

Preface

This Master thesis is the final part of our Master of Science degree in Industrial Engineering and Management at Lund University, Faculty of Engineering. The thesis has been carried out at IKEA of Sweden in Älmhult, in collaboration with the department of Industrial Management and Logistics at Lund University, Faculty of Engineering.

First of all we would like to thank Paul Björnsson at IKEA for his constant support and advice, and his genuine interest in our work. We would also like to give a special thank to Stig-Arne Mattson, for his valuable comments and guidance.

Finally we would like to thank Marie Andersson, and everyone else within IKEA that has helped us throughout the project, for taking time answering our questions.

We hope that this report will help IKEA in their future work with measuring processes.

Lund, January 2010

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Abstract

- Title:** Performance Measurement in a Process Oriented Organization – a study of IKEA Supplying Process, and its core process Plan & Secure Supply
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- Keywords:** Business Process Management (BPM), Process orientation, performance measurement, strategy
- Purpose:** The purpose is to map current measures in the main process Supplying and to select those that can be used to support the core process Plan & Secure Supply. Further, recommendations of new suitable measures for Plan & Secure Supply shall be given.
- Method:** This is a qualitative study, mainly based on answers from semi-structured interviews with employees at IKEA. 51 interviews, within all organizational units connected to Supplying, were held to ensure a full view of the used measures. The secondary data that the frame of reference is based on primarily consists of literature about process orientation and

measurement systems.

Conclusions:

When mapping the measures within Supplying, 226 were found. There are significant differences between the measurement structures of different organizational units, both concerning the presentation and the number of measures used. Of the 226 Supplying measures, eight can be used to support Plan & Secure Supply, e.g. Forecast Accuracy, DD Share and stock measures. Further, new measures such as Cost of Poor Planning and Order proposal Accuracy, are recommended to be developed.

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1 Introduction

This chapter aims to give an introduction to the thesis by describing the background and the purpose, which the report are based on. Furthermore the delimitations are stated, and a short presentation of IKEA is given.

1.1 Background

Increased competition and a more global market imply challenges for all companies, and efficiency and flexibility are urgent necessities to survive. Traditional functional oriented organizations are no longer considered able to handle those challenges, why the movement towards more process oriented organizations is popular.¹ IKEA sees the advantages of the new way of working, and took a first step towards a more process oriented organization in 2002. The result of this first step was the creation of three main processes²;

- Creating the Home Furnishing Offer
- Supplying
- Communicating & Selling

A second step in the process orientation was taken in 2008. Supplying, which is responsible for making the product range available to the customers, was then divided into core processes. One of Supplying's four core processes is Plan & Secure Supply, which aims to plan demand and supply, optimize supply chain network and secure capacity in all dimension, for the next 84 weeks.³ The process orientation is part of the creation of "One IKEA", where everyone works in the same direction towards common goals.

¹ Ljungberg, A. & Larsson, E. (2001) p. 11, 68

² Internal material (2009) p. 16

³ Björnsson, Paul (2009-11-10)

“What gets measured gets done” is a frequently used statement⁴, which points out the importance of measuring the right things as well as things right. Many of the measures that Supplying is using today were defined before step II of the process organization was initiated, and are related and optimized from a functional perspective. A justified thought is that many of the measures are not aligned with the work in, and the goals of, the processes and perhaps even counteract them. However, there is an ongoing project (“PSS Mäta”) with the purpose to create a future set of measures within PLAN & SECURE SUPPLY.⁵

1.2 Problem discussion

For large organizations it might be difficult to get an overview of all measures, and how they are defined and connected to each other. This is the case for some parts of IKEA, and therefore mapping of current measures, including definitions, measurement frequency, data sources etc. is important. Other important steps in the creation of ”One IKEA” are to review and develop a new measurement structure that is aligned with the processes.

1.3 Purpose

The purpose of this master thesis is to:

- Map current measures (“as is”), including Key Performance Indicators (KPIs) and other performing indexes, within the IKEA Supplying process, and comment on the measurement structure.
- Select the existing (“as is”) measures used within Supplying that can be connected to the core process Plan & Secure Supply, and relate them to the process.

⁴ Ljungberg, A. & Larsson, E. (2001) p. 215

⁵ Björnsson, Paul (2010-01-15)

- Recommend new (“to be”) measures to be developed to support Plan & Secure Supply.

1.4 Delimitations

The mapping is primarily focused on the main process Supplying, while the following selection and recommendations only focus on Plan & Secure Supply.

Only established measures that are followed up on regular basis are included in the mapping. This implies that measures that are only followed up occasionally, or that only a couple of people follow up for their own interest, are not regarded.

The analysis of Plan & Secure Supply is based on the tentative objects out, which perhaps have been or will be changed. Neither the process design nor the tentative objects are questioned.

1.5 Target groups

This thesis is mainly addressed to employees at IKEA, especially within the core process Plan & Secure Supply. Apart from the main target group, this report may also be useful for students, teachers and other people within the academic world that have an interest in supply chain management, process orientation and measurement systems.

1.6 Company description

IKEA was founded by Ingvar Kamprad in 1943, and furniture was introduced into the range in 1948. Since then IKEA has become a global company with stores in 44 countries and with a vision to create a better everyday life for the many people. The business idea is to offer a wide range of well-designed, functional home furnishing products at prices so low that as many people as possible will be able to afford them. The IKEA Group is

owned by a foundation based in the Netherlands, has 128,000 co-workers, and generates annual sales of more than 21.1 billion Euros. Since September 1 2009 Mikael Ohlsson is IKEA's CEO.⁶

1.7 Time plan

The mapping of current measures is the most time consuming part of the project. About two thirds of the total time is dedicated to interviews, collocation of information and designing of the map. The result of the mapping is difficult to present in a written report, why only examples of the map is provided. Therefore, the presentation of the map in this report does not give a full picture of the work that is required. This disposition is needed to fulfill the purpose, which is provided by IKEA.

⁶ IKEA 2009 (a)

2 Methodology

This chapter aims to describe the choice of methods used in the project. A selection of methods is done to suit the purpose of the project. The selection of methods for research, gathering of data, report credibility and criticism of sources are discussed further.

2.1 Methodology approaches

A study can be explorative, descriptive, explanative or normative, and the choice of study is based on the existing amount of knowledge within the area of study. Explorative studies are used when there is little knowledge and basic understanding is wanted. When fundamental understanding exists, a descriptive study can be used to describe, but not explain relations. Explanative studies are used when profound knowledge is desired and relations should be both described and explained, while normative studies are used when a certain degree of knowledge exists and the objective is to give guidance and suggest measures.⁷

This master thesis will be based on both descriptive and normative studies. In the first, descriptive, part of the project the measurement structure within Supplying is described, without explanations and valuations. The objective in the second part, however, is to give guidance and suggest recommendations about the suitable measures for Plan & Secure Supply.

There are three assumptions that define the scientific approach of the study; the analytic, the system and the actor's approach. With an analytic approach the reality is explained as objective and complete as possible and much effort is spent on finding cause-effect-relations. It is assumed that the whole is the sum of the parts, and therefore the problem can be divided into several

⁷ Björklund, M. & Paulsson, U. (2003) p. 58

sub-problems. With the system approach, the reality is explained objectively, but the whole is considered to differ from, and is often more than, the sum of the parts. Within the system approach synergy effects between different parts are emphasized, and the relations between the parts are as important as the parts themselves. According to the last, actor's approach, the reality depends on its observers and gives rise to subjectivity. Consequently, the description of the reality depends on the researcher's experiences and acting.⁸

For this master thesis, a system approach was chosen, because seeking a holistic view of the system was important. However, in the second part of the thesis, some element of the actor's approach is used, as the evaluation of the measuring system is affected by the authors' experiences.

2.2 Induction, deduction and abduction

When working on a research project there are normally two ways to start the project; induction or deduction. *Induction* means starting by collecting data from reality, without prior theoretical studies, and then drawing general and theoretical conclusions. A disadvantage with this method is the difficulty of being unbiased, since a standpoint is established already when deciding what to study. *Deduction* on the other hand starts with theory, and a theoretical hypothesis is tested empirically. Conclusions are drawn based on existing theory.⁹

Abduction is a way to draw conclusions about what caused an observation based on probable connections. It cannot be used schematic, but requires

⁸ Björklund, M. & Paulsson, U. (2003) p. 59

⁹ Wallén, G. (1996) pp. 47-48

thorough experience within the field of study. The conclusions are normally not valid without further testing.¹⁰

Since the empirical study is the basis for this thesis, an inductive approach is used. The mapping of the measures is based on empirical observations, such as interviews, and the recommendations are influenced by personal analysis. However, the analysis is to some extent based on existing theory about for example process management.

2.3 Qualitative and quantitative studies

Quantitative studies contain information that can be measured or valued numerically. However, quantitative studies are limited by the fact that not everything can be measured quantitatively. *Qualitative* studies are used to create a deeper understanding of a specific subject, a specific occurrence or situation. They are not possible to generalize to the same extent as quantitative studies.¹¹

The choice between a qualitative and a quantitative study is made based on the purpose of the study. Observations and interviews are suitable for qualitative studies, while questionnaires and mathematical models are suitable for quantitative studies.¹²

This thesis is a qualitative study since the purpose is to create an understanding of how, and what, IKEA is measuring. This understanding is needed to be able to evaluate the measures within the core process “Plan and Secure Supply”. Since the study is qualitative interviews are used to collect data and information.

¹⁰ Wallén, G. (1996) p. 48

¹¹ Björklund, M. & Paulsson, U. (2003) p. 63

¹² Björklund, M. & Paulsson, U. (2003) p. 63

2.4 Data Collection

There are two types of collected data; primary and secondary data. Primary data consists of information that is collected specifically for the research, for example by interviews, questionnaires and observations. Secondary data is general and public information that can be found for example in books and journals.¹³ A combination of primary and secondary data has been used for this thesis.

2.4.1 Interviews

A method for collection of primary data is interviews, which can be structured, semi-structured or unstructured. In a structured interview, all questions are set beforehand and are discussed in a definite order. If only the subject fields are set, and specific questions are formulated during the interview, it is called semi-structured. An interview can also be in the form of a conversation or discussion, with no predestined question, and is then called unstructured.¹⁴

Primary data for this master thesis have, above all, been obtained through interviews with people within IKEA. Using personal interviews, instead of questionnaires, ensured that the respondent understood the questions, and that the desired answers were obtained. The interviews were semi-structured, that is a discussion based on a number of questions and subject fields. This was necessary because the interviewees had different knowledge about the subject, and individual structured interviews were impossible to obtain. With semi-structured interviews the interviews could be lead in a way that fit the interviewee, at the same time as no important information was missed. Every interviewee received a short presentation of the background and purpose of the master thesis a couple of days before the

¹³ Björklund, M. & Paulsson, U. (2003) pp. 67-68

¹⁴ Björklund, M. & Paulsson, U. (2003) p. 68

interview. This guaranteed that everyone knew what the interview was about, and that they had time for necessary preparations. The questions that the interviews were based on can be found in Appendix 1.

