

From cars to care

*- A literature study of the diffusion of Lean from
Toyota to the Norwegian hospital setting*

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Abstract

Background: During the past 10 years, Norwegian hospitals has subjected to frequent organizational changes. One organizational method or idea that is currently diffusing in the Norwegian hospital setting is the Lean philosophy and method. This method is a tool that can be applied to change the way that hospitals are organized. Lean is a production and operations management philosophy developed by the Japanese car manufacturer Toyota, and thus its principles comes from the manufacturing sphere. Further, as Lean has diffused into the Norwegian hospital setting, there has been identified a scarcity of studies on its trajectory. There is a lack of studies, which focuses on Lean's trajectory and diffusion from Toyota to the Norwegian hospital setting.

Objective: To map the diffusion of the Lean philosophy and method from Toyota into the Norwegian hospital sector. Further, this thesis also seeks to undertake a theoretical analysis and discussion of Lean's fit with the hospital setting.

Method: The study is based on the qualitative methods of literature and document study of both primary and secondary sources. Sources used were those that were publicly available either online or in the form of books.

Results: Lean was found to be used across the Norwegian hospital sector, with the University Hospital of North Norway (UNN) aiming to become a fully Lean hospital. Before the period of 2010-2011 there were only a few smaller Lean projects in addition to the one at UNN, however more have followed during that period with two new Lean hospitals being planned. This point implies that Lean is starting to become a myth in the Norwegian hospital setting. Regarding the issue of Lean's fit to the hospital setting, it has been found that there is a mismatch between the manufacturing and professional organizational types

Conclusion: The diffusion process of lean has through this thesis been identified to have taken the pathway from Toyota, through both the American and Danish hospital setting before entering the Norwegian setting in 2007. For the fit of Lean to the hospital setting, the view has been found to be divided and somewhat problematic. Thus, Leans fit would depend on whose eyes one sees through, as the method already shares some properties with the health care professionals work culture.

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Acronyms and abbreviations

DUO	Digitale utgivelser ved Universitetet i Oslo Digital publications at the University of Oslo
HF	Health trust
IMVP	International Motor Vehicle Program
INTORG	Helseforetakenes interne organisering og ledelse Health enterprises internal organization and management
JIT	Just-in-Time
MIT	Massachusetts Institute of Technology
NORA	Norwegian Open Research Archives
NRK	Norwegian broadcasting corporation
UiO	Universitetet i Oslo
OUH	Odense Universitetshospital
SMED	Single minute exchanges of dies
TPS	Toyota Production System
UNN	University Hospital of North Norway Trust
VMPS	Virginia Mason Production System

1 Introduction

Organizational changes have become an integrated part of the daily life of Norwegian hospitals, as their internal organization have been subjected to frequent changes during the last 10 years (Kjekshus and Bernstrøm, 2010). The organizational changes might result from new organizational ideas, which may come from other successful organizations where the idea has been a contributing factor to their success. If an idea is known to be the contributing factor to success at one organization, then it might become highly attractive and popular in the organizational sphere and thus ending up as a myth (Røvik, 1998, 2007). Throughout the recent years, health care has started to take in ideas originating from operations management and logistics, which is highly related to the production industry. One such idea or method originating from process management and logistics is the Lean philosophy and method (van Lent, 2011).

Lean has its origination from the Japanese car manufacturer Toyota, who through adaptation, integration and domestication of selected elements from the American car manufacturer's production systems, developed the Toyota Production System (TPS). However, Lean was first defined through the book "*The machine that changed the World*" by Womack, Jones and Roos (1990) where TPS were introduced and defined as "*Lean production*". This classical operations management book was a result of research undertaken by the MIT International Motor Vehicle Program (IMVP) and have played central role in the diffusion of the Lean concept outside Japan (Holweg, 2007). Lean's more or less official entrance to the hospital sphere was when Virginia Mason Medical Centre in Seattle, Washington become the first American full scale Lean hospital in 2002 (viriniamasoninstitute.org, 2011). However, the entrance into the Norwegian setting is somewhat a bit unclear, but one can find sings of its entrance through the *Health enterprises internal organization and management report series* (INTORG) of 2009. In the INTORG 2009 report, one was for the first time given Lean as an option related to a question regarding the hospitals use of different organizational tools (Kjekshus and Bernstrøm, 2010).

Mapping processes sends one out on a journey to unknown fields, enabling the creation of a visual picture of any processes flow and path that items and ideas may undertake. Thus from the time gap between the time of Virginia Mason Medical Centre starting to use Lean and the INTORG report of 2009, a map of information on Lean's journey into the Norwegian hospital

setting is in the missing. In addition to lacking a roadmap up to 2009, more years have passed by and thus new roads have created without any Lean map.

1.1 Objective of the study

Through this study, I aim to map out the diffusion of Lean from Toyota to the Norwegian hospital sector. The study will focus on identifying the current and previous users of Lean as an organizational method within the hospital sector through using a method that is a hybrid of a literature review and a document study of publically available information. This identification process will also investigate the diffusion pattern through identifying the contributing actors and inspirational sources.

Then next, the thesis would seek to connect the results of the mapping process with organizational theory to see if it can highlight parts of the Lean philosophy. Thus, the theoretical analysis and discussion will focus on Lean's fit in the hospital setting by using Mintzbergs theory of organizational forms, together with the instrumental and cultural-institutional perspective. This analysis will by using such organizational theories, aim to pinpoint different aspects of Lean's fit with the hospital setting. However, from the organizational theory some expected findings emerge in relation to how Lean fits into the hospital organization. From the New Institutionalism perspective, myths are viewed as popular organizational trends. One may then expect to find that Lean is, or at least is on the way to becoming such a myth within the Norwegian setting. As popular ideas travel both within and outside organizational settings, the actors involved in the diffusion influence the idea by their translation and transformation (Røvik, 1998). By applying the theory of translation and transformation to the case of The University Hospital Northern Norway (UNN), one can gain insight into how the theory was applied in UNNs setting compared with Toyota's approach.

2 Theoretical framework

To be able to study and analyze the theme from the general research problem one needs a theoretical foundation to be the anchor for the thesis. As this thesis seeks to discover and describe the path of Lean from Toyota to the Norwegian Hospital Setting, establishing a general understanding of the differences among organizations and their interactions with external factors is necessary to understand the pathway and transferring process of Lean. In addition to the need of understanding different perspectives and structures of organizations, a framework for analyzing the diffusion of organizational ideas must also be present. Thus, after establishing the theoretical framework, it is then possible to go ahead with an analysis of how Lean has traveled from Toyota to the Norwegian Hospital Sector, and how it the transformation and translation process has taken place into the health care setting.

2.1 Organizational theory

Organizations are everywhere in society, such as in the form of universities and hospitals, in fact it might be one of the most common characteristics of modern societies. Even though they are a dominating part of the society, defining them is difficult as is dependent on what paradigm of examination is at interest. In other words, what kind of theory is seen as the “*right one*” will steer the definition of an organization. These differences in defining organizations often start with an image of what kind of an organization it is (Scott and Davis 2007). Such images can place a hospital and its divisions in different lights. For example, a hospital can be viewed as a machine, which can be used to accomplish its goal of treating sick people. Other ways of viewing the hospital can be to look at the departments as small societies with their own structure and culture, or to see each department as users of the available resources at the hospital, such as resources from the radiology and laboratory units. By having such different images and views of what an organization is the diversity acts like a driver for organizational research, looking at the parts and aspects of organizations. From viewing organizations in different lights, the organizational perspective divides into the instrumental and institutional approach (Christensen, Lærgreid, Roness and Røvik 2004, Scott and Davis 2007). In addition, one does also find differences between organizations in other ways, such as in the organizational structure, which varies between the types of organizations

(Mintzberg, 1979). Following this introduction, this chapter will provide a presentation of the two main organizational perspectives, followed by the myth perspective.

2.1.1 Instrumental perspective

The instrumental perspective is a product of the rational instrumental traditions, which both links and connects several schools of thought and theorists from the 20th century. Those schools that connect and give rise to the instrumental perspective are Taylor's scientific management, the classical traditions of administrative theory by Fayol and Gulick, and Weber's bureaucracy theory, as well as Simon's administrative behavior (Røvik 1998, Scott and Davis, 2007). As the instrumental perspective derives from a connection of several schools of thought, a common underlying layer connects these thoughts and ideas together. This underlying layer is what characterizes the view of organizations as tools or instruments to reach its predetermined formal goals, thus while being a fully rational actor (Røvik, 1998). Further, the behavior of both the organization and its participants are in some way similar to agents who act purposefully and in coordination, and are driven by the mix of mutual organizational goals and rationality (Scott and Davis, 2007). This steering by rationality derives from the previously mentioned rational system theories, where goal specificity and formalization are an important and central part of the theory. By having such clear determination of the goals, both the organization and the participants may undertake rational assessments and choices when having to select among different alternative activities. Thus, the starting point of the instrumental perspective centers on the understanding of both the goal and goal-mean (Scott and Davis 2007, Christensen et.al 2004). Everything compares in some way to the organizational goal. By examining the actions undertaken and their results, one can see how they relate to, and if they are in line with these mutual goals or not. Goal specificity is how the organization relates to the concept of desired ends. When selecting which activities are to be performed, the selection criteria are driven by the pre determined mutual goals (Christensen et.al 2004). The more specific they are, the more unambiguous the decision process becomes for the organization as a whole. Therefore, the more vaguely defined the goals are the harder it becomes to frame an organizational structure that enables the organization to pursue the goals.

In the instrumental perspective, the organizational structure has a formal shape, which implies the existence of a formalized structure through governing rules for the participants' roles and

relations (Scott and Davis 2007, Christensen et.al 2004). Generally, the formalization of organizational roles is a way of implementing behavioral standards in order to make the participants' behavior more predictable. Through this construction of work routines, the organization itself seeks to improve the rationality behind both the behavior and decision-making undertaken by the participants within a complex organizational system. In addition, the formalization in itself is somewhat of a visualization of roles and principles that are steering the organizational behavior. With the visualization of the workflow and processes, external observers may be able to map the flow of both information and materials within the organization (Scott and Davis 2007, Christensen et.al 2004). How the structural framework of the organization is shaped may vary between organizations within the instrumental perspective. At one end of the organizational structure-scale lies Weber's bureaucratic format, which is colored by the three factors of hierarchy, division of work and routines. The work activities undertaken regularly by the organizations participants are in this bureaucratic format clearly specified as official duties or routines. By dividing work and implementing routines, groups relating to concrete tasks are created, which affects the horizontal specialization. As for the scope of authority, the participants and their offices follow a hierarchy line, where each lower organizational part is controlled and supervised by a higher one. With hierarchy, the vertical organizational flow or coordination line is where both work and routines steers from, as well as the path of information from the bottom to the top (Christensen et.al 2004). Specialization is also possible through the vertical organizational lines by assigning specific tasks to different levels of the organization. From the description of the bureaucratic theory of Max Weber, division of work and routines may fluctuate around both the horizontal and vertical structure of the organization. Variation in the structure is what characterizes the differences between organizational formats and types, and how the horizontal and vertical structure is structured determines the level of organizational complexity.

2.1.2 The cultural perspective

Organizational culture is one concept that is hard to define, as it is used in fundamentally different ways throughout the theoretical framework. According to Smircich (1983 in Scott and Davis 2007), one can divide the use of culture in the theoretical sense between the assumption of organizations having or being in possession of culture vs. the view of organizations as being the culture. Then, if the organization is the culture, the possibility for

change is eliminated, as the organization itself becomes static. Based on this reason, the theory used further will be in connection to the view of culture as a dynamic property.

The idea of culture and institutions

The general idea of culture in the organization setting relates to the dynamic between the formalized control system on one side and the common beliefs and norms of the participants on the other (Jacobsen and Thorsvik, 2002). The organization's participants employ sets of beliefs and norms that function as a compass when it comes to orientation and governing within the organization (Scott and Davis, 2007). One can say that the culture is the meat and the blood within the organizational framework, and that these features grow out of socialization between the organization's participants. This growth of informal norms from the formal framework is a gradual process that results in the creation of institutionalized features. The growth and institutionalism factor is by Philip Selznick (1957 in Christensen et. al 2004) a classical division line between the informal framed cultural perspective and the more formal instrumental perspective. As the gradual creation process of these institutionalized features goes on, the organization transforms into an institutionalized organization (Christensen et. al 2004). From this, an analogy can be drawn to nature by describing the organization as an organism that gradually continues to develop and so attains institutionalized features. Then, when viewing organizations through the institutional framework, the changes and developments appear as a natural adaptation process. As the organism changes through the internalization of norms, the populist influence on the participants' behavior and obligations in addition to their commitment to the common values within the organization, leads to the formation of a distinct character or culture in the organization (Scott and Davis 2007). When institutionalized features grow into and attach to an organization, the level of complexity increases as it becomes less flexible to new demands. However, it simultaneously also gains new qualities that may be necessary for it to be able to solve tasks better and function better as a social community (Christensen et. al 2004).

