answers, remarks, if existing, are used for further evaluation. This section displays only the plain results, showing which companies agree and which do not. The discussion and analysis of the results can be found in **7. Discussion**. All statements and comments are clearly linked to the data (Company #, h:mm:ss). This ensures transparency (Draper, 2004).

***Statement 1**: Through lean management, an SME saves money, which can be spent on exploration*

To the questions whether they agree with this statement, seven companies answer with a yes (Company 1, 2, 3, 5, 6, 7 and 8). The reasons mentioned are for example an estimation of 20% waste reduction in terms of money through the implementation of lean management (Company 3, 1:01:00), which highlights the saving potential, "we need to stay ahead" (Company 1, 2:19:10) accentuating the importance for reinvesting in exploration or the remark that indirect effects as resource availability are possible (Company 6, 1:00:20).
The statement is not validated by company 4. Even though it is stated that "we are making money with lean" (1:07:15), company 4 relies on their annual budget for exploration and new product development, independent of additional money savings. (1:23:00)

***Statement 2**: Through lean management, employees in an SME save time, which can be spent on exploration*

Statement 2 is validated by all firms. Arguments for the validation of this statement are given extensively by different firms. Company 1 expresses that lean focuses on flow (1:51:40). Company 3 says about the lean management effects on R&D employees: "when they start with that product, they will also finish that at one time. And they don't start, and then stop, and then start again, and then stop. So focus." (1:25:05) Company 4 sees effects regarding time for exploration especially for their engineering department (1:31:00), whereas company 5 articulates that "You can get to exploration more easily, because more people tend to think about a solution or a breakthrough solution" (1:27:40) and: "If you are engaged in your company, if you have trust in your company […] of course you have more output." (1:37:30) Further specifying the effects of lean management, company 6 and 8 state that: "Lean has influence on the producibility of the product" (Company 6, 58:50), lean increases engagement (Company 8, 17:30) and: "That must be the intention that one gets more time for executed developments of new products for example." (Company 8, 34:05)

***Statement 3**: By implementing lean management throughout the whole organization, the new process structures can improve the process of taking explorative actions, which enable the SME to come up with more radical innovations.*

This statement is approved by six companies (1, 2, 4, 5, 6 and 7); only company 3 disagrees. Company 1 articulates that "Exploration is everybody's Job" (1:40:15), which captures the lean approach of including all employees and "there is more integration there." (2:10:35) Additionally, company 4 mentions that lean makes employees more enthusiastic (1:08:00) and company 5 states that: "If you see the innovation, even exploration also as a process, you can standardize that process as well, which then leads to more profits and therefore a positive relationship" (1:52:00). Further, company 6's agreement is expressed by: "lean management enables you to become more flexible and thus better serving the market".
Neither agreement nor disagreement can be analyzed for company 8. Even though the general answer to statement 3 and 4 is positive including the notion that it is theoretically possible, it is also stated that they "do not want that" (32:20). Shortly after, it is further said that lean has negative effects on explorative innovations (33:25). Since these different attitudes can lead to different outcomes on the question whether lean management can enhance explorative processes, company 8 should neither be counted as being in favor nor being against the third and fourth statement.

***Statement 4**: Lean management encourages employees in SME's to think and learn, which leads to more new ideas for explorative innovations*

In total, six companies verify this statement (1, 2, 3, 4, 6 and 7). Company 1 supports this statement with the notion that lean management increases the creativity of employees (2:14:50); it is argued that: "you challenge people. That's basically what you do. You stress their mind" (2:15:26). Further reasons for agreeing with the enhancement of employee's creativity caused by lean management are for instance given by company 4 which says that pressure from lean enhances creativity (1:18:12). Furthermore company 6 states: "Focus on lean in your organization will change the process of thinking of people" (1:00:50).
Explicitly disagreement is expressed by company 5: "In the way we do lean it had a diminishing effect on exploration, absolutely. Because we were more methodologically busy with the process of innovation." (1:48:40)
Again, no answer can be analyzed for company 8, for the reasons stated above.

7. DISCUSSION

In this chapter, the validation or disagreement on the four statements and possible reasons are analyzed further. Then, additional opinions and statements, expressed during the interviews are evaluated. For both purposes, the answers from the questionnaire (**Table 2**) are used in addition to the interviews, including *lean implementation* and *lean tools*, *scores for exploration and exploitation*, and *company and firm strategy*.
Throughout the discussion of results, the following inconsistency should be kept in mind. Company 2 did not fill in any information on lean tools. They ground this decision on the fact that they pursue their own lean tool capturing the most

important advantages of other approaches. Therefore company 2 cannot be used for analysis when it comes to numbers and implementation of lean tools, which is not mentioned explicitly during the discussion.