51 persons at IKEA have been contacted. 34 of these were personal meetings and 17 were contacted by email or telephone. The interviews were held with people from the organizational units Categories, HFB, Trading, DS Operations, Transport Global, Retail Logistics, the Red Group, Free range, Supply Teams, and CD (further on all these are referred to as the units). Additional interviews were held with people from Business Navigation Supplying, as well as from Plan & Secure Supply. The first interviews were mostly held with business navigators, with the purpose to get an overview of the units and the top measures that are used. Further interviews were then held in each unit, both with business navigators from different areas as well as with people working more operative. The personal interviews were mostly held with people located in Älmhult, but also with some people visiting from other countries in Europe. For practical reasons, personal interviews were not always possible, why email or telephone sometimes were used for all contacts with a unit. However, email was mostly used to verify information obtained from personal interviews. To get an overall picture of the measures within Supplying, and not only the ones used in Älmhult, people from different trading areas, transport areas etc. were contacted. People within Supplying have helped us to choose areas and find people to guarantee that the map of the measures is representative for all of Supplying.

2.4.2 Observations

The collection of primary data from interviews has been complemented with observation of information packages at IKEA's intranet. However, all information found at the intranet, has been discussed with the interviewees.

2.4.3 Literature study

The secondary data that the frame of reference is based on consist primarily of literature about process orientation and measurement systems. Books, scientific theses as well as journals have been used. More general theories related to the subject have also been investigated such as company culture and balanced scorecard.

2.5 Credibility

To ensure a study's credibility different aspects can be evaluated; validity, reliability and objectivity. For the results of a study to be trustworthy validity, reliability and objectivity should be as high as possible.¹⁵ Criticism of sources is also important to ensure the credibility of the report.

2.5.1 Validity

Validity shows to what extent what was intended to be measured is actually measured.¹⁶ In this case, validity refers to the communication with the interviewees. It must be secured that the questions have been correctly comprehended and that the answers have been interpreted in an accurate way. The validity is considered to be of high credibility since all interviewees were contacted afterwards and asked to verify the information in the map that was received in their interview. The interviewees that are set as sources in the definition sheet all received an excel file with the measures in question, and were asked control the information. If no answer was received, the information was assumed to be correct.

¹⁵ Björklund, M. & Paulsson, U. (2003) pp. 59-60

¹⁶ Björklund, M. & Paulsson, U. (2003) pp. 59-60

2.5.2 Reliability

The term of reliability concerns the trustworthiness of the study and the degree of reliability of the measuring instrument, i.e. to what extent the same result is achieved if the study is repeated.¹⁷ Almost all interviews have been held by two persons. This means that all information achieved during the interviews has been heard and discussed by more than one person. Most personal interviews were recorded, which further decrease the risk of misunderstandings. As the interviews were semi-structured they often resulted in a free discussion around the subject. Therefore it is difficult to guarantee that the exact same results would be obtained if the study was repeated. However, because of the nature of the subject in combination with the authors' lack of prior experience within IKEA, semi-structured interviews were seen as necessary.

Concerning the repeatability of the study, IKEA is a dynamic company that can transform rapidly due to market changes or internal circumstances, meaning that a similar study can find other results if conducted at a later stage.

2.5.3 Objectivity

The objectivity shows to what extent someone's values influence the study.¹⁸ As the project is carried out by two persons, who have worked on all analysis and conclusions together, no one's personal opinions have been allowed to dominate. Further, none of the authors have any prior engagement with IKEA, research findings to defend or other reasons to let personal opinions affect the project. For literature studies information originating from several independent sources is used, and therefore the objectivity is considered satisfying for this area.

¹⁷ Björklund, M. & Paulsson, U. (2003) pp. 59-60

¹⁸ Björklund, M. & Paulsson, U. (2003) pp. 59-60

2.5.4 Criticism of sources

This study is based on both literature studies and several interviews. With respect to the large number of sources, consisting of books, scientific theses and journals, the understanding of the theories used in the analysis is considered to be good. Naturally, a literature study covering more sources would have given the theory chapter further trustworthiness. Most literature about process orientation used in this thesis is written by Anders Ljungberg, which could imply a partial view of the subject. However, the fact that Ljungberg has done researches in the subject and presently work with process orientation makes him a reliable source.

Most parts of the empiric studies originate from information based on interviews with employees working within Supplying. The sufficient number of interviews within each unit ensures that an objective view of the measurement structure has been obtained. However all interviewees work for IKEA, why their objectivity could be discussed.

2.6 Project structure

In the first part of this thesis, measures within Supplying were in focus. The mapping was supposed to start by looking at all of IKEA (Level 0) and then be gradually more and more detailed for Supplying (Level 1) and Plan & Secure Supply (Level 2). This structure can be compared to the funnel in Figure 1. The reasons for starting at level 0 were to get an idea of the total number of different measures used within IKEA, as well as making sure that no measures connected to Supplying were disregarded. This turned out to be more difficult than expected, since all of the interviewees work within a specific unit or process and none of them could provide a total picture. As the purpose of the thesis is to map measures on levels 1 and 2, level 0 was left out. However, the probability that this would affect the results is

regarded as low since the large number of interviews increases the probability of a complete picture.

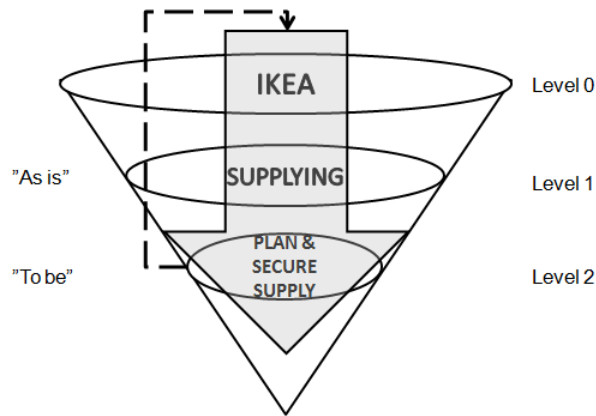


Figure 1 Mapping structure.

At Level 1, an “as is”-picture of the measurement structure within Supplying was obtained through a large number of interviews. The mapping was the largest and most time-consuming part of this project. It was done parallel with interviews and took about two thirds of the total time of the project.

In the second part of this thesis, the measures within the core process Plan & Secure Supply were analyzed. First a selection of the existing measures that could support the process was made. After that, a discussion about new possible measures that could be developed was held.

3 Frame of reference

This chapter aims to describe theories that are relevant for the report and analysis. The chapter mainly covers theory about business processes and measurement systems.

3.1 What is a process?

In the literature many definitions of a process can be found, which may lead to misunderstandings. To facilitate the work with processes it is therefore important that everyone has the same perception of what a process is. The definition used by Ljungberg is¹⁹:

“A process is a repetitively used network of orderly linked activities using information and resources for transforming inputs to outputs, extending from the point of identification to that of the satisfaction of the customer’s needs.”

A metaphor often used to describe a process is a road, which cuts across functions and divisions (Figure 2). The road starts with a customer need and ends with customer satisfaction, and is always measurable and repetitive.²⁰ A process is strongly related to the business concept of an organization, and how it is realized in practice.

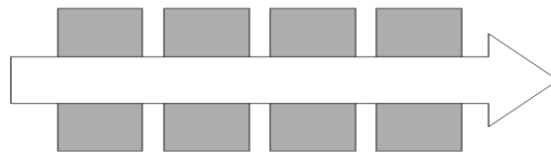


Figure 2 Processes cuts across functions and divisions.²¹

¹⁹ Ljungberg, A. (1998) p. 57

²⁰ Ljungberg, A. & Larsson, E. (2001) pp. 44-47

²¹ Based on Ljungberg, A. & Larsson, E. (2001) p. 46

When describing an organization from its processes, the following types of processes can be used²²:

- Main processes
- Support processes
- Steering processes

3.1.1 Main Processes

The main processes describe the purpose and give a perspicuous picture of an organization. By studying the main processes, it can easily be understood what is most important for the organization, and how different parts work together to create the whole.²³ A main process can be described in different levels of detail, and can be divided into a number of sub processes and activities (Figure 3). Sub processes are subordinate main processes, and activities are subordinate sub processes.²⁴

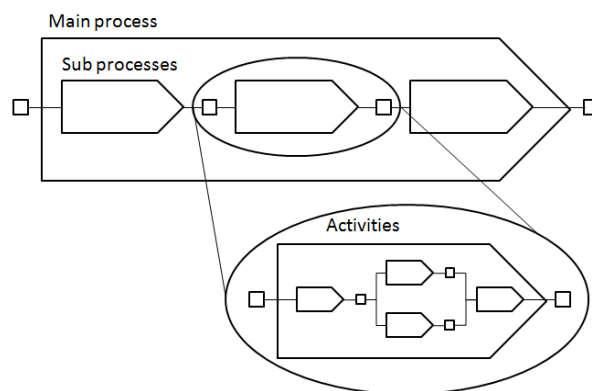


Figure 3 Different levels of detail for processes.²⁵

²² Ljungberg, A. & Larsson, E. (2001) p. 184

²³ Ljungberg, A. & Larsson, E. (2001) p. 84

²⁴ Ljungberg, A. & Larsson, E. (2001) p. 193

²⁵ Based on Ljungberg, A. (1994) p. 101

3.1.2 Support and Steering processes

The support processes are needed to make the main processes work. Examples of support processes are invoicing and creation of budgets and balance sheets. The steering processes are used to coordinate the main and support processes, that is for example to define the strategy, create the financial and resource prerequisite as well as follow up the development of the organization.²⁶

3.1.3 Components of a process

A process normally consists of six different components; object in, activity, resources, information and object out, see Figure 4.