The understanding of the concept of organizational culture

Within the area of organizational culture, one of the many sides focuses on social variables, such as the aspect of organizational survival. As there is always insecurity related to the organizations ability to survive and continue existing, the organizational culture is a factor

that serves to contribute to its continued existence by holding on to patterns in the institutionalized setting (Christensen et. al 2004).

A basic understanding of the implications of organizational culture is a shared perception of what is important and right, in addition to norms validated by the organizations participants. Due to the organizational culture containing both observable and unobservable elements, as an analogy of an iceberg can be used as a visualization of the culture. This iceberg analogy connects to Schein's three-leveled model of organizational culture (Schein, 2004). The model starts with the observable artifacts, which are visible but hard to interpret. Such observable artifacts may be the structure and processes of an organization that one acquires through contact and interaction with a group for the first time, without any preexisting knowledge about the culture. How visible the culture is to an observer depends on the depth and transparency, which goes from the apparent and observable to the level of deeply integrated and hidden characteristics. Following the artifact level are the espoused beliefs and values. This encompasses shared ideals, goals and values that may or may not guide the group behavior within an organization. The last level is the basic underlying assumptions, which capture the unconsciousness of the group, or their beliefs, and assumptions that are in a sense taken for granted within the group. The group has developed a consensus of common beliefs and assumptions after repeatedly having success with applying certain beliefs and values to given problems and challenges (Schein, 2004).

After some time, the basic underlying assumptions will serve as the group norm and make behavior based on other premises unthinkable/unrealistic. Changes at these levels are found to be hard, as it requires altering the stable framework that further implies a destabilization of it (Schein, 2004). By alteration of the stable framework, the group must engage in a learning process of "*breaking the frames*" and review the basic assumptions. This process would, as mentioned, challenge the stability and so liberate anxiety within the group (ibid). These basic assumptions are in a way a picture and reflection of their culture. It is a defining factor guiding such a social unit in what to focus on, give attention to and how to both interoperate and react to various situations.

Culture is in a way the pillar and foundation of a social unit. So, for the culture to change one need to keep it in an objective position, which opens up for alterations and thereby allowing for cultural growth (Schein, 2004). Further, the ability of successfully change the culture is reliant on two key factors. The first factor is the management of concerning moments and the

second factor is assessing the potential for those new learning moments. As new groups are founded through a stream of members joining in, a cultural development within occurs as their entry brings in cultural moments and aspects from their previous learning and social experiences. Through the process of a newly established group creating a shared history, new and shared assumptions develops based on critical moments (Christensen et.al 2004, Schein 2004).

2.1.3 The Myth perspective

One field within New Institutionalism is the myth perspective. The focus in this perspective is on the dynamic influences between organizations and through the institutional surroundings and socially created norms. Within the surrounding environment, a collaboration of socially created norms sends out signals to organizations on how those similar to each other should be shaped and organized (Scott and Davis 2007). In addition, this surrounding environment often influences the organization's behavior when it comes to taking in and implementing myths and the ideas that follows with them. Going through this jungle of organizational ideas is not a walk in the park, as these popular ideas or myths move around organizations as immaterial ideas. Such myths are created within the surroundings of the organizations, and thus they are defined as socially created norms within the institutional environment of organizations. The movement pattern of ideas that later become myths allows for a more flexible interoperation of them (Christensen et.al 2004, Røvik 1998, 2007).

Popular trends are not limited to the world of high fashion, but also applicable in the world of organization theory through the myth perspective. Many organizations want to follow the so-called high fashion of organizational styles and ideas, and thus use popular myths until they become unfashionable (Christensen et.al. 2004, Røvik 1998, 2007). This analogy to the fashion industry continues further as there are more similarities between myths and traditional fashion. Thus, as high fashion trends differ between seasons and periods so do the myths as they can take on different forms. Such forms can be super standards, institutionalized standards or as 'organizational' recipes (Røvik 2007). In addition to the forms, the similarity continues on to the diffusion timeline when an idea takes off and becomes popular then the speed of diffusion increases through different channels. Another aspect of the diffusion is the manner that a myth taken in to the organization, which somewhat resembles a fitting process as the organization that considers taking it in would adjust it so that it would fit to the context

(ibid.). The fitting process of these ideas that follows with a myth takes either the form of translation or transformation, and the form is dependent on the organizational goals. Further, the fitting result may lead to imitations or a pure showcase adaptation where it has no instrumental effects other than being a showcase for the organization that uses it (Christensen et.al 2007, Røvik 2004). Organizations and “*fashionistas*” are thus similar in the way that they are following popular trends under the manner of seeking legitimacy from its surrounding environment. They both want to achieve acceptance with the surrounding environment and show that it is living up to such fundamental western modernizing norms (Christensen et.al 2004).

2.2 Translation – the path of a myth

The translation theory of organizational ideas is somewhat similar to the literary translation process, though it is also somewhat different. For literary translation, the translator works on both sides when both translating and transferring the text in one single operation. This is however not necessarily the case when translating organizational ideas from one context to another. The organization translation theory can be divided into two main genres: the de-contextualizing and the contextualizing practice (Røvik 2007).

2.2.1 De-contextualization

The de-contextualization genre is a term used to describe the translation process of turning a known practice or worded idea into a transferrable idea. Hence, the goal of de-contextualization is to extract and transport the concept of a practice out of the original context in the form of an idea (Røvik 2007). This extraction method is an open process when compared with literary methods, as the ideas are circulating in the surrounding environment between actors and at different speed. Further, de-contextualization divides into two main analytical parts that to some extent overlap, which is secession and wrapping. Secession refers to the identification of an idea in a specific organization which is then transferred out as knowledge, and the wrapping is the idea being taken out of the context and reshaped or just generalized. Out of these two, the wrapping method is less dependent on the context due to its reshaping factor, thus it is more likely to be transferrable. Secession divides further into extraction and delivery, which are two different strategies of the translation practice (ibid.).

In the extraction strategy, the actors who are working with the translation and transformation process are not directly involved with the organization. Further, this process can be either systematic or unsystematic. With an unsystematic process, the external translator is not intentionally looking for an explicit good practice, however stumbles upon one. In contrast, the systematic process is a rational concept that uses different techniques to identify good organization practices. Common terms used to describe good practices extracted from organizations that are perceived to be doing quite well are best practice (BP) and benchmarking (Christensen et.al. 2004, Røvik 2007). Consultant companies are actors who are often involved in the process of identification and diffusion of BP and benchmarking into other areas. Even though the consultant companies perform the extraction under the best means, there possible fall pits for the translation. There is a possibility for the extractor to miss essential parts of the ideas and its surrounding organization due to the choice of translation method. Further, the extractors can have too many balls up in the air and because of that not get good enough information, or it might be too far away and thus only getting second hand information. However, an extreme case would be that the consultant firms could create a pseudo BP, based on elements from different best practices (Røvik 2007).

Delivery describes practice of translation when an actor with the knowledge of a successful organizational practice or idea takes the information out of that context, and presents it to the surrounding area and arenas of the organization (Christensen et.al. 2004, Røvik 2007). This practice is in a way comparable to how a professor gives lectures on his or her research to both students and other professionals. In the case of the professor, he or she is then in possession of knowledge on their own research, hence becomes the insider who communicates to others about the practice or idea. Thus, the translation method of delivery takes a different way compared to when consultant firms are involved. This difference lies generally in the placement of the both direct knowledge and experience as well as the experiences in presenting such ideas to other arenas outside the organization. Further, the delivery is also dependent on how the lecturer has shaped the ideas into the presentation format, and if the delivered ideas are in accordance to with the practice being portrayed. The presentation given can have either at a high configuration, which gives a detailed picture of the relevant conditions for its success or a low configuration that is not fulfilling the details. Such indicators of high or low configuration relates to the theoretical frame of context and placing. The focus is on the placement of the ideas within a timeframe and the possibility of

training participants, in addition to the placement of the lecturing organizations in the presentation (Røvik, 2007).

2.2.2 Contextualization

With the contextualizing practice of translation, an idea travels from one context to another, which can be across the organizational fields. As the idea is not static, a new setting can affect and alter the original idea. The chain of translation within the contextualizing setting may take a hierarchical form. This form is thus steered by a set of logic conditions and expectations, which influences the selection of central actors, areas and context that the idea is to be introduced. By arranging the process in such way, the freedom is limited so that the translation and implementation by contextualization becomes the truth with modifications (Røvik, 2007). However, the process of translation is subjected to rules that are applicable when ideas are reshaped from one context to another. One such rule is the enrollment rule, which cover the interpretation of an idea in the local context when accounting for time and space. The point with this rule is to make an analytical tool for the history of the idea by making it recognizable in the local contest with a past and a future. In addition to the enrollment rule, there are further more principles for translation within this practice of translation, which relates to the three modes of reproductive/copy-, modifying- and the radical mode. These three modes reflect the degree of change or translation the original idea has gone through with the chain of translation: if it is a pure copy, remolding or a radical change (Christensen et.al 2004, Røvik, 2007).

From the introduction of the myth perspective and its following framework for translation of practices and ideas, a frame for analyzing ideas and its translation path has been established. The two possible translation paths of organizational ideas can be through either de-contextualizing or contextualization, where the general differences between those are the starting point. De-contextualization translates successful practices into ideas versus contextualization extracts ideas and translates them into practice. Further, these two translation genres help analyze both the creation and diffusion of such an organizational idea and possible myth like Lean. By the help of extracted points, it would then be possible to map out the organizational recipe of Lean all the way from Toyota to its use in the Norwegian hospital sector.

2.3 Hospitals as organizations

Hospitals are complex organization, especially when compared to the traditional industrial organizations. Their complexity lies mainly in the production process featured at the hospital, as it has a strong connection to the strictly professional workforce that is in charge patient treatment (Shortell and Kaluzny, 2006). The following section presents several theoretical approaches in viewing hospitals organizational structure and the role that the structure plays when implementing change.

2.3.1 Organizational structure

As hospital is considered a professional bureaucracy due to its size, complexity of employees and the management chain (Mintzberg, 1979). However, its main difference from the industrial organizations machine bureaucracy lies in the position of standards, which in the hospital are placed outside the structure by the self-governing professionals and their interaction with colleagues. In this form of professional bureaucracy, the organizational authority is placed with these highly professional employees and their expertise. Another aspect of the hospital organization is the structure, which follows a bureaucratic and decentralized framework, and thus it is dependent on the standardization of the professionals' skills. This basic structural formation of any organization consists of five basic parts, which is illustrated through Figure 1. The size and shape of these parts depends on the type of organization, which this is the reason behind the difference between the hospitals and other types of organizations such as an industrial organization (Mintzberg, 1979).

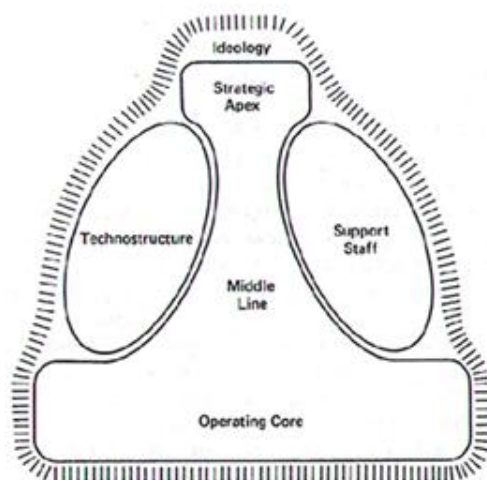


Figure 1. The six basic parts organizations. From Mintzberg (1979, p.20)

In general, any given organization has a base or an operating core that consists of those who perform the basic work within the production. Within the hospital, this operating core serves as the key part or core of the organization (Mintzberg, 1979). It is there the professionals, such as the medical doctors are located. The professionals are working more or less independently from each other but interact closely with the patients who they provide medical care and treatment. While most professionals work independently from each other, they are not unfamiliar with interacting with other professionals (ibid.). However, they conduct this interaction in a somewhat automated manner that is in accordance to their own expectations of each other. It is their knowledge and set skills, which automate the professionals' coordination, and in addition, it relates to standardization of their work tasks. Even so, independent of the level of standardization, none of the professionals will apply them in the exact same way. On the opposite vertical end to the operating core lays the strategic apex, consisting of managers that have an overview of the whole organization system. In this part of the structure, it can either be one or several managers. Thus, the number of managers will depend on the organizational structure of the organization or in this case the hospital (ibid.).