Statement 1 (*Through lean management, an SME saves money, which can be spent on exploration*) is approved by seven companies (1, 2, 3, 5, 6, 7 and 8) and only company 4 disagrees. On the one hand, the potential of lean management to save money is highlighted by all firms, which is obvious, since this is one of the main drivers of the implementation of lean management (Koukoulaki, 2014; Shah & Ward, 2007). Examples of statements are: "it focuses on eliminating waste and adding value" (Company 1, 1:54:49), "Product is better. Less waste, so you earn more money." (Company 2, 28:45) and "we are making money with lean" (Company 4, 1:07:15). Nevertheless, the sampled companies disagree on the question whether this money can be spent on exploration. On the one side, company 1, 2, 3, 5, 6, 7 and 8 agree by stating for instance that more exploration would be good if only more resources would be available (Company 6, 44:25) and "We say, if there is a good innovation, or good exploration, or even good exploitation, then money should not be the issue" (Company 7, 1:10:45). On the other side, company 4 answers statement 1 with no, referring to its annual innovation budget which would not be changed (1:23:00).
These differences cannot be explained by strategy-scores from the questionnaire. The company strategies of agreeing organizations vary between prospector (Company 3 and 7), defender (Company 8) and analyzer (Company 1, 2, 5and 6). Company 4 also pursues a prospector-strategy. Therefore, there is no obvious link between the company strategy and agreement on statement 1. The same accounts for the innovation strategy, where company 4 chooses contextual ambidexterity. The agreeing firms take punctuated equilibrium (Company 1, 2, 5 and 7), focus exploitation (Company 8) or also contextual ambidexterity (Company 3 and 6). A similar picture is given, when looking at the scores for lean implementation, the degree of exploitation and exploration and lean tools.
Correctly it must be said that most sampled companies qualify their answers when asked for reasons. Company 1 for example agrees with statement 1, but adds the notion that new money would be spent on both innovation types (2:19:00). Company 7 said: “When the money is there, then we are using it for exploitation or for exploration" (1:12:15) and company 5 adds that money can be spent on anything, including exploration. Company 8 expresses that new money would be mainly spent on new machines (exploitation) (25:15), even though they agree with statement 1 in the first place. Not only the positive answers must be altered, also company 4 gives contradictive remarks by saying that exploration is lower than it would ideally be, which is due to limited resources (1:04:05). Therefore the answers on statement 1 must be seen with caution. Of course, not all available money is spent on exploration only; the same accounts for unexpected money, which is additionally saved by lean management. By looking at the interviews it can be assumed that it is generally possible that a surplus of money is used for increasing the exploration budget, but this is depending on whether the ideal extent of exploration is already present or need to be achieved through further investments.

Statement 2 (*Through lean management, employees in an SME save time, which can be spent on exploration*) is agreed on by all companies. For instance company 1 says: "Chase the bottlenecks. Always chase the bottlenecks" (1:42:50). Company 7 further specifies: “I think when you are going to work lean, then the different departments will get more time for the exploration” (1:20:15). More detailed reasons, how lean management can increase the time for explorations are given by companies 2 and 6 who name flexibility as an important factor. Company 2 says: "it goes faster, and is stable, we are more flexible. It is easier to switch to other products” (12:10) and "Lean makes us more flexible that is also the reason we can make more innovations." (29:15), and company 6 states: "lean management enables you to become more flexible and thus better serving the market” (1:01:40).
Therefore, it can be said that lean management can increase the time available for employees to work on radical improvements and products, possibly through higher flexibility.