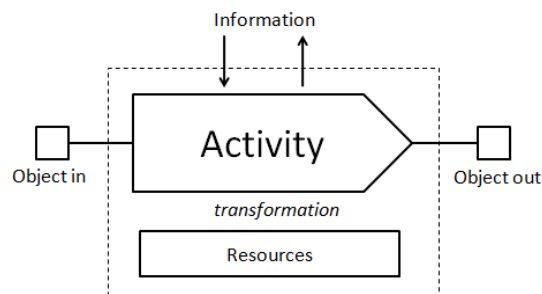


Figure 4 An activity transforms object in to object out.²⁷

3.1.3.1 Object in

Object in, which is drawn as a square, represent the trigger that cause an activity to start. Object in comes from the immediately preceding activity or process, which is an internal or external supplier with a certain need. Examples of object in can be an order or a new product idea. Object in is not everything that goes into the process, and should be distinguished from resources and information, that are further described below. However,

²⁶ Ljungberg, A. & Larsson, E. (2001) pp. 185-186

²⁷ Based on Ljungberg, A. (1998) p. 64

object in can be in form of both resources and information, given that they trigger the process.²⁸

3.1.3.2 Object out

Object out is the immediate result of the transformation within an activity or a process. Object out from one process or activity can be object in to the following.²⁹

3.1.3.3 Activity

Within an activity, the object in is transformed to object out. An activity, as well as a process, is drawn as a box with a tip pointing to the right, building up a flow from left to right. A process consists of a network of activities, where the object out of the last activity is the same as the object out of the superior process.³⁰

3.1.3.4 Resources and information

Resources, for example people and equipment, are required for the performance of an activity. The resources are dedicated to a certain activity, and do not follow the object through the process. Object in and object out can be of information type. However, the difference between objects and information is that objects trigger the process, while information facilitates and supports it.³¹

3.1.3.5 Outcome

The result of a process does not only consist of object out, but also the process' outcome. The outcomes are the more long term result of the

²⁸ Ljungberg, A. (1998) p. 66

²⁹ Ljungberg, A. & Larsson, E. (2001) p. 195

³⁰ Ljungberg, A. & Larsson, E. (2001) p. 195

³¹ Ljungberg, A. (1998) p. 68

process, like customer satisfaction. The outcomes are often more difficult to define and measure than object out.³²

3.2 Business process management and Process orientation

The traditional function oriented and hierarchic organization is built on a couple of assumptions that are not aligned with the reality today. One example of an old-fashioned assumption, that has been the basis of the work in many organizations, is that identification of small and specialized tasks, which all have a best way to be performed, always is possible. Another example is that improvement of every task implies improvement of the whole organization.³³ When focusing on performance of functions, an immediate risk of sub-optimization occurs because of lack of a comprehensive view and focus on the overall goals of the organization.³⁴

3.2.1 Business process management

Two goals within Business Process Management are integrating the management of the whole organization and creating focus on customers through all activities. A precise definition of BPM is difficult to find, but the main strand in existing definitions is that BPM is a structured, analytical, and cross-functional management approach that is striving for innovation and flexibility in the organization and continuous improvement of processes.³⁵

3.2.2 Process Orientation

In a process oriented organization, processes are used to create customer value. The emphasis is not on functional and hierarchical structures, but on

³² Ljungberg, A. & Larsson, E. (2001) p. 197

³³ Ljungberg, A. & Larsson, E. (2001) p. 68

³⁴ Ljungberg, A. & Larsson, E. (2001) p. 71

³⁵ Lee, R. G. & Dale, B. G. (1998) p. 216

the improvement of entire chains of business operations.³⁶ If processes are the basis of the organization's way to observe, develop and manage the business, the organization is process oriented.³⁷

3.3 Performance Measurement

To improve the performance of an organization, it is important to know how well it performs today. Therefore, measurement has become critical for the success of an organization. A well-developed measurement system can for example help the organization to understand how good they are at meeting customer expectations, pinpointing cost, time and quality of their logistics operations as well as deciding which suppliers are the most effective to deal with.³⁸ As the objective with measures is to steer an organization in a certain direction, it is not enough to measure the right things, but it is also important to measure it the right way.³⁹ Furthermore, a well developed measurement system facilitates benchmarking, identifies problems, creates a common language and gives motives for change.⁴⁰ For example Johnson and Kaplan point out some needs of good measurement systems, especially the need of non-financial indicators. These indicators should be based on the organization's strategy and focus on the key areas of work, e.g. manufacturing, marketing, and R&D.⁴¹

3.3.1 Traditionally used measurements

Traditional measures that are often used within organizations today usually possess one or several shortages. When organizing around processes instead of functions, a new way to measure is required. The focus should move

³⁶ Reijers, H. A., (2006) p. 392

³⁷ Ljungberg, A. & Larsson, E. (2001) p. 88

³⁸ Keebler, J. S. et al. (1999) pp. 2-4

³⁹ Ljungberg, A. & Larsson, E. (2001) p. 215

⁴⁰ Ljungberg, A. & Larsson, E. (2001) pp. 223-225

⁴¹ Johnson, H. T. & Kaplan, R. S. (1987) pp. 256-257

from the functions to the processes.^{42 43} Some potential shortages with traditional measures are described below.

3.3.1.1 Functional oriented

Many organizations still use performance measures that focus on functional optimization. Even if these measures help to improve the performance in one specific function, they can counteract improvements of the whole logistics process.⁴⁴ This is the reality especially in many manufacturing organizations. The production manager wants plenty of raw materials to support long production runs, while the sales manager desire a high level of finished goods inventory to handle spikes in demand and the finance manager is trying to cut costs by keeping inventory levels low.⁴⁵

3.3.1.2 Too financially focused

The long-term economic results are an effect that appears long after the decisions and actions, that are the basis of the results, were made. Because of this, economic results are often difficult to use to steer and develop an organization.⁴⁶

3.3.1.3 Too historical

Measurements are often based on things that have already happened. A determining factor of a measurement's ability to steer and develop an organization is if the measurement is done early or when the final result is reached. If the measurement is done after a course of events is completed the risk of not doing it better next time is bigger.⁴⁷

⁴² Meyer, C. (1994) p. 96

⁴³ Johson, H. T. & Kaplan, R. S. (1987) p. 253

⁴⁴ Keebler, J. S. et al. (1999) p. 34

⁴⁵ Keebler, J. S. et al. (1999) p. 76

⁴⁶ Ljungberg, A. & Larsson, E. (2001) p. 218

⁴⁷ Ljungberg, A. & Larsson, E. (2001) p. 219

3.3.1.4 Not always focusing on the customer

Sometimes organizations are focusing too much on their own needs, without considering if it is relevant from a customer perspective. If the customer and the supplier measure the same performance, the customers mostly do not get as good results as the supplier. An example of this is a customer who orders four pistons for his tractor, but only receives three of them at the right time. As three pistons are of no use, the delivery precision is seen as zero by the customer, while the supplier perhaps register it as a delivery precision of 75 %.⁴⁸

3.3.1.5 Focusing on input instead of output

Traditional measures often focus on input instead of output. There are often a lot of information about the resources used, and substantially less information about the actual result created.⁴⁹

3.3.2 Measurement and strategy

The statement “What gets measured gets done” indicates the importance of well-defined measurement systems that are in line with the strategy. To ensure that all employees work for common goals, and not only their own, it is of vital importance that the measures support the overall business strategy.⁵⁰ In fact, the strategy is the most important factor for the performance of a measurement system. Without a well defined strategy it is impossible to know what to measure. Inversely, a well defined measurement system is needed to achieve the objectives of the organization.⁵¹ More specifically, an organization that is focusing on quality should measure non-financial indicators concerning this, e.g. scrap, rework, defect rates and

⁴⁸ Ljungberg, A. & Larsson, E. (2001) p. 220

⁴⁹ Ljungberg, A. & Larsson, E. (2001) p. 221

⁵⁰ Keebler, J. S. et al. (1999) p. 74

⁵¹ Näslund, D., (1996) pp. 43-45

customer complaints, and organizations that aim to be low cost producers should measure how well they are able to do more with less.⁵²

3.3.3 Measurement systems

Different departments and functions need different measures. According to Kaydos, a department in a typical organization needs anything from ten to fifty measurements, not including the normal financial functions. Even if this may seem like a large number, he is of the opinion that it is not costly to monitor that many measurements with a well-designed system.⁵³ However, Keebler et al. recommend managers not to measure “everything that moves”. The temptation to use many measures is often strong when the management is not clear on which measures best reflect the overall performance of the organization. A survey even suggests that top performers of a given process use fewer measures than average.⁵⁴

Lindvall mentions three phases that organizations pass in their attitude towards, and ambition with, measurements. In the first phase measurements strengthen the attention within the organization, but still mainly act as confirmation and presentation of statistics. The ambition is to report what has happened, and not to use the measurements to manage the organization in the future. In this first phase the number of measures is often large and it is mainly someone superior who has any interest in the measures.⁵⁵

The second phase is often a reaction to the passive, administrative first phase, and organizations now develop different variants of goal-steering. Focus is on following up if managers reach their goals, but not how they are reached. The measurements are therefore only focused on the final goal and

⁵² Johson, H. T. & Kaplan, R. S. (1987) pp. 256-257

⁵³ Kaydos, W. (1991) p. 66

⁵⁴ Keebler, J. S. et al. (1999) p. 76

⁵⁵ Lindvall, J. (2001) p. 209

activities that affect the result are hard to evaluate. Organizations in the second phase are often decentralized.⁵⁶

The interest in how good results are created increases in the third phase. It becomes important to be able to fully benefit by all the competences that are available in the organization, why the need for identification and development of common ways of working increases. The question of how the work is performed is now very interesting, and it is important to know which processes and activities that are performed within the organization. This implies that organizations in the third phase are interested in process orientation. Models, such as the balanced scorecard described in section 3.3.5, becomes important in this phase.⁵⁷

3.3.4 Develop new measurement systems

Ljungberg describes an eight steps model to be used when developing a new measurement system. To guarantee a well designed system, none of the eights steps in Figure 5, can be left out.⁵⁸

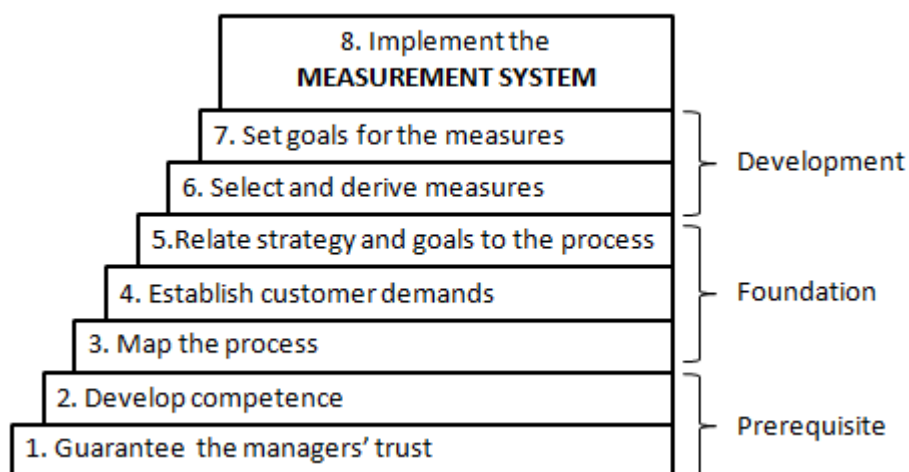


Figure 5 Seven steps for developing a measurement system.⁵⁹

⁵⁶ Lindvall, J. (2001) pp. 209-210

⁵⁷ Lindvall, J. (2001) pp. 209-210

⁵⁸ Ljungberg, A. & Larsson, E (2001) p. 246

Also Keebler et. al. describe a number of steps that can be used when to implement a new, or review the old, measurement system. (This methodology is not directly related to measurement of processes.) The first step of their seven-step approach is “record the existing measures”. The authors emphasize the importance of understanding the measures that are currently used in the organization. A solid documentation of the measures will generate knowledge about the motivators in the work environment, as well as give a foundation for the development of the new measures.⁶⁰

3.3.5 The Balanced Scorecard

Measurement systems for organizations have historically been financial. However, to survive in information age competition organizations need to use measurement and management systems that are derived from their strategies and capabilities.⁶¹ As mentioned earlier, financial measures only provide information about past performance, but say nothing about the present or the future.⁶²

A model that complements financial measures of past performance with measures of future performance is the Balanced Scorecard. The measures of the Balanced Scorecard are divided into four perspectives; financial, customer, internal-business-process, and learning and growth.⁶³ Altogether, the Balanced Scorecard translates an organization’s vision and strategy into objectives, measures, targets, and initiatives across these four perspectives, and aims to create a balanced measuring system (Figure 6).