Looking back on Figure 1, next to the vertical shape that consists of the operating core and strategic apex structure, one finds the supporting staff. In the hospital organization this functions is an important part, since it functions as it assists and backs up the operating core through helping out with the formalized routine work. Another side in the professional bureaucracy structure of a hospital one finds the techno structure (Mintzberg, 1979). This part of the structure is responsible for both planning and formalizing the work of professionals, however its importance limits to the non-professional side of the hospital. Back in the vertical structure in between the strategic apex and the operating core, one finds the location of the middle line where the managers between the managers are located. The middle line is a part of the organizational structure that follows hierarchal lines of authority. However, in the hospital setting this middle line is just like the techno structure limited in its function. This limitation links to the hospitals low need for direct supervision and adjustments of its highly professional staff. In addition to that, the parts related to the operating core might be large and have few managers in the different levels of the production line. Surrounding the organizations five basic parts is an organizational ideology consisting of a mixture of beliefs and traditions, such as norms, values, culture etc. It is a collection of beliefs that the organization has of itself, and not the ones that the surrounding environment has of it (Mintzberg; 1980, 1983). Summing up the characteristics by the professional bureaucracy

structure and thus for hospitals, is the unique designs and distribution of the structural features. It has a relatively large operating core consisting of professionals typically divided into large units, with a decentralized structure in both vertical and horizontal dimension. Therefore, the key feature with this type of bureaucracy is in the placing of the formal and informal power to the operating core as the professional expertise is located there and thus cements the professional bureaucracy together.

2.3.2 The Norwegian hospital structure

In the Norwegian hospital setting, there has been an ongoing process of organizational development since the 1970s. Up to the late 1970s, the hospital organizations were known for having a strong professionalized doctoral hegemony and management of the hospitals departments conducted under the simple management philosophy of the head physicians' legitimized management (Berg, 1991). However, as the hospitals started to change, the doctoral management hegemony lost some of its functions when management divided into two parts. After the alterations, there was then one nurse specific leader/manager and one medical profession leader/manager. This practice of management division between nurses and medical professionals existed until the spring of 2001 when the Norwegian parliament decided that the hospitals were to introduce unifying management, with one responsible manager on each level of the hospital (Gjerberg and Sørensen, 2006). With the reform, the management structure of the hospitals moved towards a more professional line while getting fulltime managers that are trained managers rather than trained medical professionals taking on management responsibilities (Kjekshus and Bernstrøm, 2010). Nowadays the most dominant organizational form used in the Norwegian Hospitals Trusts is in the form of clinics and departments/divisions. As for the numbers of management levels it is most common to have four formal levels, however some trusts have three levels. Since most of the hospital trusts have the same amount of formal levels, the structural difference between them is limited. On the higher organizational level, the management is often more formalized which in the departments are through the provision of written instructions of their responsibilities. As for the question of centralization and decentralization, it has been a development towards a more decentralized mode imposing more local responsibility. The local leaders of departments and divisions have gotten more responsibilities as a direct result of the decentralization, and they do now have such responsibilities as taking care of employment, work schedules, coordination of patients, purchases etc (ibid.). Another aspect of the

continuous change of the Norwegian hospital system has been the movement towards centralization of both the regional health authorities and the Health Trusts management (Kjekshus and Bernstrøm, 2010). Even though during the last decade the Norwegian Hospitals organization has been through some major organizational changes, those changes has been reported to have been in the form of a stable change trend (ibid.). With that stable change trend, those alterations made to the management- and authority structure have consequently delegated more power to the department level. Further, the hospitals have moved towards a more unified and simplistic organization structure with the introduction of this new management structure, which has emphasized the professionalism and competence of the management. This *modernization* or alterations were in a way a movement towards more professionalism in all the organizational levels of the hospitals, not just in the operating core but also in the middle line and strategic apex (Kjekshus and Bernstrøm, 2010; Gjerberg and Sørensen, 2006).

Donabedian's quality triangle

Zooming out from Mintzberg's organizational parts one can connect the focus on organizational structure and its five basic parts, to what has become known as Donabedian's quality assessment triangle (van Driel, De Sutter, Christiaens and Maeseneer, 2005). As Quality is a normative and relative concept that is hard to define, through the quality triangle one may connect quality with three major approaches or dimensions of quality assessment: *structure, process and outcome* (Donabedian, 1980, 1988).

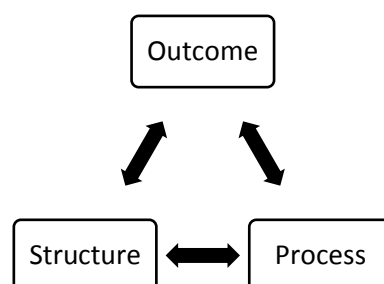


Figure 2. Structure, process and outcome (van Driel et.al. 2005)

The figure is an illustration of the functional relationship between the three aspects of quality. Between these three approaches, there is a functional relationship, which relates to their interaction dynamic. Structure and processes influences both each other and the outcome,

which again does not directly influence the structure and processes (ibid.). Viewing in on the triangle with different eyes such as through the professionals, patients or owners ones, the focus areas would tend to vary between the dimensions.

2.4 The history of Lean production

The history of Lean production goes all back to the scientific management theory of Frederick W. Taylor and his focus on rationalizing industrial organizations through standardization of both the parts in the production and the work processes (Womack, Jones and Roos, 1990). The Scientific Management movement believed in the analysis of the individual workers tasks as a way to find the best methods for producing the most at the minimum use of resources (Scott and Davis, 2007). From those analyses, it was attempted to rationalize the individuals' tasks but instead they ended up with changing the whole work structure in the organization. In addition to the changes at the workers level, changes at the management level also happened. The transformation implied that the management were standardized and rationalized under the scientific management principles, using analytical and scientific procedures (ibid.). These Scientific Management principles were taken a step further by the car manufacturer Henry Ford who is now known for "*inventing*" mass production or just Fordism. He supplemented the principles of Scientific Management with introducing technical machines, standardizing the parts across models, simplifying the assembly process and introducing the assembly line. Because of these supplements, productivity improved and the market was supplied with standardized products (Scott and Davis, 2007; Womack et.al, 1990). However, there was one thing his standardization model lacked, which was a proper organization and management system within the company to handle the global business. This problem was solved by Sloan at Fords competitor GM, who pointed out the lack of professional management of the enterprise. Sloan solution to Fords and GM's organizational problems were to set up decentralized management divisions, which were lead by the numbers from small corporate headquarters. The mass production we know today was completed by the additions made by Sloan to the Fordism and its factory practices (Womack et.al., 1990).

The link between the American car industry and the Japanese car manufacturer Toyota was Eiji Toyoda who made a study trip from the Toyota factory to Fords Rouge complex in 1950, where he studied every inch of the largest and most efficient manufacturing complex in the world at that time (Womack et.al., 1990). After studying the Rouge, he had noted that there

was some room for improvements of Toyotas production system. However, as he and Taiichi Ohno discovered it was too hard to directly cop and thus improve it by doing it “*the Rouge way*”. Instead, they ended concluding that classical mass production was not possible to transfer to Japan. Thus, from the conclusion of the lack of transferability of classical American car mass production into the Japanese setting, the conception of Lean’s processor the Toyota Production System (TPS) was a fact (ibid.). At Toyota Taiichi Ohno the chief production engineer lead the development of the TPS after realizing that the Detroit tools and methods were not applicable to his nor the Japanese strategy. Ohno took several measures at Toyota, which were inspired by the methods used at Western factories. One of these measured taken were the introduction of the multipurpose metal presses that were easy to alter accordingly to the production needs, and which at the same time also opened up for smaller batches of inventory at the factory. This idea of a multipurpose press was an adjustment to the Western production methods, which required a high production to for it to be economical efficient. Thus, the reason behind adjusting the Western production method was Toyotas lower production that would not have been economical efficient. Therefore, the Western production method was changed for the better. An additional benefit with this flexible multipurpose press method was producing smaller batches of parts, making it easier to detect production errors as the production stock got smaller. However, the drawback of this type of production, were its sensitivity towards the work force that needed to be both extremely skilled and highly motivated. From the 1940s negotiation with the Unions, the workers got lifetime employment and steeply graded payment for seniority rather than for job functions like in the US. This made the employees members of the Toyota family, where the company got long-term employees who agreed on flexibility in their work tasks and an interest in initiating improvements in the company (ibid.).

When Ohno was in Detroit on one of his many study trips to the American car manufacturers he came to think that they were producing in a wasteful way or Muda, which is the Japanese term for waste and in that case waste of effort, materials and time (Womack et.al. 1990). Back in Japan, he sat up teams of workers under the management of a team leader who were also participants in the assembly line in addition to being the team coordinator. Eventually these teams got more and more responsibilities, which in the Detroit factories would have been assigned to the supporting systems such as the housekeeping and other small tasks around the production line. At Toyota, after the teams were starting to work well together, they were given time to suggest parts for improvements in their work process, known under the

Japanese word Kaizen (ibid.). Another area, which Ohno and Toyota focused on while developing the TPS, was on how the Detroit manufacturers handled errors occurring through the production line. In the classical Western manufacturing method the errors were following the car all the way from the making of the error to the end of the production line where it was finally caught up with (ibid.). Ohno's solution to that issue was to install a cord over each work station at the Toyota factory while instructing the workers to stop the entire assembly line if a non fixable problem occurred so that the whole team could help out and instantly solve the problem. His idea was not to treat the problems as a random event, but rather to solve them and then find out why it happened through asking the "*five whys*".

As for supply chain of parts to the Toyota factory, Ohno developed a coordination method that focused on the flow of parts on a day-to-day basis. This supply chain method is known as the Just-In-Time system or Kanban system (Womack et.al. 1990). The suppliers to the factory were only produce parts when exactly need just so that the immediate demand was to be covered. With the Kanban system, Toyota was set to get rid of their inventories of production parts located at the factory and thus remove the safety net to the production line in case of any problems occurring. Another aspect of the TPS and Lean method is making what the customer wants, a concept, which has been with the company since the early days of Eiji Toyoda, who with the help of Shirogami started to think about the link between the production system and customer (ibid.).

The history of Lean has a wide span, from the early days of Toyota and Kiichiro Toyoda's introduction of JIT and further to their development of the TPS philosophy, before TPS were finally defined as Lean by in book "*The Machine That Changed the World*" by Womack, Jones and Roos (1990). This process of bringing out the knowledge of TPS and thus defining Lean was a result of a research program at MIT called "The Future of the Automobile" that later became known as the International Vehicle Program (Holweg, 2007). This MIT program played central role in the diffusion of the Lean concept outside Japan, and directly resulting in the book by Womack et.al (1990). Following the success of the "Machine" book of the authors Womack and Jones published a follow up called "*Lean thinking*" (1996, 2003). In the follow up, the authors defined five Lean principles together with updating Taiichi Ohno's original list of the seven types of waste by adding one more type to the list (Womack and Jones, 1996). Their classification of the five Lean principles is as follows: *the value, the value stream, flow, pull and perfection*. By understanding these five principles and connecting them,

in general managers would then be able to make a full use of the Lean method. Ohno's original seven types of waste defined as *waste of transport, inventory, motion, waiting, overproduction, over processing and defects*. To this list, it was added an eighth one which considered the waste of producing a good or service that is either not meeting the customer demand or its specifications. A general perception of waste through the Lean philosophy is those processes that does not add value to the customer. When such situations occurs that a process is not value adding, then the production of a good or service will not meet the demands and specifications of the customers (Toyota, 2012; Womack et.al, 1990). Thus, value is the capability to deliver what the customer wants in a time and cost efficient way so that one does not create wastes. Further, when one reads different publications that address the use of Lean as a method in different settings (see for example articles by Hines, Holweg and Rich (2004), Kolberg, Dahlgaard and Brehmer (2007) and Holden (2010)) one finds that five Lean principles and the seven types waste in addition to other general principles connects with the work of Womack et.al (1990) and Womack and Jones (1996, 2003). Moreover, the first publication by Womack et.al (1990) has since its publication, become one of the most cited publications in the area of operations management (Holweg, 2007).

2.4.1 Critique of Lean diffusion into health care

As the Lean method has diffused into other organizational areas such as health care, it has been met with both open arms and criticism. The manner of criticism often relates to its origination within the operational management sphere. Hence, those questions raised have considered Lean's fit with the health care setting.