Statement 3 (*By implementing lean management throughout the whole organization, the new process structures can improve the process of taking explorative actions, which enable the SME to come up with more radical innovations*) is validated by six companies (1, 2, 4, 5, 6, and 7) and declined by company 3 (No analysis of company 8, see **6. Results**). Using the results from the questionnaire, the different company strategies of the firms do not shine light on the reasons for agreement and disagreement. Whereas company 3 follows a prospector strategy, strategies for the agreeing companies vary between analyzer (Company 1, 2, 5 and 6) and prospector (Company 4 and 7). Further, company 3 pursues contextual ambidexterity, whereas the other companies follow a punctuated equilibrium (1, 2, 5 and 7) or contextual ambidexterity (4 and 6).
Additionally, the degree of exploration and exploitation is measured by different questions in the questionnaire. The scores for the agreeing firms vary between 4,8 and 6,2 (average of 5,6) for exploration and 4,7 and 6,5 (average of 5,7) for exploitation. Company 3 scores 5,8 for exploration and 5,0 for exploitation, which leads to the conclusion that the extent to which the sampled firms focus on the different innovation types does not affect their decision on statement 3 either.
Furthermore, the degree of lean implementation is measured in addition to total implemented lean tools and a score for those tools. In lean implementation, company 3 scores a 3,5 in total. The other companies average is 3,6 with variations from 3,2 to 4,5. Whereas company 3 is almost on average for the extent of lean implementation compared with the agreeing firms, this picture looks different for lean tools. Company 3 knows and has implemented 11 lean tools, which is at the lower end of the range of the sample. Similarly, they only score 1,3 on lean tool implementation. Only companies 4 and 7 scored similarly low; if they are crossed out, company 3 scores much lower than all agreeing firms. While the low score calculated for company 7 is hard to explain, reasons for the low score of company 4 can be found. Company 4 has a lean-tools-score of 1,2 and 11 implemented lean tools. The reason why company 4 scores much lower than most other agreeing firms may be, that they limit their agreement to the engineering department (1:31:00). It is expressed that most explorative actions are still in the hand of the top-management and that lean management therefore only has narrow promoting effects. Therefore, a tendency can be observed with only one exception (Company 7). The numbers given above indicate that the implementation and total number of lean tools may play a role when it comes to effects of lean management on process structures for exploration. Generally, firms are expected to start with the most widely known tools and techniques. The most famous tools are concerned with the elimination of waste mainly. Approving, company 1 said: "you always start with the obvious” (1:59:00) referring to the elimination of waste, which is seen as the first aim of lean management (Demeter & Matyusz, 2011). Therefore, it can be proposed that the number of lean tools and the degree of the

implementation of these tools can indicate, whether an SME experiences process improvements for explorative actions.
Not always do process improvements lead to a higher number of radical innovations as proposed in this paper. For instance, does company 3 describe the process effects as: "Commercially best ideas go first" (18:35). Nonetheless, enhancing effects on the time, an explorative product development takes, are identified. Company 1 describes the effect as accelerated evolution and names a "focus on moving the products to the customer" (1:51:30) as part of lean management.
Concluding on statement 3, this paper proposes that the number of total explorative innovations may be increased by process improvements caused by a higher number and implementation of lean management tools. Nevertheless, one company (7) as an exception has to be kept in mind.

Statement 4 (*Lean management encourages employees in SME's to think and learn, which leads to more new ideas for explorative innovations*) is accepted by all firms, except company 5 (No score for company 8, see **6. Results**). The analysis of results from the questionnaire does not bring any explanation why only company 5 disagrees. In all categories they lie in between the range of the agreeing companies, mostly even close to the average. The only exceptions are known lean tools and the degree of exploration, where company 5 scores at the upper end of the range of the other firms but does not stand out in any way.
The explanation why they disagree may lie in the complexity of lean management as a concept. Different definitions of lean management consider different factors; this clearly indicates that the implementation of lean management can have different effects. Company 1 expresses that "You utilize the brains of everyone in your company" (2:15:10), which considers the incorporation of all employees. Another point is mentioned by company 2 and 7 which say: "I think all people who work here enjoy to work here. And also they always came with ideas. Low hierarchy." (Company 2, 16:50), "I think there is more space to have more creativity" (Company 2, 17:48) and "I think it is improving the creativity of the employees. You are not telling them, they are only here for the money; you are telling them that it is important to improve" (Company 7, 1:09:45). All quotes imply the notion that low hierarchy and personal space caused by lean management can lead employees to think and create new solutions, hence being creative. That this can be important for innovations is stated by company 6 by saying that exploration and product development is not only caused by customers or market conditions, but also by own ideas (45:50).
Whereas the quotes above imply different outcomes and effects of lean management, which are positive for creativity and learning, company 5 disagrees and states: "lean management gives more structure and structure is not always helpful when it comes down to creativity." This quote denies statements 4, but captures an additional outcome of successful implementation of lean management, namely the focus on workflow.
All in all it can be said that lean management forms structures that can inhibit creativity and learning, but at the same time increase time and space for more thinking and learning. The complex construct of successful lean management seems to have different effects on different firms. It can be concluded that individual structures, preferences and workflow can influence, whether statement 4 is true or not. Different productions, size, skills, etc. may play a role; therefore statement 4 cannot completely be validated for SME's in general.