⁵⁹ Based on Ljungberg, A. & Larsson, E (2001) p. 249

⁶⁰ Keebler et. al. (1999) p.128

⁶¹ Kaplan, R. S. & Norton, D. P. (1996) p. 21

⁶² Kaplan, R. S. & Norton, D. P. (1996) p. 24

⁶³ Kaplan, R. S. & Norton, D. P. (1996) p. 24

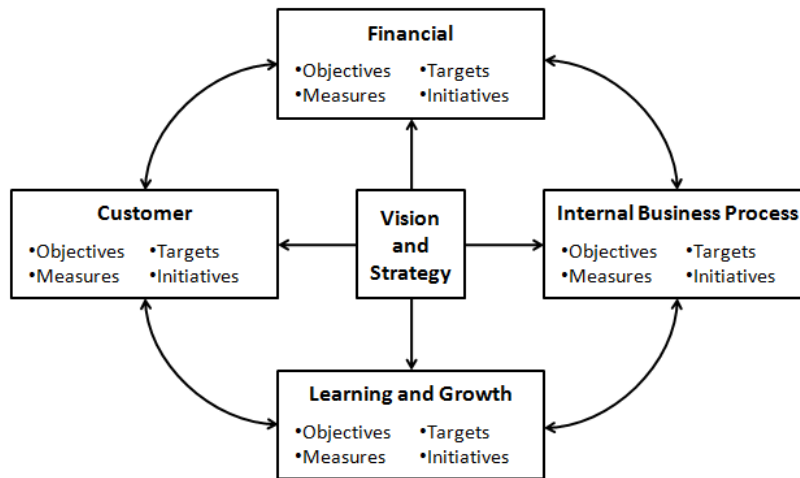


Figure 6 The Balanced Scorecard.⁶⁴

3.3.5.1 The Financial perspective

The financial perspective is included in the scorecard since financial measures are good for summarizing economic consequences of past actions. It indicates if the implementation and execution of an organization's strategy contribute to improve the bottom-line. Return-on-capital-employed and economic value-added are examples of financial measures.⁶⁵

3.3.5.2 The Customer perspective

For an organization to achieve long-term financial results it must create and deliver what is valued by the customers. In the customer perspective organizations therefore identify the customer and market segments where they choose to compete, and that will bring revenue. The main customer outcome measures are satisfaction, loyalty, retention, acquisition, and profitability.⁶⁶

⁶⁴ Based on Kaplan, R. S. & Norton, D. P. (1996)

⁶⁵ Kaplan, R. S. & Norton, D. P. (1996) pp. 25-26

⁶⁶ Kaplan, R. S. & Norton, D. P. (1996) p. 63

3.3.5.3 The Internal Business Process perspective

Organizations need to identify the critical internal processes that will enable them to deliver the value propositions that will attract and retain customers as well as satisfy the shareholders' expectations. This could be improved quality, reduced cycle times, maximized throughput, and lower costs. Two differences between the Balanced Scorecard and traditional performance measurements are that the Balanced Scorecard identifies new processes at which an organization needs to excel and includes innovation processes in the internal-business-process perspective.⁶⁷

3.3.5.4 The Learning and Growth perspective

The learning and growth perspective identifies the infrastructure that organizations need to build up to create long-term growth and improvement. By only using the capabilities and technologies that exist today organizations are unlikely to meet the targets for customers and internal processes. Organizational learning and growth are mainly based on people, systems, and organizational procedures, and the scorecard can reveal gaps between the existing infrastructure and the one needed to improve the performance.⁶⁸

3.3.5.5 Other perspectives

The foundation for working with the balanced scorecard is an organization's strategy. This implies that other perspectives than the four mentioned above might be applicable. Some organizations have therefore added a fifth perspective, while others have changed one of the original to one that is better suitable.⁶⁹

⁶⁷ Kaplan, R. S. & Norton, D. P. (1996) pp. 26-27

⁶⁸ Kaplan, R. S. & Norton, D. P. (1996) p. 27

⁶⁹ Ax, C. et. al. (2009) p. 457

In Swedish organizations the employees often have a quite strong position, so adding a co-worker perspective is quite common. The co-worker perspective can include areas such as education, work satisfaction, age structure, gender structure, and experience. Other perspectives that could be possible are environment and supplier.⁷⁰

3.4 Culture

The performance of an organization cannot be improved by solely focusing on technical aspects. The human aspect is also very important since everything happens through people. People act differently depending on their beliefs, values, and knowledge, i.e. their culture. All organizations have different cultures, and the work environment affects individual performance. Hence, the level of performance that can be achieved is limited by the organization's culture since there is a strong cause-and-effect relationship between the culture, what the organization can do, and how things get done.⁷¹

⁷⁰ Ax, C. et. al. (2009) p. 457

⁷¹ Kaydos, W. (1991) pp. 145-146

4 Empirical study

The empirical study is mainly based on information from interviews with people working within Supplying. Documents obtained from IKEA's intranet and from the interviewees are also used to support the empirical study. The chapter intends to give an overview of the organization and the measures that are used within Supplying. When no source is specified the information comes from one of the interviewees.

4.1 IKEA Organization

IKEA is divided into several different organizational units. The past decade IKEA has started to implement Business Process Management (BPM), and is now in addition organized in processes. The units and processes are described below.

4.1.1 Home Furnishing Businesses

IKEA's range consists of home furnishing articles that are developed by IKEA of Sweden in Älmhult.⁷² IKEA of Sweden is divided into different Home Furnishing Businesses (HFB) that are responsible for different parts of the range, e.g. kitchen, workspaces, and textiles. The HFBs are active in all main processes, and handle activities such as range management, communication, and supplying.⁷³

The HFBs that do not have furniture in their range are referred to as satellite HFBs, and their business must be handled differently. One reason is that customers often behave differently when buying furniture from when buying cheaper and smaller articles.

⁷² IKEA 2009 (b)

⁷³ IKEA Intranet (a)

4.1.2 Categories

Every HFB used to be responsible for purchasing the material and the components needed for their articles, but a new way of working is purchase development in categories. A category is defined as a group of articles which belong to the same industry, i.e. they share similar materials and/or production technique and supplier base. The Categories are also grouped into Material Areas. Two examples of categories are plastic and carbon steel tubes. Each category has one category leader at IKEA of Sweden and one in each relevant Trading region. The Categories do not follow the HFB structure, but might cover one or many HFBs. This new way of working will increase the coordination between functions and secure that IKEA has an optimal supplier base.⁷⁴

4.1.3 Trading Operations

IKEA purchases material and components from all over the world. To be able to monitor production, test new ideas, negotiate prices and check quality as well as keep an eye on social and working conditions, IKEA has 41 trading service offices in 30 countries. 67 % of the total purchase comes from Europe, 30 % from Asia, and 3 % from North America.⁷⁵ The trading organization is divided into nine trading areas; five in Europe, three in Asia, and one in North America.

4.1.4 Distribution Services Operations

Distribution Services Operations (DS Operations) handles all the warehouses, called distribution centers (DC), in the supply chain. DS Operations is divided into different DS Areas that normally consist of a number of countries in the same geographical region. To optimize the flow of goods there are two types of DCs; high flow and low flow. The idea is

⁷⁴ IKEA Intranet (b)

⁷⁵ IKEA 2009 (b)

that goods that only need to be stored during a short period will go through a high flow DC, while the rest will go through a low flow DC.

In addition to the warehouses DS Operations handles transports. The transport business is divided into five geographical areas; three in Europe, one in Asia and one in North America, and each area has its own transport organization that is responsible for all transports that start within that area. The transport areas are closely connected to the DS areas, and they often work together to optimize the supply chain.⁷⁶

4.1.5 Transport Global

Transport Global plans, purchases, operates, and controls all IKEA's transportation activities globally. No transportation activities are carried out by IKEA, but are purchased from external carriers, and the flow of goods can be transported directly from supplier to store or via a distribution center or consolidation point. The transport business is divided into four categories; land transportation, ocean transportation, customer delivery, and handling material. Handling material, such as pallets, has a two way flow as it is also transported from stores back to suppliers or DCs.

4.1.6 Retail Logistics

Retail Logistics is responsible for in-store logistics, which includes activities such as goods receiving, transportation within the store, and refill. This is the part of the supply chain that meets the customers and securing availability in the sales location is prioritized. Retail Logistics operates where the two main processes Supplying and Communicating & Selling meet, which sometimes result in contradictive goals. Customer satisfaction might for example not be achieved by striving to minimize the inventory

⁷⁶ IKEA Intranet (c)

carrying costs. Every country that has an IKEA store has its own retail organization.⁷⁷

4.1.7 Customer Distribution

Everything that is delivered to a customer's home is called customer distribution (CD). This includes deliveries from the stores that the customer cannot bring home itself, called local customer delivery (LCD), as well as home shopping via internet, called central customer delivery (CCD). The products that customers buy via internet are stored in special warehouses called customer distribution centers (CDC). CD is part of the activities for DS Operations, Transport Global, and Retail Logistics.

4.1.8 Free Range

Free Range is similar to a HFB, and handles articles that are outside the normal range. The articles from Free Range can be divided into three segments; time restricted offers, gap fillers, and store direct. Time restricted offers are articles that are only sold during a couple of days or a week in some selected stores, e.g. in a country. The goal is to attract more customers to the stores when there is a time restricted offer. Gap fillers are articles that are not part of the IKEA range, but that are introduced on certain markets to fill gaps. It is normally articles that the customers would expect to find in an IKEA store, such as chopsticks in China. Store direct are articles that the stores can choose themselves and buy from an internal web shop.

4.1.9 The Red Group

There are some IKEA stores around the world that are not owned by IKEA, but by franchisers in each country. The stores owned by IKEA are called the blue group while the stores owned by franchisers are called the red group. The stores in the red group are mainly located in countries where it can be

⁷⁷ IKEA Intranet (d)

hard for a foreign organization to start its business. All contacts between the franchisers and IKEA are handled by Inter IKEA Systems Services (IISS). For example IISS buys all products and then sells them to the franchiser, arranges all transports, and helps with marketing. IISS designs the supply chain for the stores in the red group and decides for which articles direct delivery should be used.

4.1.10 Regional Supply Teams

The Regional Supply Teams work to create high availability in stores and CDC. They manage inventory throughout the supply chain in order to meet sales expectations and look for possibilities to reduce lead times. The work is performed in cooperation with suppliers, Trading, and Retail.⁷⁸

4.2 “Working together as One IKEA”

In 2002 IKEA started to implement Business Process Management, with the objectives to increase customer satisfaction, increase the ability to sustain growth in revenue, and increase the short and long term profitability. The definition of BPM that is used by IKEA is⁷⁹:

“A structured way to implement improvement, management & control of our essential processes to achieve the goals defined in our Strategy.”