In the spring of 2011, the documentary "Helsefabrikken" were for the first time shown on the Norwegian broadcasting corporation (NRK) (NRK, 2011). This documentary had a highly critical view of Lean's appliance with the Norwegian health care setting. One part were highlighting the measurement aspect, where every little detail should of the employees work processes should be measured as one believed that it would increase the productivity. Through the documentary, the Norwegian health care system was portrayed as a mass production line that placed patients on a factory production line just like any other commodity good. Thus, the focus of the documentary was mainly to criticize both the factory and time approach of Lean.

Further, the difference between health care and other sectors is by Young and McClean (2008) said to lie in the “*staggering, global, scale and complexity of healthcare provision*” (Young and McClean, 2008). In addition to those limitations that follow with the complexity of the system, the perception of the value of a product or a service is somewhat problematic. Thus, the perception of value is in health care problematic because of a general absence of both a single customer and unified view of what value is. As health care is full of advanced views of value that has yet to be systematically connected, its complexity and fragmented scene becomes visible. Thus, there is an issue of engaging in a homogenization of values for Lean to fit with the sector (ibid.). Another point of criticism relates to the effect Lean method has on the job characteristics if one does not take into account sociotechnical aspects and dynamics. By simplifying work routines through standardization, one can make work processes less dependent on high skilled professionals, thus opening up for less trained professionals to step in and perform those tasks (Joosten, Bongers and Janssen, 2009).

Even though lean is relatively new in the health care use, there is however a wide selection of critical and realistic reviews which addresses the topic of lean thinking in health care. One point made by Mazzocato, Savage, Brommels, Aronsson and Thor (2010) were that Toyota used decades to develop lean as a response to challenges from the outside, and so their competitive advantage was thought to lie in the evolutionary learning process. This point is not a direct critique towards lean but more towards the general implementation processes of Lean within health care. Further, there is a need for a holistic approach connecting the implementation of Lean to a larger context, not just single smaller improvement projects. Department and clinic dependency may interfere and affect the result of the Lean method if not applied throughout the organization. Those departments and clinics where Lean is not applied to would become a bottleneck, hence a possibly root cause for problems, which would need to be fixed by Lean. If not utilizing a holistic view of process improvement, the total effect of the improvement may be lower as the domino effect would lead to incomplete problem solving as problems may occur elsewhere in the system (Joosten et.al 2009).

Finally, the last moment of critique relates to the publications of Lean research, where the review by Mazzocato et.al (2010) raised the issue of suspected publication bias. The suspicion related to finding published articles only reporting positive and successful results of implementing Lean. Further, the argument was that there must surely be some Lean projects that have failed and thereby waiting to be studied.

3 Method

Research is a systematic process that starts with collecting information about the subject in focus, which is then analyzed and interpreted, so that it can bring light to the research question and answer it (Kumar, 2005). The process of collecting such information can either fall into a qualitative or quantitative mode, which is dependent on the methods used in collecting the data (ibid.). The strategy of this thesis aims to map out the diffusion of Lean into the Norwegian hospital context and to frame one specific example of the use of Lean. This chapter elaborates on the extraction process together with the preliminary stage and general research methodology

As the strategy is to map and identify the diffusion of Lean, the research method selected to use in the extraction of the necessary information falls under the qualitative approach.

Qualitative research is an unstructured approach and with that, it opens up the possibility for flexibility in different aspects of the process (Chambliss and Schutt, 2009; Kumar, 2005). The focus of this type of research method is on describing the qualities or the characteristics of certain type of data or a phenomenon. This description process can involve studies of text, speeches and conversations, such as interviews between the researcher and the objects of interest. Further, the qualitative research method provides a more complete understanding of the research object, as it encounters more of the richness that quantification methods might miss (Chambliss and Schutt, 2009).

3.1 Preliminary stage- searching - sampling and reviewing

The preliminary stage to the explorative investigation of searching and sampling from available open sources consisted of contacting two key informants. These two informants were asked some general questions regarding the diffusion of Lean in to the Norwegian health care setting. In general, the feedback was that available information on the topic was limited and mostly concentrated within each of the four Regional Health Enterprises and their underlying trusts. Following the preliminary stage, an initial systematic search through pubmed.com and cochranelibrary.com was undertaken to identify any reviews and publications regarding the diffusion of Lean in the Norwegian hospital setting. This search used the key words of Lean + Norway and Lean Hospitals Norway. Through this systematic

search of those search engines while using the two key words no reviews or publications on the topic of Lean in the Norwegian hospital setting were found. From both the initial explorative investigation and the search through the databases, it became clear that the prospect of mapping out the diffusion and use of Lean as a method would imply using alternative qualitative methods. One such hybrid and alternative approach is the snowballing- or chain referral sampling method (Chambliss and Schutt, 2009). This method is common in qualitative research, and its principles are suitable for this thesis as it gives the sample size by referrals from either/or people and literature at interest to the research subject. The collection process repeats until it reaches the saturation point, which is when the desired sample size is reached. Moreover, when comparing this sampling technique with the quantitative selection method it is regarded to be more purposeful, as it takes into consideration if the selected data meets the given inclusion criteria's (Russel and Gregory, 2003).

3.2 Search strategy and selection

As the purpose of this thesis is to identify the diffusion of Lean into the Norwegian Hospital sector merely by using publically available literature and documents, a follow up of the initial explorative search was necessary. Both internet search engines and databases were used in this follow up process, where the searches were going deeper into the material while taking use of the snowballing and the chain referral method. In practice, the search for relevant gray and white literature utilized the search engines of PubMed.gov, google.com and helsebiblioteket.no as well as utilizing of the two databases Bibsys Ask through the UiO library and the Norwegian Open Research Archives (NORA). Adding to the use of the search engines and databases, a search was preformed through the four Norwegian Health Enterprises sites to locate any possible local information and gray literature that might not be available through other search engines. From identified subjects located through the search, more documents were located. All the searches were conducted in the period from late August (2011) to the end of October (2011), and as the informational literature and documents was identified, a review and analysis of Lean's diffusion was undertaken to extract the relevant information regarding the path into the Norwegian Hospital context. In general a literature and document review is a method that analysis the available literature on a specific topic, by being systematic in the analysis of the content (Chambliss and Schutt 2009, Kumar 2005). As mentioned in the introduction of this chapter, one identified Lean project is to be framed and

analyzed in accordance to the theory presented in the theoretical framework chapter. The analytical framework is formed as a systematic extraction of information from those available documents regarding the studied Lean project, by using instances from the translation theory.

4 The diffusion of Lean from Toyota to the Norwegian hospital setting

This chapter will present the findings from the search through publically available literature and documents. First, the results on the documentation of the diffusion of Lean from Toyota to the Norwegian Hospitals, followed by a presentation of a specific case of Lean used as a method at the University Hospital of North Norway.

4.1 Identification of the diffusion of Lean to Norway and the contributing actors

The diffusion of Lean within the automotive and component assembly sector started in the late 1980s, early 1990s as the idea diffused from the Japanese car manufacturer Toyota (Hines, Holweg and Rich 2004). Then in the mid 1990s, the diffusion of Lean continued as it entered into the general manufacturing sector that used repetitive manufacturing methods. Following repetitive production, it sustained to diffuse within both the high and low volume-manufacturing sphere before it entered the service sector (ibid.). As for the documentation of Lean entering the health care, it is not particularly clear when the first steps was taken. However, there are according to Graban (2008) some examples of US hospitals having used the Lean method as early as in the 1990's with the help from Michigan automakers. Nevertheless, the real call for using Lean in the health care sector came in 2001 through an USA today article (Appleby, 2001; Graban, 2008), where the executive vice president of the Robert Wood Johnson Foundation Lewis Sandy said; *"We want to see a Toyota in healthcare. That has been one of the barriers in healthcare. No one can point to a health system and say; 'That's how it ought to be done'"* (Appleby, 2001). This was a clear breaking point in the health care organization sphere, where one key actor came with clear call or shout out for the sector to start looking outside *"the common tool box of organizing health care"* and so to find solutions on their commonly problems (Graban, 2008). From this breaking point in time, the diffusion of Lean from Toyota and the automakers into health care became a reality (ibid.). Soon after this shout out, the Virginia Mason Medical Centre in Seattle, Washington, who is now probably one of the biggest actors within the Lean health care movement, started to use Lean as a method in 2002 (virginiamasoninstitute.org, 2011). The Virginia Mason Medical Centre was highly inspired by the Toyota Production System. In fact, they were so inspired

that they renamed their own production system the Virginia Mason Production System (VMPS). During the process of developing their own VMPS method, representatives for the hospital undertook study trips to Japan and Toyota to closely study the Toyota-Production-System, and so on use their inside experiences at the factory to create such an equivalent production method just for health care (ibid.).

4.1.1 The entrance to Scandinavia and then Norway

The diffusion of Lean into the Norwegian hospital context took the road from the American Virginia Mason Hospital (2002) through the Odense University Hospital (2006) in Denmark, before the University Hospital of Northern Norway (UNN) decided to become the first Norwegian Lean hospital officially in 2009. Nevertheless, this project at UNN is still the only full-scale Lean project at hospital level in the end of 2011. In addition to this full-scale project, several smaller projects have been identified through this mapping process. This process of mapping the entrance and the diffusion of Lean method to the Norwegian hospital context is given in the following section.

Mapping out and identifying projects were conducted through different search strategies. The first one involved searching through the Norwegian Open Research Archives (NORA) and Digital Publications at the University of Oslo (DUO) for published research on the Lean topic specific to the Norwegian health sector. That search resulted in identifying four master projects, which were accessible through the archive. These four covered two different projects, one was on a specific project at Ullevål University Hospital (Mjåseth, 2009) and the three others were connected to the UNN project (Hjorteland and Aa, 2011; Hansen, 2011; Henriksen and Edvardsen, 2010). However, in addition to those four, there was one additional project that did not directly relate to Lean as a hospital organization method, but rather the construction process of the new part of St.Olavs (Tradin and Ileby, 2010). From the thesis by Hjorteland and Aa (2011) Stavanger University Hospital was identified to have taken a decision in the early months of 2011 to take in and use Lean as a method at the hospital. In the thesis by Mjåseth (2009) both the history behind the case study of implementing Lean thinking at the women's clinic at Ullevål University Hospital was described as well as the implementation process. The consultant firm Earnst and Young were identified as the initiators behind the start of the project "*Even a bit better...*" by them having a hypothesis on the transferability of Lean thinking to the health sector already in 2007 (Mjåset, 2009).

The second search strategy took the use of the four Regional Health Enterprises web sites, which was searched for Lean projects and this resulted in the identification of more single Lean cases. Through the pages of Northern Norway Regional Health Authority, the two projects of Finnmark Hospital Trust and Helgeland Hospital Trust were identified. The board of Finnmark Hospital Trust decided through the case 16/2011 to start collaboration on a common patient flow project with UNN using Lean as a method (helse-nord.no, 2011). At Helgeland Hospital Trust, the board decided through the case 33/2011 to use Lean as a method in developing better patient flow (helse-nord.no, 2011). The St.Olav Hospital in Trondheim was in addition to the Lean construction also identified as a Lean user at their laboratory unit since 2010 (helse-midt.no, 2011). In august 2010 the management of Vestre Viken HF initiated the use of Lean, with the help of Earnst and Young after the waiting list scandal at Bærum Hospital in 2009 (Vestre Viken Hospital Trust, 2011; leanforumnorge.no 2011). From the strategy document of 2011-2015 the hospital highlights the need to undertake efficiency measures, to reduce waste through continuously improvement and that they should not use expensive consultant firms as assistance in the training of their internal Lean consultants. Further, through the same document, Odense Universitetshospital in Denmark (OUH) was mentioned as a possible collaborating hospital for the project as well as their role in being an inspiration to the "*patient flow project*" at UNN (Vestre Viken Hospital Trust, 2011).

Through a plain document snowballing at google.com and the Lean Forum Norway, Lillehammer hospital showed up as a user of Lean since 2010. They started training their leaders during the year of 2010; however little information on the implementation in the hospital has occurred was available (leanforumnorge.no, 2011).

In addition to searching through the four Regional Health Enterprises sites as well as google.com, selected consultant firms' web sites were also searched for Lean projects related to Norwegian hospitals. This was to see if they were open about their own provision of consulting services relating to implementation of Lean in the Norwegian hospital setting. The collaboration between Implement and Agenda Health Care was quite open about their involvement in such projects both in Denmark and in Norway (agendakaupang.no, 2011). In opposition to this openness, Earnst and Young (2011) who we now know have been involved in two projects were not as open about their own involvement in Lean projects.