In addition to the statements, companies are asked to give their general opinion about the relationship between lean management and exploration. While most companies give statements which are in line with the discussion above, two additional points are mentioned by some interviewees.
First, companies 1 and 2 add that employees like to work caused by lean management and that this may boost their ability and motivation to contribute to radical changes and good ideas. Both companies mention that lean management can add fun to the work. Company 2 says: "I think it creates the fun factor in your work" (2:38:20). Additionally, company 2 states: "One indirect effect is that people are more happy" (31:10). Company 2 further adds: "People are healthier. It is easier to make more production in less time" (30:22). Both factors, *fun* and *health*, contribute to the overall motivation of people, which cannot only be logically linked to the second statement, but also have general effects. On the one hand, people who are motivated usually work faster and therefore may have more time available (statement 2). On the other hand people may be more enthusiastic during explorative work, which can increase the quality and speed of this work itself.
Another point mentioned is the *design* of a radically changed product. Company 1 expresses: "What is a very good way of making it cheaper? Looking at the design with lean eyes" (2:12:12), which includes the notion that R&D or other departments responsible for product design need to keep those lean processes in mind, taking place further down the value stream in the company. Connected to design, company 8 additionally states: "quality becomes better" (35:00). This is also shown by the statement of company 3: "And being a customer means, if the one department is the customer of the other, they have to deliver a product with a good quality" (1:03:30). This statement does not only include that R&D needs to lean production in mind; it furthermore implies that product quality can be increased by lean practices. The definition of lean management used in this paper also incorporates the quality factor, nevertheless the definition limits quality to how the customers see the price/performance relation. The comment by company 3 focuses on product performance for the production. This mainly means less failures, mistakes and downtimes through lean (Company 3, 1:01:50). In the end it comes down to money and time that can be saved, which in turn can contribute to the discussion of statement 1 and 2.

8. SUMMARY & CONCLUSION

Based on statements derived from the literature, assumptions concerning lean management effects on exploration are tested by qualitative interviews in eight SME's. From this research it can be said that lean management definitely has an influence on exploration in SME's. If this is always present or positive could not generally be said.
All sample companies agree that money and time can be saved by successful implementation of lean management. Concerning additional money, no agreement is given to whether it is always spent on exploration. Whereas some samples indicate that both innovations deserve a raise in resource allocation, others would not change budgets. On the contrary, it can be said that additional time availability is always seen as promoting radical, explorative innovations.
Further, all companies express that structures caused by lean management definitely influence the development of exploratory actions. Unfortunately, the sampled SME's do not agree if these effects are positive or negative. While lean structures seem to speed up development processes, not all firms experience this effect. It is found that those firms have implemented a lower number of lean tools. Hence, it is concluded that organizations which are still concerned with the basic tools of lean management do not experience exploration-

friendly effects caused by lean structures, but those which are using more tools do.

Furthermore, this literature review suggested that lean management encourages employees to think and learn and thus find solutions, which is validated by most of the companies. Nonetheless, it is also mentioned that lean structures focusing on workflow may also inhibit creative thinking and the development of own ideas.

It seems like that it depends on the individual firm, how exactly exploration is influenced by their lean thinking; sampled firms cover a wide spectrum of different opinions. Some interviewees indicate that they only see an indirect relation: “I think that’s more an indirect effect" (Company 1, 2:34:05), whereas others make a distinction between departments: “But when one uses lean only for certain fields, then lean may accompanies innovations" (Company 8, 35:55). Company 5 even says: "I would think, also culture wise, lean management has a negative effect on exploration and a positive on exploitation" (1:50:55).

Therefore, this paper concludes that lean management affects exploration in SME’s, either positively or negatively, through the factors examined; possibly, there are more factors. How the exact effect looks like, depends on the individual firm. The main contribution this paper delivers is the demonstration that a focus on the relation between lean management and exploitation is not sufficient. Lean management has many side effects that need to be kept in mind. Practitioners should take a holistic viewpoint on their organization in order to be able to evaluate all effects, control outcomes and prevent negative side effects. This paper also demonstrates that positive effects are possible in most cases, if managed right.

9. LIMITATIONS AND FURTHER RESEARCH

There are several limitations present in this research that needs to be considered. First, the sample size is rather low with only eight firms. Second, interviewees have different positions within their firm and therefore possibly different insights and knowledge reflected by their opinions. Third, the drawback of statement needs to be kept in mind, which basically means that proposed statements may lead to biased answers. Whereas the first two flaws can be overcome by extending the sample size, the third limitation needs more attention for future research. For this purpose it may be a good way, to intensify literature research and come up with more statements that ideally lead to unbiased answers. Nevertheless, this is hard to achieve, since biases are one of the major drawback of qualitative research (Draper, 2004).