Instead of using the term process orientation, IKEA calls it “Working together as One IKEA”. Working as “One IKEA” implies that everyone has the customers and their expectations in focus and the goal is to contribute to the customer success. IKEA’s founder, Ingvar Kamprad, has had these ideas long before the implementation of “One IKEA”, so even though it has not been called BPM it has been affecting the way of working. For example in

⁷⁸ IKEA Intranet (e)

⁷⁹ Internal material (2009) pp. 14-16

the booklet known as Ingvar Kamprad's testament some BPM concepts, e.g. simplicity, are mentioned.

Today the functions still remain, but the work is increasingly organized around the processes. The work is performed in diverse teams across organizational borders, and a shared process map facilitates to describe, share and improve the way of working.⁸⁰

4.2.1 Process terminology in IKEA

IKEA is using a terminology for processes that is similar to what is presented in section 3.1 in this report. However, there are some differences, and to avoid misunderstandings these are presented below.

The expression main process is at IKEA used in the same way as the frame of reference states, i.e. processes that describe the purpose and give a perspicuous picture of an organization. According to the frame of reference main processes consist of sub processes, which at IKEA are referred to as core processes. At IKEA a sub process is a part of a core process. The most detailed components of the processes are, as in the theory, called activities.

4.2.2 IKEA's main processes

IKEA has three main processes; Creating the Home Furnishing Offer, Supplying, and Communication & Selling (Figure 7). As the name unveils, Creating the Home Furnishing Offer is the process responsible for creating and developing the range. This includes for instance design, product development, and testing. The second process, Supplying, is responsible for making the range available for the customer. This includes all activities from purchasing of material and components, till the product is on its sales location. The focus of this project is on Supplying, why it is further

⁸⁰ Internal material (2009) pp. 14-15

described below. The last of the three main processes is Communicating & Selling, which is responsible of communicating the product range to the customers in the store, catalogue or other media.

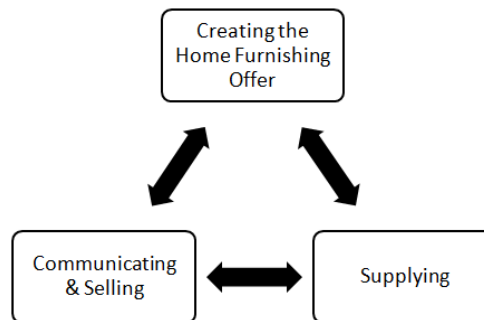


Figure 7 *IKEA's main processes.*⁸¹

4.2.3 Supplying

The main process Supplying is responsible for the supply chain, from raw material to customer. It cuts through the four functions Trading Operations, Transport Global, DS Operations, and Retail Logistics. The overall goals for Supplying are:

- Everyday good product quality,
- Produced and distributed under good conditions,
- Available when customers want it,
- At lowest total cost, and
- People

The work within Supplying can be seen as an optimization model where the goal is to minimize the total cost, given the constraints availability, product quality, social and environmental requirements, and people.⁸² When working as "One IKEA", better results will be generated for all five goals.

⁸¹ Based on Internal material (2009) p. 16

⁸² Jonsson, Örjan (2009-09-25)

Today the units within Supplying sometimes have developed parallel working methods which can result in sub-optimization, unnecessary overlaps and high operational costs. In addition to the four functions, there are two organizational divisions especially important for the work within Supplying; the Categories and the Home Furnishing Businesses.

The supplying process has four core processes, as well as a couple of steering and supporting processes. The four core processes are:

- “Purchase Development & Design Supply”
- Plan & Secure Supply
- “Supplier Development”
- “Excellent Logistics for Availability”

None of the processes are completely defined yet, but Plan & Secure Supply is the process that is most developed. The other ones are only preliminary at the moment. The second part of the thesis is focused on the core process Plan and Secure Supply, why this is further described below.

4.2.4 Plan & Secure Supply

The core process Plan and Secure Supply consists of activities that, as the name reveals, aim to make sure that IKEA’s supply of material and products works as it should within a time span of 0-84 weeks. The purpose of the process is to create a “One common plan” for the current and following year that is accurate, agreed and executable. It should also optimize flows and secure that the Supply Chain Development Plan is possible to execute. The Process consists of a number of sub processes:

- Plan Demand
- Plan and Optimize Supply Chain Network
- Plan Supply

- Plan and Secure Capacity

Within the sub process Plan Demand a demand plan of how much each store will sell is designed. The plan is based on a sales forecast that comes from the financial headquarters in Leiden. Objects out from this process are the demand plan and an operational forecast. The demand plan does not include 100 % of the articles in the product range. Some articles belong to the so called non forecast based range, and in addition to that some news and outgoing articles etc. are not forecasted.

The sub process Plan & Optimize Supply Chain Network aims to plan an optimal replenishment solution, based on a design made by Purchase Development & Design Supply. Decisions made within this process concern for example direct delivery share, and if a DC should be high flow or low flow. The object out from the process is an optimal replenishment solution, which is used as information for the following processes.

Based on the demand plan and information about the optimal replenishment solution, a supply plan is created and order proposals are sent to the core processes “Supplier Development” and “Excellent Logistics for Availability”. This is made within the sub process Plan Supply. The supply plan is based on forecasted demand and therefore the supply plan is not 100 % complete, which can cause problems. In this process, calculations of the safety stock are also made. The main objects out from this sub process are the supply plan and order proposals on time.

The last sub process is Plan & Secure Capacity. Work to balance need and capacity is carried out in this process. Based on the supply plan the process calculates the capacity that is needed throughout the supply chain. The

process secures the supplier capacity as well as the capacity in stores, DS Operations and Transport Global, based on two capacity plans calculated in Plan Supply. The object out from Plan & Secure Capacity is a “One common plan” for the processes Perform Finance and Administration, Excellent Logistics for Availability and Supplier Development. As mentioned above, the supply plan is seldom complete, which often implies shortages in the following capacity plans.

The tentative objects out from the Plan & Secure Supply process are:

- “One Common Plan”
- Order Proposals on time
- Availability Info on time
- SC Deviations resolved on time
- Precision in phasing in/out
- Increased DD share
- Minimized Inventory Costs

The long term results of the process are Excellence in Operations, Reduced Total Supply Cost and Availability.

4.3 Computer Systems at IKEA

IKEA uses several different data bases, tools and systems. The major data bases are IDW (IKEA Data Warehouse), RT70, Razon, IBIS (IKEA Business Intelligence System) and CNS (Cargo Network System). The information in IDW can only be used centrally, while information in e.g RT70 can be used by everyone.

Business object (BO), Access and Cognos are tools that are used to read the information in the data bases. Access is a tool where everyone can create

their own reports and measurements, which require good knowledge about the system. As many co-workers do not have this knowledge the result is that many poor and misleading reports are created. BO and Cognos, on the other hand, have predefined reports. Previously BO has been used to large extent, but IKEA is now trying to make Cognos a common tool. The use of predefined reports in Cognos ensures that everyone looks at, and compares, the same things.

Information from all stores, besides the franchise stores, is reported into MHS (Möbel Hus System) and transformed into IDW. The franchise stores use their own systems, and EDDA is one of the most used. Even if the measures are the same, the use of different systems implies different results of the measurements.

4.4 Measures within Supplying

What measures are followed up within a unit depends on what the main tasks of the unit are. It also varies over time depending on what the main focus areas for the organization are. One effect of the process organization is the development of measures that are not only optimizing one function, but the whole supplying process. However, there are still a large number of functional measures that aim to optimize certain activities within a function, and most functions follow-up a combination of functional and process measures.

When looking at measures from a management perspective, there are different levels of importance, i.e. some are important for managers and some are important for co-workers lower in the organization. Most units have a weekly or monthly management report that shows the most important measures and their results on an aggregated level, e.g. per HFB, Category or trading area. In addition to this highest level the measures are normally also

followed-up on lower levels, sometimes as low as article number and supplier.

The purpose of this thesis is to map all measures that can be connected to Supplying. For this reason some important economic measures, such as profit, are left out. Measures that are only followed up occasionally, or that only a couple of people follow up for their own interest, are not regarded either. Only established measures that are followed up on regular basis are included in the mapping.

Based on the goals of Supplying the measures are divided into the following groups; availability, total cost, quality, social and environmental responsibility, and people. The most frequently used measures related to these five goals are described below.

4.4.1 Availability

The measures within availability follow up if the articles are made available to customers when they want them. This includes service level in stores and delivery precision, but also other areas such as lead times, shortages, and planning accuracy.

4.4.1.1 Service Level

Service Level (SL) measures if the articles that should be available to the customers actually are available. It is followed up in stores on a daily basis, and the articles are classified into four different groups; S1-S4. The goals for the groups are 99 %, 97 %, 95 %, and 90 % respectively. S1 articles are the top sellers that always should be available for sales, for example strategic articles from the catalogue and key articles for product systems. S2 articles are other important articles, and S3 and S4 are consequently less important. SL is measured in the stores every day, but the result that is followed up is the average during a week.

Another way to look at SL is SL achievement, which means number of days out of total number of days that the SL goal is fulfilled. This measure is more distinct than SL since the result is not an average.

4.4.1.2 Delivery Precision

Customers who buy articles via customer delivery do not go to the sales place in the store to pick them up themselves, but get the articles delivered to their homes. A measure for these orders, that is similar to Service Level, is Delivery Precision, i.e. if the customers get the articles delivered as promised. Delivery precision is defined differently in different parts of the world. Some DS areas define it as delivery within a promised week, while others define it as delivery the promised week or earlier. There are also a few DS areas that compare promised date to actual date. One problem with this measure is that the deliveries are performed by carriers, so it might be difficult for IKEA to know exactly when the articles have been delivered, as well as to affect the precision.

4.4.1.3 Lead times

Lead times are followed-up throughout the whole supply chain. However, most lead time measures only include one part of the supply chain, e.g. from supplier to DC, from DC to store, or handling time in a DC.

4.4.1.4 Shortages

IKEA looks at three different types of shortages; local local, non central, and central. The definitions can be seen in Table 1.

Table 1 Different types of shortages.

<u>Name</u>	<u>Definition</u>
Local Local shortages	Articles are available in store but not to the customers, e.g. articles that are in buffer above the sales place.
Non Central shortages	Articles are available in DC, but not in store.
Central shortages	Articles are neither available in DC nor in store.

The service level is affected negatively when shortages occur. If they are local local or non central the problems can normally be solved within a week or two, but if they are central there are problems with the suppliers, and that can take much longer. Local local shortages are followed up by Retail and non central by Retail and DS Operations. No unit follows up central shortages directly, but if there are problems with service level, and there are no local local or non central shortages, the problem is normally central shortages.

4.4.1.5 Forecast Accuracy

To be able to have articles available when customers want it the demand planners in the HFBs make a sales forecast. Forecast accuracy is a measure that looks at how correct this forecast is, and it is based on a forecast that is made 10-13 weeks before the sales week. To be included in this measurement the articles should have passed the sales start date by at least 26 weeks.