Through a chain referral from Lars Erik Kjekshus, the Internal Organization of Norwegian Hospital (INTORG) report of 2009 was located. The INTORG series follows the internal changes of the Norwegian hospitals through surveys that cover several areas of the organization such as the different trusts organizational changes (Kjekshus and Bernstrøm, 2010). Organizational changes at the Norwegian hospitals has through the INTORG series been followed since the first survey was conducted in 1999. In the survey of 2009, the question about organizational tools included for the first time an option of Lean as a design method. The response to that particular question was 16% of the hospitals who responded (n=66 of n=88) on that question had used Lean as an organizational tool (ibid.). From this, the general tendency from the findings located through the document search is strengthened by the INTORG report of 2010 that Lean started entering the Norwegian hospital context in the time-period of 2007-2009. However, most of the findings points in the direction of hospitals starting to use the method during the years of 2010-2011, following the big scale implementation at UNN and the single case at Ullevål University Hospital. These two projects seem to be the two first to take in Lean and implement the method to departments at the hospitals.

4.2 Lean at UNN

By the spring of 2012, the University Hospital of Northern Norway Trust (UNN) is the only Norwegian hospital, which now strives to become a full-scale Lean hospital. UNN is one out of five Hospital Trusts located under the Northern Norway Regional Health Authority and it is as the name indicates the university hospital of Northern-Norway. The Hospital is both the leading provider of health care in the region as well as the leading health trust offering the population in Northern Norway medical expertise at several levels (unn.no, 2012). It provides a wide range area of specialized treatment to patients, as it serves the functions of being both a local hospital for residents of Troms and parts of Nordland as well as being a specialized unit for Northern Norway. UNN is a decentralized health trust organized into four local hospitals located in Tromsø, Harstad, Narvik and Longyarbyen, where the hospital in Tromsø is the main hospital offering specialized features of care (ibid.). As for the organizational framework of the treatment, training, research and diagnosis are organized under 11 clinics and 70 sub departments employing around 5900 people that are spread across those clinics and underlying departments. However, this way of organizing the hospital into clinics and sub

departments were together with UNNs' path in becoming a pioneering Lean Hospital in the Norwegian setting a result of a major ongoing development and restructuring process, which started in the spring of 2007. The process from the realization of the need for organizational changes to the official formation of a strategy for the *"patient flow project"* in 2009 is presented in the following section.

4.2.1 The Preface of the Patient flow project

It was the hospital director Knut E. Schrøder who initiated the call for change and thus addressed the need for a *"Long term development and reorganizing project"* through a letter presented to the hospital board during their March (2007) meeting. Based on the directors' letter presented through board case nr 14/07 (UNN, 2007¹), the board decided to start assessing the need of such long-term project at UNN and to follow it up during the next board seminar in April 2007. The background for realizing this need were accordingly to the board case of 36/07 an ongoing gap between work tasks related to the hospital production and the available resources in a short time perspective (UNN, 2007²). In addition to the prioritization problem with tasks and resources, there was also disparity in both the hospitals economic balance and their catering to the owners' expectations and demands. Thus, due to the hospitals issues with the operating conditions and the available resources it was clear to be a strong need for *"prioritization of tasks and streamlining processes and resource use"* (Board case 36/07). More fuel to the fire of need for change was the apparent increasing gap between treatment options, technology and available resources as well as the continuously demanding relationship between ownership, patient rights, expectations and work environment. Another factor in this *"need for change process"* was the rapid organizational growth of UNN that called for a revision of the valid organizational and management structure (ibid.). Moreover, based on these different problem streams and thus the rising need for change, possible solutions emerged from the board's recognition of these different issues within the hospital framework.

Already from the initiating board case 14/07, which considered the note from the hospital director and his suggestion of a *"Long term development and reorganization project (LUO)"*, both problems and possible solutions was out in the open (UNN, 2007¹). The work with the process of identifying problems and solutions in relation to the LUO project continued through the following board cases of 36/07 and 55/07. As the first board case laid out the

framework for development of the project, a board seminar were arranged to highlighted and followed up the directors note. From that seminar, the main conclusions with goals for the project as well as both the main elements from lecturers and the boards' following discussion was presented in the board case 36/07(UNN, 2007²). The result of the case presented through 36/07 was that the board agreed upon the implementation of LUO and the project framework, such as the content and ambitions, the timeframe and both the processes and follow up in the short time. Through the same case one additional central point were highlighted, which were the expectation of the board having a central position in the further project development and progress (ibid.). Further, in the board case 55/07 the project was decided to be continued as well as the implementation process to be carried out through two phases(UNN, 2007³). In the first phase, the project was to be framed as an organizational development project which were to sketch out a new organization format and then to implement the suggested alterations within a given timeframe. Then in the second phase, the project was to seek to better the internal coordination and patient flow that was set to start in the fall of 2008. The case presentation and the following discussion paper connected to board case 55/07 brought back the suggestion of the project administration should take a field trip to for example Jønköping and learn from their experiences with fostering an environment for continuing learning and renewal. Thus, the reason for taking such study trip was to secure and foster a new organizational structure that should not be a hinder for the second phase of LUO, which focus on coordination and patient flow (ibid).

Next, in the board case of 84/07 the board decided on the new organization model for the hospital, which was in accordance to the case-report connected directly to it. Further, a timeline for establishing both the new clinic structure and the connecting stab functions and operation center was set up. As these suggested restructuring moments were to fall into place, they were to be the foundation for the execution of LUO's second phase (UNN, 2007⁴). In addition to the organization model agreement, the board framed the management of the model giving the hospital director the power if necessary to change and alter both the number of clinics, stab functions and operation centers as well as their content if it. For the aspect of revision and evaluation, the administration was set to review the organization two years after the implementation. The last point of the decision made in the case concerned the boards' premise of securing the quality of the hospitals professional parts with the academic environment, and the training of both specialists and medical students. To the presentation of

the board case 84/07 there followed a case statement, which contained an up to date summary of the LUO project (ibid.).

The summary contained information on the involved actors in establishing LUO, those involved was the internal project manager, project co-workers and the external process support from the two consultant firms Agenda and Muusmann (UNN, 2007⁴). Further, the decision of hiring the two consultant firms as external support was a direct result of the decision undertaken by the case of 55/07. From post nr five under the case of 55/07, the Chairman of the board and hospital director was given the authority to appoint both the project manager and steering group for the project. In one phase of the LUO project, one of the consultants from Aagenda/Muusmann collected on the behalf of LUO information from other reorganizational projects undertaken in the Nordic setting. One of these projects was assumed to have the strongest and best documentation of reorganization project was the 3S in Stockholms län. In addition to information on reorganization projects also experiences from organizational-development-projects at different hospitals such as St.Olavs hospital, Karolinskasjukhuset i Stockholm and Aarhus Universitetssygehus were collected. This information was together with a trend-analysis, used as background material in the development process of the project. Thus, the final suggestion presented to the board of a new organization model bared fruits of a wide engagement within UNN. The proposal had considered suggestions, wishes and feedback from within the hospital. Further, the implementation of this new organization structure were set to be a part of the second phase of LUO were it was set to follow different paths as it would depend on the organization projects and establishment of clinics. Different subprojects were suggested under the implementation process and among those were Lean projects that utilize “*Lean thinking*” as a tool for improving production and logistic processes on selected patient flows (ibid.).

Jumping to UNNs’ official decision to use Lean as a method, which was taken as a part of the second phase of the “*Long term development and reorganizing project*” (LUO). The prequel to the decision of board case 65/09 follows the lines from board case 14/07 through the cases of 36/07, 55/07 and 84/07 before deciding on the official “*strategy for the patient flow project 2009-2011*” in October 2009 (UNN,2009¹). Between the 2 board cases of 84/07 and 65/09, the hospital director decided in the fall of 2008 to establish one *pilot project of patient flow* through the formation of an interdisciplinary acute stroke unit at UNN-Tromsø, which was to use Lean as a method in the project (UNN,2009²). After a bidding war, the two consultant

firms Agenda and Implement Healthcare was selected to assist the pilot project. In addition to providing UNN-Tromsø with assistance through the pilot phase, they were also set to manage the Lean-training of both the leader group and the first future internal Lean consultants. During the spring of 2009, more Lean pilot projects followed in three other departments at UNN-Tromsø (ibid.). Following the continuation of the LUO project as known through case 55/07 and the fourth strategy point concerning the development of systems for unified patient flow, these four pilot projects highlighted a need for systematic planning and specific goals for the future patient flow work. Following the pilot projects, an initial draft for the project strategy was internally distributed at the hospital for feedback during the fall of 2009. Based on the feedback posted to the directors' management group, an official draft was prepared and then presented to the board through the board case of 65/09 (UNN,2009¹). So, through the case of 65/09 an official strategy "*Adding Common sense into the system - Strategy for the patient flow project at UNN HF 2009-2011(Sunn fornuft satt i system- Strategi for pasientforløpsprosjektet ved UNN HF 2009-2011)*" were decided upon by the hospital board (UNN, 2009¹).

4.2.2 The framework and structure of the *Patient flow project*

Lean was chosen as a supporting tool to the ongoing change process at UNN, where it is set to help securing a better *patient flow*, as well as strengthening research, quality and coordination. The structure and framework of the "*Patient flow project*" anchors to the Hospital Management and the hospital directors' management group (UNN, 2009², 2011). However, there is a general expectation that that suggestions for new "*Patient flow project*" are to come from the employees. These suggestions have two deadlines a year and thus there are two opportunities to be presented project suggestions to the hospital directors' management group via the employees' clinic manager. This management group will then make decisions on which projects to choose. However according to the steering document, they are to "*prioritize projects that are cross sectional and includes several locations, and are clinic overarching*". The group also seeks to avoid stressing the core functions such as laboratories, x-ray and emergency department when choosing new projects (ibid.).

In the formal structure, there is a directly connection between the hospital director and the general project manager and its assistant, who are responsible for coordinating the work with the projects and so on report directly to the vice director of the hospital (UNN, 2009²). The

contact between the hospital management and the general project manager is through a continuous process that uses both the intranet and internet to update on the status of the projects. Further, each project has to provide a quarterly presentation and report to the hospital management. In addition to the communication responsibility within the management levels, the coordination unit of each “*Patient flow project*” has a responsibility to communicate on the status through the internal and external forums. The local project manager follows up the different projects in terms of formalities, progress and documentation. In addition, the local project manager is also responsible for the Lean education provided at the hospital as well as following up the internal consultants and motivating participants in the projects (ibid.).

To help with the description of the framework for the patient flow project at UNN and the different group functions that each of them has as illustrated by figure 2.

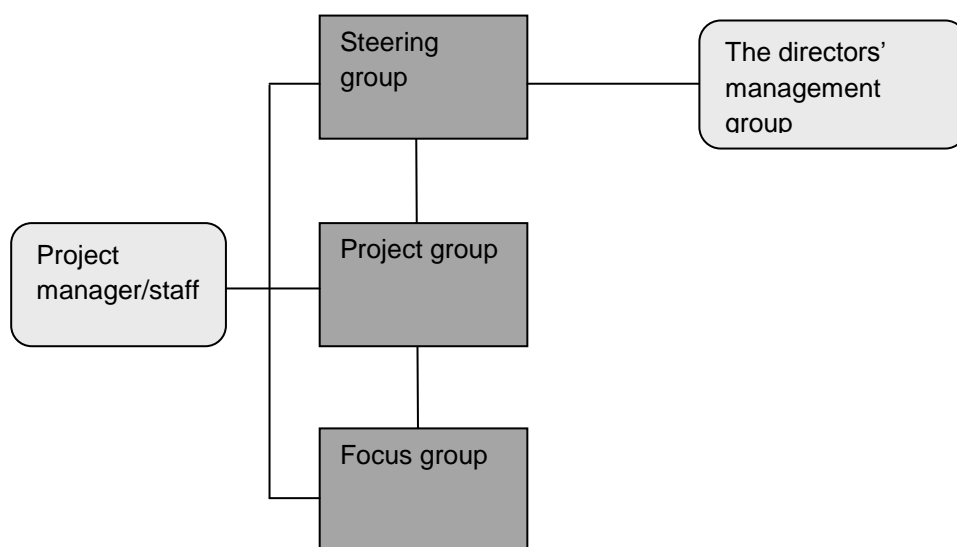


Figure 3. Illustration of the patient flow project organization (UNN, 2009² p. 9)

The member composition within the project and steering groups is dependent on the complexity of the project. If there is a large and cross sectional project that touches and intervene with several clinics, then it is the vice director who serves as the leader of the steering group, thus if the project is smaller and a single clinic project then it would be lead by the clinic manager. Besides the representation of the management, the unions do often have one representative within each project (UNN, 2009²). Further, the project manager for each project participates directly in the project on several levels, as it is a member of all the three groups. In addition to the project managers' involvement in the different groups, it is

also the one has the daily responsibility to maintain the continuation of the project, the results and gathering the documentation on the progress. This project manager is also an internal Lean consultant who is chosen among the clinics employees (ibid).