One point, which is no real limitation of this paper, but needs to be dealt with in future research, is the fact that companies almost always see lean management as promoting exploitation only. It needs to be made clear that interviewees accept the possibility of effects on exploration.

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APPENDIX:

Table 1: Sample Firms

	Industry (of the company)	Company size (# of employees)	Respondents position
Company 1	Aerospace	130	General Manager
Company 2	Building & Chemical	180	HR Manager
Company 3	Agriculture & Lawn care	40	Company Director
Company 4	Semiconductors	90	Financial Director
Company 5	Paper	150	HR Manager
Company 6	Instruments for measuring, testing and navigation	94 (+up to 100 temporary workers)	Plant Manager
Company 7	Internal logistics & vertical transport	50 (+20 temporary workers)	Production Manager
Company 8	Packaging from paper and paperboard	80	Operations Manager

Table 2: Company Scores

	Company strategy	Lean Implementation				Tension		Lean tools			Innovation strategy
		Supplier related	Customer related	Internal related	Total	Degree of Exploitation	Degree of Exploration	Score lean tools	Lean tools known	Lean tools implemented	
Company 1	Analyzer	3,6	5,0	4,8	4,5	4,8	6,5	3,5	25	25	Punctuated Equilibrium
Company 2	Analyzer	3,6	4,4	4,0	4,0	6,2	5,8	*	*	*	Punctuated Equilibrium
Company 3	Prospector	3,1	4,0	3,4	3,5	5,8	5,0	1,3	11	11	Contextual Ambidexterity
Company 4	Prospector	3,5	3,6	2,5	3,2	5,3	4,7	1,2	13	11	Contextual Ambidexterity
Company 5	Analyzer	2,8	3,8	2,9	3,2	6,2	5,5	2,5	29	19	Punctuated Equilibrium
Company 6	Analyzer	2,7	3,6	3,5	3,3	5,0	6,2	2,0	26	17	Contextual Ambidexterity
Company 7	Prospector	2,8	3,4	4,0	3,4	6,0	5,7	1,3	12	11	Punctuated Equilibrium
Company 8	Defender	2,8	3,0	3,4	3,1	5,3	5,3	2,1	28	23	Focus Exploitation

*Company 2 did not fill in any information on lean tools (See **7. Discussion**)

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:

m.g.j.siemerink@student.utwente.nl

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:

Maarten Siemerink:
Tel: 06-57160248
Mail: m.g.j.siemerink@student.utwente.nl

Deel 1: De mate van exploratie / exploitatie.

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.	**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.

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.	**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. **(REVERSED)**							
Prijsconcurrentie is een kenmerk van onze industrie.							
Klantenwensen zijn vrij eenvoudig te voorspellen in onze bedrijfstak. **(REVERSED)**							
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*).

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.	**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. **(REVERSED)**							
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.							

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.	**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. **(REVERSED)**							
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. **(REVERSED)**							
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. **(REVERSED)**							
Leidinggevenden ontmoedigen medewerkers om werk gerelateerde zaken met anderen te bespreken dan met hem/haar. **(REVERSED)**							
In onze organisatie, moedigt het management de ontwikkeling van innovatieve producten en/of diensten aan, goed wetend dat sommige zullen mislukken. **(REVERSED)**							
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 concurrente 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!!!!

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.	**1**	**2**	**3**	**4**	**5**
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 houd 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?					

Schaalwijziging

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).

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

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

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

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

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

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

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

a. onze aanpak om ons te concentreren op het verder ontwikkelen van die markten die we reeds bedienen
b. onze aanpak om te reageren op spanningen in de markt door het nemen van weinig risico
c. onze aanpak om actief nieuwe markten te betreden met nieuwe concepten en programma's
d. 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.

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

a. het beheersen van de kosten
b. 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
c. het zeker stellen van de beschikbaarheid en toegang tot mensen, middelen en uitrusting die nodig zijn om nieuwe producten, diensten en markten te ontwikkelen
d. het zorgdragen voor verweer tegen kritische bedreigingen door het nemen van elke actie die daarvoor benodigd is

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

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

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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

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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

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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

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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

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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

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	**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 gerede 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.					

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	**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).					

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	**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

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.	**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)							

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.	**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)							