4.4.1.6 Supply Plan Accuracy

Based on the forecasts need planners in the HFBs make a supply plan and Supply Plan Accuracy (SPA) measures how correct it is. SPA compares

planned orders with actual orders for a period of four weeks. The measure is still under development.

4.4.1.7 Fixed Order Type Share

IKEA's goal is that as many orders as possible should be based on forecasted demand. However, to be able to handle unexpected variations orders that are called fixed orders are used. One of the main drivers of fixed orders is news that are not registered in the systems in time to be included in the forecast. Since the supply plan is based on the forecasted demand fixed orders can cause availability problems. It is therefore very useful to know the share of fixed orders.

4.4.2 Total cost

The total cost for the supply chain is affected by purchase prices, transport prices, warehouse costs and retail logistics costs, and different units within the supply chain have different degrees of influence on the total result. Making the supply chain more efficient, by for example decreasing stock levels and increasing filling rates in trucks, helps reducing the total cost.

4.4.2.1 Price development

Price development (PD) is a measure that is very important to the Categories and to Trading, since they are involved in purchasing. Given IKEA's low cost profile the goal is to constantly reduce purchase prices to be able to save money, but also to lower the prices in stores. The total PD gives an indication of how well IKEA manages to do this.

Total PD is divided into Ongoing PD and Re-distribution PD. Ongoing PD looks at the purchase prices current year compared to last year for suppliers that have delivered both years. It gives an indication of how well IKEA has managed to negotiate better agreements, as well as if the suppliers have been able to lower their prices thanks to streamlining their production or

reduced raw material prices. Re-distribution is a measure that indicates how the purchase prices for a certain article develop. It looks at the whole portfolio of suppliers and compares the average price for the article current year to average price last year. This can for example be affected by changes in volume per supplier as well as if new suppliers are introduced. Other factors that affect the total price development are called Inflation adjustment, Other savings, and New Distribution Mode.

4.4.2.2 Stock

The reason for keeping stock is to be able to handle fluctuations in demand and lead time. Keeping stock costs money, but it increases the service level, and finding an optimal stock level can be a challenge. This implies that stock measures could be connected to both availability and cost, and in this thesis the latter is chosen. IKEA has a few different measures for stock, and the main ones are described in Table 2.

Table 2 Stock measures.

<u>Measure</u>	<u>Business navigation definition</u>	<u>Retail Logistics definition</u>
Stock weeks	average stock in DC (m ³) / average sales per week (m ³)	average stock in DC (m ³) / average sales per week (m ³)
Overstock	Asset stock – calculated stock	% of the stock value that has more than 15 weeks of stock.
Concrete stock	Stock that will not be needed during the following 20 weeks	% of the stock without sales the past five weeks of more
Discontinued stock	Articles that have passed their end sale date, but are still in stock	Articles that have passed their end sale date, but are still in stock

Apart from these measures actual stock levels and stock value are followed up, as well as some very detailed and function specific indicators. As can be seen above different units sometimes have different definitions for some of the stock measures. This can cause problems and misunderstandings between the units. Another example of this is that DS Operations calculates stock weeks based on goods flow, while Supplying calculates it against sales.

4.4.2.3 Transport Global, DS Operations and Retail Logistics costs

Each of the functions Transport Global, DS Operations and Retail Logistics has several cost measures, e.g. cost development, efficiency, productivity, and cost per cubic meter. One example of an important measure is filling rate in trucks, which mainly affects the transport cost, but that is followed up by several units. By increasing the filling rate IKEA could save a significant amount of money, why this is of interest for many units.

4.4.2.4 Direct Delivery share

Simplified, IKEA's supply chain looks like in Figure 8. Some articles are transported directly from supplier to store, called direct delivery (DD), while others are transported via a DC.

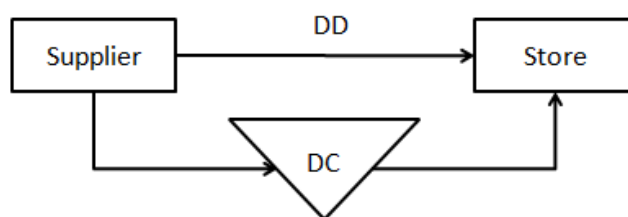


Figure 8 Direct Delivery.

A measure for this is Direct Delivery share (DD share), i.e. how many % of the total flow that is transported directly from a supplier, or a cluster of

suppliers, to store. Today, one focus area for IKEA is to increase the direct delivery share. This share also includes flow that is consolidated on the way, so the measure is sometimes called non-warehouse share. The DD share is measured from a receiving perspective, i.e. the share of deliveries that a store receives that are DD deliveries. However, for the Red group, DD is calculated when the goods reach the distribution centre in the country in question. This implies that the DD share often is registered as higher for the franchise stores than the normal stores.

DD is normally profitable when there are large flows from a supplier or a cluster of suppliers, and for articles with high flows. IKEA focuses a lot on increasing the DD share.

4.4.3 Quality

Quality is something that IKEA focuses on very much today, since improved quality could save a substantial amount of money for the organization. In the past IKEA has had various problems with quality, and for that reason a few measures that indicates how the quality is experienced by customers and how much it costs have been developed.

4.4.3.1 Customer Experienced Product Quality

Customer Experienced Product Quality (CEPQ) is the result from a survey that is sent out to IKEA Family⁸³ customers. The survey is sent out in two rounds, and is based on the customers' receipt. In the first round, which is sent out directly after the purchase, customers are asked if they have had problems with any of the articles that they bought. Two months later a second round is sent out, in which the customers get the same questions for all articles that they were pleased with in the first round. The answers are

⁸³ IKEA Family is a club that IKEA customers can join. Members get inspirational ideas, offers, discounts etc.

considered to be statistically significant if more than 1 000 answers are obtained. This means that the results are normally significant on HFB, Category, and trading area level, but the results on article and supplier level are still followed up. The results for CEPQ are followed up for the past four months, and it shows the percentage of problem articles of total number of articles in the survey.

CEPQ is a good measure to get information of what the customers think of the products, and what they consider to be bad quality. However, the results are sometimes difficult to interpret if the customers have stated that there is a quality problem with the article, but have not specified what the problem is.

4.4.3.2 Cost of Poor Quality

Cost of Poor Quality (COPQ) is a measure of costs caused by damaged customer returns and damaged goods in store in relation to sales. And the main cost drivers for COPQ are scrapping and handling.

4.4.3.3 Customer Return Statistics

Customer Return Statistics (CRS) is a database that contains return data. The stores can use it to find frequently returned articles and to support quality claims. To be able to take responsibility for defects and rectify the problems there are four different reason codes that are used to report why goods were returned. The reason codes are shown in Table 3:

Table 3 Reason codes.

<u>Reason code</u>	<u>Reason</u>
00	Change of mind
10	Handling defects
20	Products defects
80	Sales error

4.4.4 Social and Environmental Responsibility

IKEA focuses a lot on the low prices and they are the cornerstone of the vision and business idea. However, the goal is to keep the prices low and take responsibility for people and the environment at the same time. To make sure that this is done, some measures, which are described below, have been developed.

4.4.4.1 IWAY

IKEA's code of conduct, The IKEA Way on Purchasing Home Furnishing Products (IWAY), was introduced in 2000 and it defines what suppliers can expect from IKEA and what IKEA requires from its suppliers. It is based on international conventions and declarations and covers working conditions, the prevention of child labor, the environment, responsible forestry management and more. All suppliers must communicate IWAY to co-workers and sub-contractors, and make sure that all required measures are implemented at their own operations.⁸⁴

The first part of IWAY contains start-up requirements, called IWAY Musts, which all suppliers must meet to be able to deliver to IKEA. The rest contains guidelines that should be followed as closely as possible. The

⁸⁴ IKEA 2009 (c)

measure IWAY is therefore divided into two parts; IWAY Must and IWAY Total. IWAY Must should always be 100 %.

4.4.5 People

IKEA thinks that it is important to focus on the co-workers to be able to run a successful business. Therefore a measure that is based on a satisfaction survey has been developed.

4.4.5.1 VOICE

VOICE is IKEA's co-worker satisfaction survey, and it measures how the current work situation is perceived by the co-workers. Factors such as customer competence, motivation, openness and learning are measured to get a global assessment of the co-workers' satisfaction level. VOICE results are published once a year, and the goal is that they can facilitate constructive discussions that lead to actions to improve the ways of working.

4.5 Ownership

To own a measure within IKEA means to own the definition of it, i.e. the unit or process that has defined a measure owns it. Often there are other units and processes, apart from the owner, that are interested in, and use, the measure. This might cause problems if the definition does not fit the exact need of different users. The question of who should own measures can therefore be discussed if there are several interested parties.

4.6 Measures within Supplying's units and processes

IKEA's different units and processes work with different parts of the business, and therefore focus on different measures. No unit follows up all the measures described above, but have chosen a set that supports their goals. It is difficult to present a total number of measures that are connected to Supplying, since the total number depends on how they are counted.

Some units have divided their measures into several more detailed measures, e.g. customer delivery and store separate, while others present their measures on an aggregated level. Because of this, the number of measures that is found per unit varies substantially.

To simplify the mapping of existing measures within Supplying some measures have been combined into one, and the total number of measures in the map is 215. Some measures are used by more than one unit. Consequently they are counted for each of those units, but only once in the total map. The mapping method is described further in chapter 5.

4.6.1 Business Navigation Supplying

As described in section 4.4 the measures for Supplying are divided into five groups; availability, total cost, quality, social and environmental responsibility, and people. Business Navigation Supplying (BN Supplying) looks at a few measures from all these groups, e.g. CEPQ, IWAY, SL, Delivery precision, Total cost, Price development, and VOICE.

4.6.2 Home Furnishing Businesses

The HFBs are active in all of IKEA's main processes, and therefore they look at many measures that are not related to Supplying. There is for example much focus on sales, and the management report includes measures such as growth and profit. The Supplying measures cover availability (SL, SL achievement, number of S1 and S2 articles, and forecast accuracy), stock (stock weeks, stock level and stock structure), and product quality (CEPQ and COPQ).

4.6.3 Categories and Trading

The Categories and Trading work closely together, and therefore the two have developed a common measurement structure. Every week they look at a material area report and a trading area report. The Categories are focusing

on purchasing, and hence purchase price development is a very important measure to them. Other measures that are followed up by the Categories are SL achievement, purchase volumes, IWAY, CEPQ, and COPQ. The material area report, which is the management report for the Categories, also contains a measure called target fulfillment. This measure looks at the total result for service levels S1-S3, and it is calculated as the sum of deviations from the SL goals. Results above the goal are seen as zero deviation.

Trading looks at all the measures that the categories do, except purchase volumes. In addition the trading area report includes DD share, filling rate, stock weeks, operational efficiency, VOICE index, and Supplier Survey index. The trading areas are ranked every week based on their performance on all measures in the trading area report except, VOICE and Supplier Survey. In addition to the measures in the trading area report Trading has some measures that are considered to be less important.