When it comes to the role of group management, it strongly depends on the complexity of the project. The steering groups' role is to be the overall management function of a patient flow project, which involves taking decisions and manage it (UNN, 2009²). It is suppose to decide on the members to the project group and secure the continuation of the project process so that it runs on time. Further, it has the responsibility to calculate any risky moments connected to the current projects capability to produce and perform in accordance to expected results and if necessary decide on alterations and adjustments. As it is the main managerial unit within a project, its responsibilities also include securing adherence to the clinic and hospitals overall goals and visions. Next in line under the steering group is the project group, which consists of department managers from the affected clinics as well as a union representative or safety representative. This group is formed and appointed by the steering group on the basis of the specific clinical project, which is lead by the internal consultant. The project groups' responsibility is to be a supportive function to both the focus group and the steering group, thus help secure progress of the project so that it does not deviate from the set time schedule. The focus group is the last one, and classified as the working unit as it is closest to the project "action". It consists of selected middle managers and employees who are familiar with the affected clinic or great knowledge of that particular type of patient flow, which the base for the project. The internal Lean consultant is the leader of the group, and this group is a kind of practical work group looking at important factors in terms of flow and logistics at the clinic. An example of analysis is to look at the flow of communication, resources, staffing, work arrangements or patient logistics at the clinic. Based on this analysis, any possible changes are brought to the attention of the project group who then asses those suggestions and so decides if these should be taken further. In case of a positive feedback from the steering group in regards to implementing changes, the focus group is then divided into smaller work groups. These smaller groups are then going into details in regards of the planning and implementation process of any measurements that may be undertaken (ibid).

4.2.3 Translation and transformation of Lean at UNN

To determine the translation and transformation of Lean into the setting of UNN key points from both the theoretical framework on Lean and the case example were extracted. The information gathered on the case came from a systematic search through three public documents that contain information about the “*Patient flow project*” at UNN. The documents that were used was the strategy document “*Adding Common sense into the system 2009-2011*”, the UNN board case of 65/2009 and the status report of august 2011 (UNN, 2009¹, 2009², 2011). Through the following section, the results of the comparison made are presented in an analysis-table. This table attempts to connect the theoretical framework of the Lean theory with UNN’s interpretation and use of Lean measures. Further, the framework for the table aims to use instances from the translation theory presented through the theoretical framework.

Variables	Lean Thinking – from Toyota to the world	UNN – translation in practice
Extraction point	Womack et.al (1990) extracted Lean concepts from Toyota	Concepts from the Lean literature were translated into the setting of UNN
Active translators	The active translation actors were Toyota themselves and the MIT research project resulting in the publication of “ <i>The Machine that changed the world</i> ” Womack et.al (1990).	Lean was chosen as a method after a bidding war related to the second phase of the “Long term development and reorganizing project” (LUO), and it was the two consultant firms Agenda and Implement that won. Thus, the consultant firms were the active translators and support in translating Lean into the UNN setting.
Lean concepts: A comparison between TPS and Lean literature and the description of Lean in the patient flow project at UNN	<p>“<i>Jidoka</i>” (In-station quality and self-regulation) (Toyota, 2011; Womack et.al, 1990)</p> <p><i>Jidoka</i> describes as the habit of the <i>automation with a human touch</i>. Its main point is the possibility to stop the production when problems or errors are detected in the production (deviation from the normal workflow) for so to find and remove the cause of the problem. Implementing and incorporate improvements to the standard workflow, thus implement those daily improvements</p> <p>Divided into five steps:</p> <ol style="list-style-type: none"> 1. Detect the problem 2. Stop the process 3. Change the process so that it will function as it should 4. Find the root cause of the problem 5. Implement and incorporate the measurements that would eliminate the problem 	<p>The strategy document does not directly mention <i>Jidoka</i> and neither anything on the concept of <i>automation with a human touch</i>, nor anything about the possibility to stop the production/patient treatment when errors are detected.</p> <p>However, elements of those five steps of <i>Jidoka</i> are through the strategy document identified. The employees are encouraged to come with suggestions for improvement with patient flow projects or as suggestions to new projects. Those suggestions for improvements that becomes implemented should be secured a scientifically anchor with each patient flow project.</p>
	<p>5 Whys’ Investigation and analysis of root cause and analysis (Liker, 2004; Womack et.al,1990)</p> <p>A process orientated concept.</p> <p>One-step within the concept of <i>Jidoka</i> is to <i>find the root cause of the problem</i>. The method of investigation requires detailed thinking and analysis of the problem to be able to find the root cause, which lies hidden somewhere and needs to be located. The process of finding the root cause is to dig into the deeper levels and thus ask why the problem occurred. By asking the 5 whys’ then one can systematically trace and find the root cause of the problem (<i>root cause analysis</i>).</p>	<p>Through the project, one is not directly encouraged in an active use of the 5Whys’ as a part of seeking learning and investigation of processes that causes problems. However, the project seeks to learn from the continuously implementation process of the patient flow projects. Thus, when starting a patient flow project a framework and goals are set up and may be a result of previous experiences from other projects.</p> <p>Before any new “<i>Patient flow project</i>” is started, the current situation is mapped out and documented before starting the redesigning and implementation process.</p>

Table. Comparison table part 1

	The Toyota Production System	UNN – translation in practice
<p>Just in time (JIT) (Toyota, 2011; Womack et.al, 1990) A production philosophy whose main focus is in “<i>supplying what is needed, when it is needed, and in the amount it is needed</i>” (Toyota, 2011)” JIT Production is a productivity improvement philosophy that pulls the needed resources, thus Minimizing the storage space</p>	<p>Alteration of production (Womack et.al, 1990) Single minute exchanges of dies (SMED) changeover time reduction in the production. Easy to alter the production, flexible with multi task machines</p>	<p>It is a focus on the patients in the form of quality and service, where the patient should get the right examination to the correct time, in addition to treatment, care and rehabilitation. In general, the quality of a <i>patients’ flow</i> through the hospital is in focus, thus a quest for seamless and continuous flow between different departments and clinics.</p>
<p>Lean concepts: A comparison between TPS and Lean literature and the description of Lean in the patient flow project at UNN</p>	<p>Kaizen – a strive for perfection (Toyota, 2011; Womack et.al, 1990) Kaizen is a daily process of making continuously incremental improvements. This process teaches the employees improvement skills in the form of efficiency in the work, problem solving, documentation and improving processes etc. It strives to encourage the employees to be a part of the decision making or proposal making, and thus be a part of the discussion before implementing any decision. The driver of the process is the goal of eliminating waste.</p>	<p>The “<i>Patient flow project</i>” and the work related to it is a continuously work of improvement, where both new and corrected goals are constantly developed. Establishing an internal control and a focus on best practice.</p>
		<p>The purpose of using Lean principles in the patient flow projects are is to work towards realizing improvements for the patients, employees and hospital through suggestions made by the employees. It is the employees who both drive and bear the improvement work, who are also encouraged to come up with ideas for new patient flow projects. These suggestions should seek to gain efficiency of work processes by reducing those that is not of a value adding process. The hospital manager’s leader group takes the decision of which new project to start, having an application/suggestion deadline twice a year.</p>
	<p>Integrated leadership (Womack et.al, 1990) Integrated leadership within working teams implies that the managers are taking part in both production and management</p>	<p>The patient flow project anchors at the hospitals top management, through one adviser in a direct line under the hospital director. Each project is organized in the same way with a steering group on the top, then the project group and at the lowest level the focus group that divides further into implementation groups. The member composition of the groups varies between the projects, and in addition, it depends on the size and complexity of the project. In projects that limits within a clinic the project group is not constructed and instead the department managers makes up the steering group (cont. next page)</p>

Table. Comparison table part 2

	The Toyota Production System	UNN – translation in practice
<p>Lean concepts:</p> <p>A comparison between TPS and Lean literature and the description of Lean in the patient flow project at UNN</p>	<p>Integrated leadership (cont.) Integrated leadership within working teams implies that the managers are taking part in both production and management</p>	<p>cont. Representatives from the hospital directors' management group participates in each project. The internal Lean consultant from the affected clinic is assigned as the project leader, in addition it also the one who trains the internal participants in the Lean method. Further, the project leader must have close and continuous contact with the hospital directors' management group. However, if the project goes across departments and clinics, it would be the hospitals vice director who is assigned to be the project leader.</p>
<p>A comparison between TPS and Lean literature and the description of Lean in the patient flow project at UNN</p>	<p>Consumer thus customer oriented (Toyota and Womack et.al. 1990). A supplier-customer focus. This implies a quest to satisfy the customer through adding value and eliminating waste in the production</p>	<p>The <i>Patient Flow Project</i> focuses on improving the quality and service for the patients, by providing the right examinations to the right time as well as treatment, care and rehabilitation and controls.</p>
	<p>The five Lean principles (Womack and Jones 1996):</p> <ol style="list-style-type: none"> 1. Precisely specify value by specific product 2. Identify the Value stream for each product 3. Make value flow without interruptions 4. Let the customer pull value from the producer <p>Pursue perfection</p>	<p>The five Lean principles:</p> <ol style="list-style-type: none"> 1. Specify what is creating value for the patient 2. Map the value stream and remove the processes that is not adding value to the patient 3. Create flow in the work processes 4. Introduce new steering principles 5. Make sure that there is continuously improvements
	<p>Elimination of waste or Muda (Womack et.al, 1990; Womack and Jones, 1996) The seven original Mudass:</p> <ol style="list-style-type: none"> 1. Transportation 2. Inventory 3. Motion 4. Wait 5. Over-processing 6. Over-production 7. Defect <p>(8.) Goods and services that do not meet the customer's needs (Womack and Jones (1996) added this one to the original list). Rationalize operations through seeking to eliminate waste in accordance to the 7 mudas.</p>	<p>The eight types of waste as defined by UNN:</p> <ol style="list-style-type: none"> 1. Over treatment 2. Waiting time 3. Unnecessary movement 4. Unnecessary processes 5. Inventory 6. Transport 7. Disposal 8. Unused competence

Table. Comparison table part 3

From the three parts that makes up the comparison table, a framework for assessment is generated. This framework is primarily based on lean concepts drafted from the three main sources; the classical book “The machine that changed the world” (Womack et.al, 1990), Womack and Jones (1996) “Lean thinking” and Toyota (Toyota.com, 2011). In general, the comparison part of translation and transformation relates mostly to the setup and framework of how Lean has been included into the “*Patient flow project*” at UNN. The argument for using those sources of information as a benchmark of Lean is their position within both the concept literature and their role in bringing out the concepts of Toyota’s production method. Then next, the following theoretical analysis and discussion will utilize this comparison table, which contains information on concepts from both the Lean toolset and the general framework of the “*Patient flow project*” at UNN.

5 An analysis and discussion of the diffusion of Lean from cars to care

As the previous chapter mapped out and elaborated on the diffusion of Lean from cars to the Norwegian hospital sector, this chapter seeks to explain and discuss the empirical findings in light of the theoretical framework. This chapter concludes with a discussion and analysis of Lean at UNN.

5.1 Lean and the aspects of organizational theory

In society, one finds the sphere of organizations where they in a dynamic way both inspires and influences each other. There are many possible areas which this surrounding environment can affect an organization. Such influence can for example affect both the structural and behavioral context as new and old ideas flow between them.

As for the diffusion of Lean, one can argue that there is no longer a question about the influence between different types of organizations. The argument relates to Leans actual entry into the hospital and thus the professional bureaucracy sphere. By this analogy, it is meant that the methods origination within the machine bureaucracy should no longer be a critical focus point. Thus, now it should rather be a question regarding the influence within the sphere of similar types of organizations, such as between hospitals. However, even though Lean is somewhat established within health care, it is still questioned and criticized by its opponents. Both questions and critique regarding the fit of Lean into health care are raised in the following analysis by relating it to organizational theory and the interaction with professionalism.

5.1.1 Theoretical discussion of Lean in the light of the instrumental and cultural perspective

In the light of the instrumental perspective, an organization is associated with being a tool or an instrument for reaching its formal goals by being a fully rational actor (Christensen et.al 2004). Thus, as a method Lean places itself within this perspective in terms of being both a tool and an instrument for the organization or management. Further, one can view Lean as an organizational recipe that within the theoretical framework describes as a set of tools that

seeks to reduce waste or *muda* in the production. Arguments supporting Lean's relation to the instrumental perspective is its connection to both Fordism and Scientific Management. Toyota used the American Automakers as an inspirational systems for the long and dynamic development process of Toyota Production System, and thus founded upon instrumental principles (Womack et.al 1990).

In general, an organization can use Lean as an organizational tool to reframe the formal side. This philosophy and method would influence the formation of a new organizational framework, as it affects both structure and formal frames through its focus on reducing waste and inefficient moments (Womack et.al 1990). Lean is concentrated around the goal of minimizing waste and maximizing the value. Waste defines as motions that do not add value to the final customer (ibid.). Thus, the tools of Lean focus on eliminating waste and maximizing value for the customer, and these tools are often associated with the "*five Lean principles*" and "*seven (or eight) types of waste muda*". However, it consists of more tools that emphasizes on reducing waste and creating value, such as "*ideas of continuous improvements*", "*asking the five whys when problems occur (root cause analysis)*" and *Kanban* concept of Just-in-Time. JIT is a tool that focuses on improving the production flow and so on reduces the inventory that is a waste in terms of storage costs etc. Overall, the Lean philosophy is a customer-focused philosophy, which the tools seeks to improve the workflow processes under the general means of standards and standardization.

Altering the organization structure through implementation of Lean in such a complex organization as the hospital is anticipated to be somewhat difficult (Christensen et.al 2004). Even though hospital organizations are complex, they do share some structural similarities with the other organizational forms. From the theory of Mintzberg (1979), those structural similarities relate to the building blocks whose sizes vary according to the type of organization. Thus, this structural similarity opens up for a transfer of such instrumental ideas as the Lean theory from one organizational context to another (Røvik, 2007). Even though there are structural similarities between the machine bureaucracy the hospital context, there is however a prospect of difficulties with taking it in. These difficulties would most likely relate to the characteristic by the hospitals tradition of having a strong professional operational core.

As previously mentioned in the theoretical framework, the professionals are self-governing in their practice and highly automated in their interaction with each other. It is their knowledge and skills, in combination with the standardization of work that directs their interaction. Due

to the doctors' independence in work and ways that they interact with others, the management is highly decentralized and therefore very dependent on standardization of their skills (Mintzberg, 1979). Thus, because of decentralization and fragmentation of management, any alteration to the structure would need to be in accordance with the hospitals goals. Then, from the need of alterations by goals, any suggestions for change must be in adherence with the hospital official goals so that it would not end up in conflict with the professional's culture. This argumentation links to the cultural perspective, where the dynamics within an organization plays a role. Further, the dynamic in question relates to the struggle between the organizations participants shared norms and beliefs, against the formalized control system. On one side of the organization, one has the institutionalized features of the professionals. These features have grown out from the hospital organizations formal framework, which through an implementation of Lean will most likely change and thus possibly battling against the institutionalized features (Jacobsen and Thorsvik, 2002). Whether if there would be a battle against the changes, depends solely on its accordance with the institutionalized culture.

Further, one would still expect it to be somewhat of a resistance from the health care professionals in terms of the adaptation of Lean principles, merely because of its origination. These conflicting views and culture clash between the organizational framework of the hospital and the professional's institutionalized culture is be expected be barrier for change. This is somewhat paradoxical, especially if organizational changes are highly needed so that the hospital would be able to facilitate an optimal provision of care to the patients. The paradox is that both hospital and employees share or at least should share the goal of providing patients with the best attainable treatment and quality of care, given the available resources. In addition to this point of shared goals by the employees and the hospital, the Lean philosophy is within health care focusing namely on the patient and the processes around it. Thus, the translation of Lean into healthcare and hence the hospital setting has shifted the focus of the method from a customer to patient orientation. The method seeks to minimize waste and wasteful steps in "*care production*". This process of minimizing waste and non-value adding processes seeks to get rid of those processes and steps, which do not add value to the patient. Even though the patient is in focus when applying Lean in the hospital setting, it is still in conflict with what is traditionally accepted and in accordance the cultural-institutional norms and values of health care professionals.

From the organizational theory, for Lean to be successfully integrated within an organization its institutionalized culture must adopt and take in the Lean principles. By using methods of Lean as a tool to analyze and alter the hospital structure, those changes resulting from that can as previously mentioned be in conflict with the professional culture. The argument for such a violation of the professional culture may link to both the origination of Lean and the alteration of “*the right way of doing it*” mirrored through their norms and values. Logistics and operational processes that come with the Lean method are at first sight very different from the medical professionals work and culture. Thus, it is easy to mistake the Lean principles as a pure factory approach, where the patients are moved through the hospital as if they were to be put on a hospital assembly line (NRK, 2011). This mistake is easy to make since the method originates from the automotive industry where the production of cars have been on a production line since the early days of Henry Ford. When patients move around in the hospital they do not move in the same way as a common commodity good does on the factory production line. However, the patients are moved around the hospital accordingly to their diagnosis, the needed and required treatments and tests. In other words, patients are pulled through the hospital accordingly to their needs, which again can be related to the Just-in-Time concept. It is their disease and health that determines their movement and thus demands, not any pre determined standardized patient production line. Applying the Lean method to such a system would thereby focus on the movements of the patient and those aspects around its journey.

One problem and critical issue, which arises with the application of Lean within the hospital setting, is the differences in processes between the automotive production and provision of patient care. The design of the operational processes within the automotive production serves as a support to both the production and delivery of a homogeneous group of products and services. However, in the health care setting one does not deal with homogeneous goods that have an equal predictable need when it comes to the delivery of care. This issue with the differences in both processes and structure between health care and the automotive production highlights the issue of transparency. With transparency, it is meant what can be directly assigned to different parts of Lean. The possibility of actually pin down what adds and creates values for the patients, when the nature plays may influence the finale outcome of care, is a challenging issue. Thus, the transparency of healthcare limits the ability to draw a causal link between Lean and for example, the three dimensions of quality that Donabedian defined as structure, process and outcome. If one applies Lean within the hospital setting and to a

specific department, the visibility would then relate to the structure of organizing the department and the processes of care provided there. However, one may or may not be able to draw a concluding line from the measures taken to any outcome effects, as nature and other undetermined factors may influence the treatment outcome. The only causality line one may draw is that Lean has facilitated certain measures related to both processes and structure. In terms of processes, it may for example link to the Just in time approach, and structure would relate to the department layout, which would facilitate the JIT processes. Thus, the causality issue highlights one discussable point of applying lean as a quality measure, as to what degree the Lean method could be the cause of quality improvements.

Traditionally, care provided within the hospital setting such as medical professionals have been providing patients with care services under the manner of the “warm hand”. This warm hand symbolizes the caring for the patient and that it has been served accordingly to individual need, demands and expectations on quality. Since patients differ from each other, the question about homogenization is quite clear in the big picture where each patient is not alike. However, at the hospital it has been a tradition for clinic and department structure (Kjekshus and Bernstrøm, 2010). Thus when going from the overall perspective of the hospital setting into the local setting, then the debate on homogeneous and heterogeneous patients’ shifts towards similarity among patients. By diagnosing the patients’ and grouping them together, they become more homogeneous and alike, which reduces the difference to the operational processes of the automotive production. When looking at the professionals own routines and standards, they are divided by diagnosis and treatments, thus already share some similarities with the logistic approaches of Lean.

The complexity of hospital makes it hard to moderate exaggerations toward what fits the organization and not. This possibility of exaggeration may be rooted to a one-dimensional holistic focus placed on the overall level and big picture, and not break it down into pieces. In addition, the professional pride among the employees may make it less attractive to link them with low skilled workers through the same culture and work norms that may follow with Lean. Professionals also like to differentiate themselves from each other, both those on the outside and inside of the organization. On the inside, the hierarchical structure and the work position plays an important factor in the professional dynamics (Christensen et.al 2004). Even though there might be a need for a reorganizing of the structure so that, the organization can have a better compliance with the goals, the complexity of the professional culture may be in

opposition to changes. The professionals' resistance to change may be rational according to their own institutionalized culture that is in contrast to the official hospital framework where the need for change is by the organizational goal seen as rational. For any organization to be able to change, those critical conflicting points needs to be handled in such manner that there will ideally not be any imposing problems with change. There are many ways to handle this complexity through the different levels of the organization having unequal approaches to structural changes as well as to the hierarchical channels. As long as the problematic areas focused on, the attention given to it may open up for the possibility of successfully overcoming them. There are multiple options to overcome such complexity, one way would be not steer the whole project through the hierarchical channels under the top- down approach. It can rather strive to include a wider specter of organizational members in the formation of the project and so get the professionals included.

The complexity is not only limited to the patient groups and the professionals, but also to the hospital structure. Different hospitals and their sub division may vary in the institutional frames. Hence, hospitals might take these structural changes into the formal framework on a somewhat differently way. Even though hospitals and departments seem to be alike, it is not necessary the case. According to one part of the theory that covers organizational culture the organizations transparency is only visualizing the obvious factors. These obvious factors are those that lie on the "*surface*" of the organizational culture (Schein, 2004). One can draw an analogy of this visibility of the culture to an iceberg, which connects to Schein's three-leveled model of organizational culture. These three levels starts with the observable artifacts, then the espoused beliefs and values, and at last the basic underlying assumptions (ibid.). As the three levels were fully elaborated on in the theoretical framework, the details are not restated here. Those cultural factors that places itself in the lower field of the three-leveled iceberg and thus has a deeper attachment within the culture context may be harder to catch up on. Further, a challenging point with this depth of culture, is that one may not know if those factors that are placed within the "*harder to catch*" areas are the explanation factor. Hence, one possible explanation of difference between "similar" hospitals and departments is those cultural factors that do not related to the observable artifacts. Because of variations in the clinics and departments by differences in functions, forms and culture, new organizational ideas such as Lean is not necessary given the same chance throughout the hospital setting. Examples of such different departments would be the emergency and radiology department, where both the flow and type of patients varies. In an emergency department, the work tempo is high and less

predictive than in a radiology department that has a better possibility to predict their patient flow. From that analogy, the nature of workflow and processes that colors a department could be contributing factor to either success or failure of implementing Lean. However, the nature of department structure and functions is only one factor, as the manner of implementation is important. By this, it is meant how cultural dynamics should be assessed and integrated into the implementation process. In other words, managers responsible for implementation has or should take into account the institutionalized culture within the hospital setting while attempting to integrate the Lean philosophy to the framework.

It is worth noting that the more a top down and hierarchical approach the management takes in highly institutionalized organization, the more frightening these actions become to the affected clinics and departments. Moreover, in such professional organization as the hospital an hierarchical approach to management may insult the professionals by not including them in the process, and make them feel less important in the hospital organization. This may result in a bad climate at the hospital and that the professionals become less pruned to put the effort into the implementation and integration process of new ideas. In addition, by not considering the bottleneck aspects of implementation and integration process of Lean, the management and leaders of the implementation will go directly against the Lean philosophy and toolset. The reason is that by creating wasteful processes such as Lean failing to integrate the finale user that is the patient may have lost a possible value gain if it were successful and not staying put at status quo.

Such method as Lean should not be to unfamiliar to the professionals in the hospital setting as they seek to treat patients accordingly to their needs and under the best manners. Further if there is any room for improvement to the treatment methods given, then it is anticipated both by the professionals them self and the patients that they undertake the improvements. In the end, the medical professionals share a common goal of providing the patients with the best care that they can provide within the given framework. Hence, the professionals within the hospital and health care setting are already in possession of some characteristics that is present within the Lean philosophy. Even though Lean is a way of production, it is still classified as “*automation with a human touch*” by Toyota, which implies that there are room for alterations and human aspect to such “mechanical” process.