4.6.4 Distribution Services Operations

Within DS Operations a great number of measures are used. DS Operations has a well developed measurement map, called “KPI mapping”, where the measures are placed on different levels. The map clearly shows how the measures depend on each other, and which of Supplying’s goals they are connected to. Most measures have an appurtenant document that contains definition, measuring frequency and data source.

The measures on the highest level are SL, delivery precision, stock weeks, operational costs, transport costs, and VOICE. On the lower levels measures such as shortages, efficiency, filling rate, and handling damages can be found. DS Operations is the only unit specifying the components of VOICE.

4.6.5 Transport Global

Transport Global has a standardized management information package (MIP) with measures that is used for all transport areas. Depending on which transport modes are used within an area, the measures in the report differ. Transport Global makes no difference between the levels of importance of the measures in the report, but they are all on the same level. The main areas in the MIP are cost, price, filling rate, service performance, social & environment, forecast accuracy, business size, and people & organizational efficiency. As transport is a service, product quality is not measured. Instead the quality of transports is measured with e.g. availability (arrive on time for loading and unloading). Because of lack of IT resources Transport Global does not measure lead time, but the intention is to do so in the future.

4.6.6 Retail Logistics

As mentioned earlier every country that has an IKEA store has its own Retail organization. These organizations follow some common standards, but work quite independently. This implies that Retail Logistics in different countries focus on, and follow up, different measures. The interviewees in this project could provide information about Retail Logistics in Sweden, Germany, and Russia, and it could be seen that cultural differences affect the choice of measures. In Sweden the understanding of the measurement systems are high. Therefore it is possible to focus on improving working methods instead of the results of the measures, since good working methods often ensure good results on measures.

4.6.7 Customer Distribution

Customer Distribution is part of three different functions; DS Operations, Transport Global and Retail Logistics. Hence, measures for CD can be found among the measures for these three functions. Examples of measures

are delivery precision, CD share of sales, and different kinds of operational costs.

4.6.8 Free range

Free Range is similar to a HFB, and therefore looks at many of the same measures, such as availability, sales and quality. However, Free Range has one unique measure called 100 % Just in Time, which measures if the articles are delivered to the stores in time or not. This has been developed especially for the time restricted offers, since it is very important that those articles are available in the stores at the time of the offer. All articles that belong to Free Range are classified as S4, which means that they are never prioritized by suppliers and Transport Global, and this could imply problems with the service level.

4.6.9 The Red Group

The Red Group has its own set of measures, but they are the same or similar to measures used by the rest of IKEA, such as SL, filling rate and forecast accuracy. However, since IISS buys products from IKEA and is not involved in purchasing or product development, measures concerning quality and social and environmental responsibility are not followed up. Instead, all measures are focused on availability and cost. One example of an availability measure that is important to the Red Group is Goods Availability Measurement (GAM), which measures availability in DC. The stores in the red group use different computer systems for the measures than the rest of IKEA.

4.7 IKEA Culture

IKEA is an organization with a very strong culture, which has its origins in Småland in southern Sweden. Småland is an area that has long been associated with hardworking people, who have developed skills for living

on small means and making the best of limited resources. They have obtained a reputation for thriftiness, innovation, straightforwardness and a no-nonsense approach to problem solving and business challenges. According to Ingvar Kamprad “maintaining a strong IKEA culture is one of the most crucial factors behind the continued success of the IKEA Concept in the future”. To communicate the culture to everyone within IKEA Ingvar Kamprad in 1976 wrote a summary of the company’s objectives and the ways in which they should be reached. It is called *The Testament of a Furniture Dealer* and still remains the central document of the IKEA Concept. To ensure shared objectives Ingvar Kamprad also wrote *A Little IKEA Dictionary* in 1996. The dictionary contains definitions of IKEA words and expressions that everyone within IKEA should know.⁸⁵

The culture is always present within IKEA and it affects the way all the work is done. The main goals and measures are also based on the culture.

⁸⁵ IKEA Intranet (f)

5 Map structure

This chapter aims to describe how the map of the measures within Supplying is built up. Neither the whole map nor the whole definition sheet will be presented, but just a sample of measures to give the readers a picture of the structure.

The mapping of measures is divided into two parts; a map and a definition sheet. The map shows an overview of all measures, while the definition sheet provides more detailed information about each measure.

5.1 Map

The total map is divided into five different sections, each one relating to one of the goals of Supplying; Availability, Total cost, Quality, Social & Environment, and People. The reason is to make it easier to get an overview, and the five goals are considered to be a natural base for the division. Within each section, the measures are neither structured in a way corresponding to the processes and activities in Supplying nor to the units. They are instead structured after type of measure, e.g. lead time, shortages and stock. The reason for this is that many units and processes use the same measures, and by structuring it after measurement type, common measures can be brought together. A sample of the map is shown in Figure 9.

Customer view	Level 1	Level 2	Level 3	
Availability CSI: Having the products I wanted in stock. CSI: Didn't get something due to product out of stock.	SERVICE LEV EL LEA D TIM ES SH OR ES - S FC AS ET	Service level S1 % Service level S2 % Service level S3 % Service level S4 % CD Delivery precision	Service level achievement S1 Service level achievement S2 Service level achievement S3 Service level achievement S4 Number of S1 - S2 articles S:Zero Target Fulfillment Goods Availability Measurement (GAM) HM Availability Goal Fulfillment LDP Service Level CDC (S1-S4) Service Level CDC (S1-S3)	Sale start precision TRIO 100 % JIT
		Diff to agreed sender LT Lead time precision	Actual sender LT Delivery security Cancellations LT DC handling	
		LT Supplier to store within time window Transport LT reliability CP Lead Time LCD Lead time precision	DC handling time for transit	
		Non-central shortages Local-local shortages	Central shortages	
		Forecast Accuracy Volume Dev on comparable relations		

Figure 9 A sample of the map, showing some of the measures related to availability.

Some measures can of course affect more than one of the five Supplying goals. One example is stock, which could be placed under both availability and cost. However, to keep the map simple and lucid, each measure is only recorded once, and is placed by the goal which it is considered to be related to the strongest.

5.1.1 Management perspective

The measures are also placed under different levels. When deciding on what level the measure should be on, a so called management perspective is used. This means that the measures on level one are the ones that top management within Supplying looks at. Further, the measures on level two are the measures that the managers within each unit focus on, and so on. The levels in the map do therefore not point out the importance of the measurement, but to whom, and on what level, it is important. For example filling rate is one of the most important measures within Transport Global. However, it is

not placed on level one, as top management for Supplying does not focus on it.

The first column in the map, “customer view”, shows the measures based on customer surveys.

5.2 Definition sheet

In the definition sheet more detailed information about each measure can be found. It consists of eight columns, which are described in Table 4.

Table 4 Description of the columns in the definition sheet.

<u>Column</u>	<u>Description</u>
Org. Unit Name	The organizational unit in which the measure is found, e.g. DS, The exact name of the measure, used by the unit in question
Definition	The definition of the measure
Unit of	The dimensions/level of detail in which the measure is measured,
Goal	Shows if the measure has a goal or not
Frequency	Shows how often the measure is measured and followed up
Data Source	Shows where the data for the measure is collected from
Source	The person at IKEA who the information comes from

Some names of measures have been slightly modified in the map. The reason for this is that some names are very long and detailed or that different units use different names for the same measure. When different units use different names, a common name has been used in the map. However, in the definition sheet the exact name is shown for each unit. The reason for bringing measures from different units together under a common name, even if they are not exactly the same, is to facilitate comparisons. There are two different cases when this is made; when measures have the same definition but different names and when measures have the same name

but different definitions. When the measures are the same, the definition is often not literal, but has the same signification. Examples of both cases are shown in Table 5 and Table 6.

Table 5 Measures with the same name, but different definitions.

<u>Unit</u>	<u>Name</u>	<u>Definition</u>	<u>Unit of analysis</u>
			...
BN Supplying	Concrete	Stock that will not be needed during the following 20 weeks.	...
HFB	Concrete	Stock that will not be needed during the following 20 weeks.	...
Retail Logistics	Concrete	% of the stock without sales the past 5 weeks or more.	...

Table 6 Measures with the same definition, but different names. In this case, the measure is called Service level S1% in the map.

<u>Unit</u>	<u>Name</u>	<u>Definition</u>	<u>Unit of analysis</u>
BN Supplying	SL1	(with stock/want stock	...
HFB	Service level S1	(with stock/want stock	...
Trading	S1%	(with stock/want stock	...
DS	Service level in	(with stock/want stock	...
Retail	Service level S1	(with stock/want stock	...
Red Group	Service level S2	(with stock/want stock	...

5.3 Number of measures in the map

There are big differences between how units present their measures, why it can be difficult to compare them to each other. For example, when using a measure for both store distribution and customer distribution, some units see

it as two different measures, while others only see it as different units of analysis. When bringing all measures together, a common way of presenting them is used to simplify the map. Therefore some measures from e.g. DS Operations that has different measures for store and customer distribution (SD and CD), have been brought together. When this is made, SD and CD are noted as different units of analysis. The choice of how to present the measures therefore strongly affects the total number of measures, why it is difficult to provide an absolute number of measures within Supplying.

6 Reflections about Supplying's measures

In this chapter reflections about the measures that are found within Supplying are provided. After talking to many people within IKEA, the authors have got a lot of thoughts and information from the interviewees that cannot be presented in the map.

Some of the main thoughts with process orientation, as presented in chapter 3, are that different functions should try to avoid sub-optimization by working together and that there should always be focus on the customers. The mapping of existing measures within Supplying gives a picture of how well these thoughts are used.

Many measures found within Supplying are functional, and can probably not be related to any of Supplying's core processes.

6.1 Focus on the customer

The mapping shows that Supplying has a lot of focus on the customers. All processes and units work for the vision to create a better everyday life for the many people, and the five overall goals of Supplying are well aligned with the business idea. It can also be seen that almost everyone focus on the overall goals together with functional oriented measures, and many of the interviewees especially stressed the importance of following up measures connected to the overall goals. However, some interviewees thought that focusing too much on one target can cause problems, and if focusing only on high level measures some underlying problem might be missed.

The fact that almost every unit follow up the main goals of Supplying implies that the performance of a certain unit sometimes is measured somewhere in the supply chain where other units might affect the outcome,

and this can cause frustration. For example, it can seem illogical that different trading areas are evaluated on service level in the store, as there are many following units that can affect the result. However, it has turned out to be more successful when everyone focuses on service level in the stores, instead of dividing the service level into smaller parts along the supply chain. On the other hand, this implies that it might be difficult to know how a certain unit contributes to e.g. service level in stores, and when problems arise this might result in unnecessary actions within several units.

6.2 How different units work with measures

As discussed earlier, the total number of measures is strongly affected by how they are counted. Even if a total number can be an indicator of Supplying's way to measure and used for evaluation, the differences between units is what is most interesting. The collection of information and the mapping shows that the work with measures, as well as the number of measures, varies significantly between units. The HFBS for example have 15 supplying related measures, while DS Operations has about 120. Many people within Supplying are of the opinion that the number of measures is too high and that the measures are too detailed. When using such a large number of measures as DS Operations, there is an impending risk that the focus on the most important things may be lost.