5.1.2 Myths and translation

When looking at the timeline for Lean, we see that the travel of the organizational idea has rapidly diffusion from the first Hospital who adopted it in the US and then later on into the Scandinavian sphere. In the Norwegian context, the UNN has been found to be the only one that at the current time to have started using Lean as a method through the hospital organization. UNN consists of one regional and two local hospitals, which is not too many since there are approximately 88 hospitals in Norway operating at different levels (INTORG 2009). In addition, to the overall project at UNN some smaller projects been conducted in selected areas at other hospitals. The timeline for these are quite compact in addition to a low number of newcomers until 2011. This compressed timeline is somewhat supported by the one question posted through the INTORG 2009 report, which is based on the 2009 survey to the Norwegian hospitals. Through question nr 21 in second part of the report, one of the options of organizational tools that the hospitals could check of state that they had used in 2009 were Lean. Of the 66 hospitals responding to that specific question, 16% reported that they had used Lean during 2009. Two things needs to be pointed out in relation to question nr 21 first the survey was distributed to 88 geographical units of which 66 of them specifically answered this question. Secondly, the option of reporting the use of Lean was first posted as an option in 2009. The result from that concrete question suggests that the ideas associated with Lean were not important or notable 2009, which supports the sketched timeline of its diffusion within the Norwegian context. Moreover, in relation to its myth status this may contribute to the assumption of it just starting to become a myth in the Norwegian health care setting sometime after 2009.

Lean's status as a myth within the Norwegian hospital sector is hard to define due to the limited findings of the diffusion and timeline. However, more signs of it becoming a myth can connected through the locating of the two future Lean hospitals, Stavanger University Hospital and Vestre Viken Hospital Trust, who both decided in 2010-2011 to start Lean projects throughout the hospitals. When these two start the implementation, they will then become the second and third Lean hospitals in the Norwegian setting. By these two hospitals deciding on implementing and becoming Lean hospitals it is shown that it is not only diffusing as a partial organizational method but also as a whole between hospitals at the national level (Vestre Viken will look to UNN and Odense for inspiration). In addition to the two hospitals recent kick-start to the diffusion it is supported by the identification of cases with a more local character, such as the in Lillehammer and St.Olavs Hospital in Trondheim.

If connecting a myth to common popularity and trends another way of seeing that a phenomenon or thing becomes popular is the increase in the critique of it. The documentary “Helsefabrikken” aired on NRK (2011) initiated a public debate on how Lean fits into health care. These discussion and debate, which followed on how well the method fits into the hospital setting, implied that had gotten both “*haters and lovers*”. Thus, from the assumptions of a phenomenon such as an organizational idea becoming fashionable only when it has been criticized, then Lean reached that point in the Norwegian hospital setting after the airing of the “Helsefabrikken” documentary. However, a year has passed by since the documentary first aired and it has been quiet in the area of critique of Lean’s application to the Norwegian health care sector.

5.1.3 Main actors’ involved in the diffusion of Lean

Another point to elaborate is the actors who are involved in the diffusion of the Lean philosophy, such as big international consultant firms as Ernst and Young, Implement Health Care and Agenda Kauphang. Ernst and Young wanted to test the transferability of Lean into the health care setting and initiated the “Enda Litt Bedre” project at Ullevål Hospital. From the theory of trends and translation, such actors as the consultant firms are classified as deliverers of best practices (Røvik, 2007). They are involved in the process of transferring ideas and building myths from the identification to the diffusion of it into other areas. In the Ullevål Hospital setting Ernst and Young proposed the testing of Lean in the hospital setting, as they had a hypothesis regarding the transferability of it into the hospital setting. Even though it is interesting to know the transferability of Lean into the health care setting, the consultant firms may not necessarily share the same goals and perceptions as a hospital. The question to pose any such exploratory project as the one at Ullevål is if there are any other motives behind the quest to test the transferability of Lean to the health sector. One will assume that the wish of being the best is what drives the consultant firms to sit on fresh and current knowledge on transferability and organizational challenges of the following implementation processes. They might have a goal of being the lead actor in the diffusion of new and possible emerging myths, which may indirectly mean that they would be busy working on those projects and generate income for the company.

An additional aspect of the consultant firms and their involvement to diffusion organizational ideas and myths are the homogeneity of the framework and the flexibility of the implemented

methods. Therefore, even though they are responsible for both the diffusion and partially for the implementation, which depends on their contractors wishes, the flexibility of what they present would also be dependent on them. The more flexible and independently adjusted such methods can be, the more time and effort is required from the actors. This implies that the success of implementing such myths may not only rely on the organization itself but also the consultant firm's translation practice and guidance to follow up such projects.

5.2 UNN using Lean as an improvement method

As presented in the results section the UNN was the first Norwegian hospital to implement Lean as a method throughout the organization. It aimed to become the first fully Lean hospital in Norway and to use the method as a part of the *Long-term development and reorganizing project* (LUO). After the elaboration of the framework for the project, a comparison between Lean at UNN and Lean known through both Toyota and Womack et.al (1990) was undertaken. From the comparison, signs of both contextualization and de-contextualization are present, such with the case of the five Lean principles and eight types of waste. The five Lean principles was translated to the health care setting of UNN, where the wording and focus shifted from focusing on the product as it appeared through Womack et.al (1990) to patient oriented. This shift in the focus from materialistic products to the dynamics of patients and their trajectories falls firstly in under de-contextualization by the work of Womack et.al (1990) and later in under the contextualization due to the travel from automotive to professional hospital bureaucracy. In general, most of the points of translation and transformation undertaken at UNN go in the direction of first being de-contextualized through the Womack et.al (1990), Toyota and other Lean authors, and then contextualized into the setting of UNN and other inspirational hospitals, such as Odense and Virginia Mason. Further, when looking at the eight types of waste it also follows along the same pattern as the five Lean principles. UNN's translation of both the five Lean principles and eight types of waste are suppose to be a supporting method to the patient flow project to reduce the non-value adding processes. Patients are supposed to get the right care at the right time, through a seamless and continuous patient flow through the hospital departments. This quest is directly linked to the just in time concept and the Lean methods quest of reducing or limiting those processes which are not adding value to the final user. However, in the framework of the patient flow project the orientation is around the patient, which is not surprising as one of the

goals of using Lean as method has been to improve quality and service provided to the patients. Within the hospital setting, the patient defines as the customer, with the following logic of it being the one who consume and demands health care treatments. Patients are both the final user of the treatment given and an indirect part of treatment 'production'. Due to this complexity in the definition of the product and the end user, the translation of it into the setting of UNN the customer-oriented focus also shows signs of contextualizing through being modified and remodeled.

Another point to elaborate on is the translation and transformation of the *Jidoka* concept or tool from Toyota, better known as “*automation with a human touch*”(Toyota, 2011). At the Toyota factory each of the employees are given the possibility to stop the whole production line if errors occur so that they can be instantly managed and not pushed further down the production line. Comparing this with the work routines that the different professionals has at the hospital, the concept of *automation with a human touch* may already be present in both the formal and informal norms. The groups of professionals working at the hospital may thus already be in possession of such norms and values that resembles the automation with a human touch through their deeper and underlying institutionalized professional work culture. By specifying such obvious manners as stopping a patients trajectories and treatment when errors and adverse events occur, it may lead professionals to feel undermined by the project and its managers. The same reasoning may also apply to why the tool of *asking the five whys* when errors occurs to systematically identify the root of the problem is not mentioned in the reviewed documents. Such identification processes of finding the root cause may also be assumed to be included in the professionals' work culture, routines and the official framework to the hospital and health care system. However, the five whys can be somewhat related to the learning from the continuously implementation process throughout the hospital. In the start of a project they focus group seeks to learn from previous experiences as well as mapping out the status quo and then to identify problem areas that are in conflict with the Lean principles and creates waste for the patient. With the focus on continuous improvement driven by the focus group members, it may relate and connect to the *Kaizen* principle of the Lean method that seeks continuous improvements initiated by the workers. From the framework, employees are encouraged to come up with new ideas for possible new patient flow projects at the hospital. One can assume that suggested projects may not function in accordance with the Lean principles, and so create waste for the users. So therefore one can see the employee driven improvement process being in line with the Lean from Toyota, and that is somewhat

contextualized to UNN. When linking these parts of the framework for the “*Patient Flow Project*” further to the translation of practice then they fall in under the contextualization due to the modification and adjustment of the process.

Mostly the translation and transformation of Lean at UNN has gone through the phase of de-contextualization as a part of the work by Womack et.al (1990) other Lean works, and then contextualized in to the setting of the *Patient flow project*. In the work with the project, UNN received help from the two consultant firms Implement and Agenda. Their influence on the translation and transformation of Lean into the setting, related to the initial training of the internal Lean consultants. The documents do not elaborate on the organization and the content of the training given by the consultant firms to the management of UNN and the internal Lean consultants. Due to the limitation of information on the consulting firms work, the credit of translation of Lean into the setting of UNN is hard to specify. Either way, through the analysis of the project framework the process of translation and transformation shows signs of both contextualization and de-contextualization. In the end, the framework bears signs of having an anchor with the top management, with diagonal lines further down the organization of the project groups. The concept of integrated leadership is somewhat indirectly pointed at through the composition of the project groups. However, the focus group, which is the working part of the project, would mainly consist of employees at the affected department and clinics and may be lead by the vice director. Even if the top management might be involved, there is the possibility of them not being active in the production process, so it may not necessarily be in the same line as what has been the case at Toyota.

5.3 Limitations

As the construction of this thesis was undertaken in accordance with a of qualitative research method, it sought to answer the question on how Lean has diffused into the Norwegian hospital context with the use of freely available white and grey literature. The somewhat mixed model of systematically searching for relevant literature to extract relevant information imposes some limitations on the study that may or may not be possible to avoid.

First, the method used to extract information on how the Lean philosophy has diffused from the machine bureaucracy at Toyota to the professionalism of hospitals may impose some selection bias. The question of selection bias relates to the consideration of validity of both

the reviewed and not reviewed literature. Because of the subjective decisions made on the inclusion criteria and further the question of whether the identified literature is representative or not for the subject of study. However, this is a somewhat common limitation of using qualitative methods where the researcher defines selection criteria. Another side of the identification process and imposing biases through that is the availability of relevant publications as some of the relevant literature may not publically available through the different databases.

Secondly, the selection of the research method may have some limitations as it only searched through open sources and relied solely on written documents and literature. In a way these limitations are somewhat connected to the selection bias, but here it is more on the term of information bias as some information may be lost through the focus on written documents and literature. For mapping out the diffusion of Lean in the Norwegian context, a survey among all the hospitals could possibly be a supportive measure to limit information bias. By conducting such a survey, one would rely on the hospital's feedback being high enough to become valid, and consider the problematic of report bias especially since Lean is such a popular term these days

6 Concluding remarks

Through this thesis, the author tried to identify the diffusion process of the Lean philosophy and method from Toyota to health care and the Norwegian hospital sector. Such identification attempts as the one undertaken through this thesis is to the author's knowledge, the first study focusing on the Norwegian extent. In addition to the identification of the philosophy and methods trajectory through the different organizations, it also looks into the translation and transformation aspect of Lean. The results presented through this identification study highlighted some complex and discussable points that follows the diffusion of such philosophy and method as Lean, which traveled across organizational settings.

From the result, one can catch up on the movement of Lean in both the international and Norwegian hospital context. From the call for using Lean in the American health care in 2001, the method and philosophy used some time in diffusing to Norway. The first two findings of use were in 2007 and 2008, at respectively Ullevål Hospital and UNN. In both projects, consultant firms were active in training Lean-consultants and one may assign them to be the active transformation and translation actors of Lean to the hospital setting. However, it is not only the consultancy firms who were found to be actors of transformation and translation, as both Odense University Hospital in Denmark and UNN are referred to as inspirational sources for newer projects. From the diffusion pattern, one can to some degree conclude that Lean is a myth in the making and possibly already one in the Norwegian hospital setting.

The mismatch between the organizational configurations of the professional and machine bureaucracy has often been the main argument for not using logistical approaches such as Lean in health care. Through an analysis of the organizational differences between the two bureaucracies at the overall and local level, it was found that structural differences might be minimized when patients are divided according to diagnosis and departments. One main barrier and contributor to the complexity is identified as the professionals and their culture, as both their place within the organization and work routines differs from what is viewed as normal in the machine bureaucracy. Further, the issue of transparency of causal effects of Lean as a quality improvement tool was discussed. The discussion has linked the visibility of Lean's to the three dimensions of quality, where the complexity of health care have been found to pose challenges how one may link improvements in health outcome directly to the

Lean method. In addition to the complexity of the hospital, structural differences among Norwegian hospitals may be a barrier for direct transferability of Lean philosophy and methods within the Norwegian hospital setting.

Future research on the diffusion of Lean in the Norwegian hospital setting is needed. One should consider the possibility of making use of the surveys that the INTORG reports are based on, solely due to its distribution pattern and previously high response rate. Questions asked should seek to calculate the current and past use, formed in such a manner that other similar organizational tools, such as patient focused care and redesign are not mistaken for Lean.

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