Furthermore the standardization between units varies. Some units use the same model for reporting in all geographical areas, while other units use different reports and sometimes focus on different measures. However, for some units measurement adjustment for the country in question can be necessary. One example is that Retail Logistics in Sweden has large focus on the range, while in Germany focus is on productivity. In addition, there are many examples of when units use different names for the same measure,

which could imply unnecessary confusion and also make communication between units difficult. Even more confusion is created when units use the same name for different measures. When working in a process oriented organization, it is important to have a common language and common standards, as the units no longer act individually.

The existing measures are seldom adjusted to the processes, but many of them are still to some extent in line with the processes. As mentioned earlier, Ingvar Kamprad has had the process orientation ideas since the beginning. Furthermore, the HFBs earlier worked with something called “work flow”, which is similar to process orientation. However, the measures used today are neither old and never reviewed nor used by force of habit. Instead, every unit constantly develops and reviews its measurement structure to better fit the organization. Even during a short period as this project, the measures within some of the units have been changed. So perhaps it is wrong to say that the map shows an “as-is”-picture, when it actually shows “as it was”.

6.3 Supplying and process orientation

The discussion above shows that Supplying follows the ideas of process orientation to some extent, but not fully. Focusing on the customers is always present, and the interviewees also confirm that this contributes to increasing the transparency between units. However, the fact that there are significant differences between how units work with and present their measures makes the integration much more difficult than it could be.

If Supplying, and its measurement system, are compared to the three phases mentioned by Lindvall, it is clear that Supplying is in the third step. Process orientation is an important part of the work and there are several measures that focus on how the work is performed.

6.4 Balance in the measurement system

Overall, the measurement system within Supplying seems balanced. It contains availability and quality measures focusing on the customer, IWAY focusing on the environment, as well as several measures focusing on the co-workers. As the Balanced scorecard recommends, the measures do not only consist of financially oriented measures. The goal areas are well aligned with IKEA's strategy and also follow the thoughts of Johnson and Kaplan that an organization should have non-financial indicators that are based on the strategy.

6.5 Traffic lights

Today most measures are presented in reports containing information that is interesting to many people within a unit. When talking to people around Supplying, many have said that they would prefer to have the measures that they focus on presented in form of traffic lights. With traffic lights, the focus is on deviation from the goals instead of on the exact measurement itself. The light is red if the goals are not fulfilled, and green if they are at or above the goals. Traffic lights make it easy to see if the goals are fulfilled and it enables everyone to focus on the measures with red lights, which is where action is needed.

7 Measurement related to Plan & Secure Supply

This chapter aims to analyze and discuss future measures for the core process Plan & Secure Supply (Plan & Secure Supply). The analysis/discussion compares the empirical findings with the theoretic framework, but also gives the authors' view of suitable measures for Plan & Secure Supply.

The second part of this thesis aims to select existing Supplying measures that can be used within the core process Plan & Secure Supply, and to recommend new measures that can be developed. Since Plan & Secure Supply is not yet completely defined it does not have clear measures today. The selection of measures is presented in chapter 8, and is based on the discussions in this chapter. The method used in this part of the project is described in Figure 10.

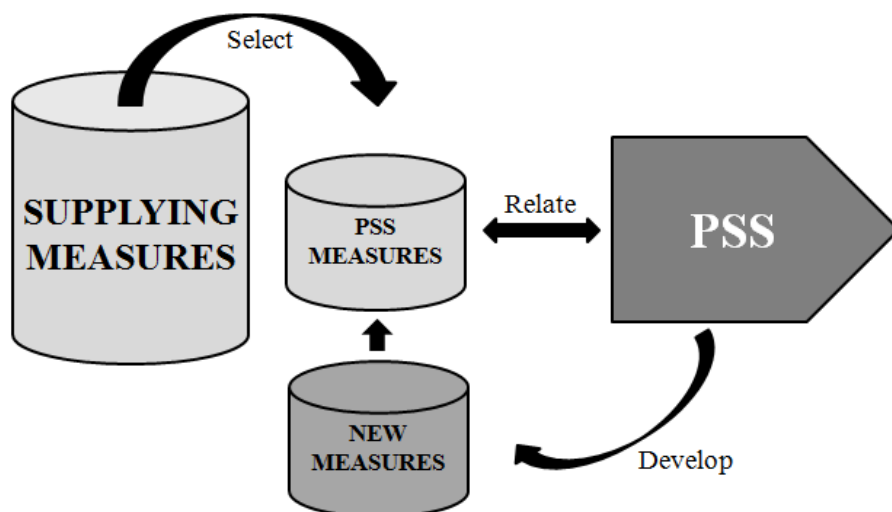


Figure 10 Method used to select and develop Plan & Secure Supply measures

7.1 Develop a measurement system

It can be hard to develop a good measurement system for a process based on existing measures that are mainly functional. Normally the work would start with a number of steps similar to the ones that Ljungberg describes, for instance identifying customer needs.⁸⁶ Trying to choose which of the existing Supplying measures that can be connected to Plan & Secure Supply is hence to do it backwards, and probably not the optimal solution. However, as Keebler et al. suggest, starting out from existing measures can give a foundation for the development of the new measures, and good measures can be reused.

Since measures are used to steer organizations, and the people working within them, they should be followed up where something can be done to affect the result. Therefore, Plan & Secure Supply should follow up measures that are related to the results it can affect.

7.2 Components of Plan & Secure Supply

As described in section 3.1.3, a process consists of different components. Measurement of components in Plan & Secure Supply is discussed below.

7.2.1 Processes and activities

The work within Plan & Secure Supply mainly consists of planning, and no real execution. Measuring the performance of a planning process can be difficult if not considering the results of the processes and activities. When a process is more operational, it is easier to measure the performance within the process, with e.g. productivity and lead times measures.

7.2.2 Object in, resources and information

Many of the measurements that are carried out within Supplying are used by Plan & Secure Supply as information. One example is productivity

⁸⁶ Ljungberg, A. & Larsson, E (2001) p. 246

measurements, which provide information that is necessary to be able to plan demand and secure capacity. As this information is something that Plan & Secure Supply cannot affect directly, they should not have measures for it.

The objects in to Plan & Secure Supply are often information, time or reports that trigger the different sub processes to start. As the quality of objects in, as well as information, mainly depends on the performance of the preceding processes, they should not be followed up by Plan & Secure Supply. However, objects in and information are important for the evaluation of the performance within Plan & Secure Supply, as poor input will affect the output. Since the activities in a process are performed over and over again the output will affect the input. Therefore, to measure and secure the quality of the output, somehow lays the foundation of the quality of the objects in.

The resources used by Plan & Secure Supply mainly consist of people. Therefore, one measure that could be used is the number of employees that is needed to carry out the tasks of the processes. However, as the number of employees is relatively consistent over time, there is no need to measure it on a regular basis.

7.2.3 Objects out and outcomes

A common, and often desirable, way to measure the performance of a process is to measure its results – objects out as well as outcomes. As it can be difficult to measure the performance within a planning process, measuring the results could be a good solution. Plan & Secure Supply has seven objects out (see page 28-29), which all should be measured to secure the results. If not measured, the results are difficult to improve and it is difficult to see if they meet the expectations of the following processes.

Measures that compare plans with the actual outturn, such as forecast and supply plan accuracy, are good indicators of the performance of a planning process. Measures that can be related to all of the seven objects out do not exist today, why some new measures must be defined.

Long term results are also important to measure, as these are the overall goals of IKEA and therefore also of the different processes. As for many other processes, the performance of Plan & Secure Supply is of vital importance for long term results such as availability, total cost and excellence in operations. However, since these measures are affected by many processes and units, the ownership of these measures should be on a higher level (level 0 or level 1).

7.3 Prevent sub optimization

As the literature suggests, there is an impending risk for sub-optimization when using too many specific and functional oriented measures. In the same way, there could be a risk of sub-optimization if the process is divided into parts that are too small, each having its own measures. For that reason it is important to find a suitable number of measures that facilitates steering and development of the process, but that not causes sub optimization. Having at least one measure for each sub process within Plan & Secure Supply could be reasonable. Then the performance of each sub process can be discerned, and everyone working within the process has a measure connected to their daily tasks. However, not having too many sub process specific measures reduces the risk for sub optimization.

8 Recommendations

This chapter aims to give recommendations of which of the existing measures that can be used within Plan & Secure Supply. A discussion about new possible measures, to support the process, is also held, which can make a basis for further investigation.

The mapping that is presented in chapter 5 includes all measures that can be connected to Supplying. Some of these can be linked to Plan & Secure Supply, and the selection of which is mainly based on the objects out as well as the ability of the process to affect the results of the measures. This selection method has been chosen based on the discussion in chapter 7.

8.1 Existing measures

None of Supplying's existing measures are direct measures, which show how the work within Plan & Secure Supply is performed. Examples of direct measures could be how long the planning takes or the amount of resources that is needed. However, the following suggested measures are indirect measures, i.e. measures that are related to the results that Plan & Secure Supply affects.

- Forecast Accuracy
- Supply Plan Accuracy
- DD share
- Filling rate
- Stock measures
- Fixed order type share
- Service Level
- Total Cost

These are a combination of measures that have been developed with activities, that are performed within Plan & Secure Supply, in mind, and measures that are of interest also to other parts of Supplying. In addition to these measures there are naturally many more that are of great interest to Plan & Secure Supply. However, these primarily serve as information and

should consequently not be included in the measurement structure for Plan & Secure Supply. Some of the recommended measures could also possibly be altered to fit the process even better. All measures mentioned above are commented below.

8.1.1 Forecast Accuracy and Supply Plan Accuracy

Forecast Accuracy and Supply Plan Accuracy are measures of objects out from two of the sub processes within Plan & Secure Supply, and they are consequently evident measures for Plan & Secure Supply. Since the supply plan is partly based on the forecast, a faulty forecast results in a faulty supply plan. Therefore, the two measures are closely related. The measures are comparisons between a plan and outturn, and the results can therefore be affected by both. This means that bad accuracy can be caused by either an incorrect plan or unexpected events during the execution and it can be difficult to establish the influence from each. As mentioned earlier the supply plan normally is not 100 % complete since the forecast does not cover 100 % of the product range. This can be seen as a systematic mistake that affects the results of both measures negatively.

An incorrect plan is more likely to be the result of systematic mistakes than unexpected events. For Forecast Accuracy and Supply Plan Accuracy to be good measures for Plan & Secure Supply the mistakes should be minimized, especially systematic mistakes. Work to improve the completeness of the supply plan should therefore be prioritized. It is likely that the share of news, fixed orders and other parts of the product range that are not included in the forecast is rather constant. If this average share is calculated based on historical data it could be used to complete the forecast. A more complete forecast would result in a more complete supply plan, which in turn facilitates the work in the last sub process within Plan & Secure Supply,

Plan & Secure Capacity. Since the output from the first sub process affects the input to the following it is good to correct the data as early as possible in the process. Also, it is better to correct errors where they occur, and not in a later stage.

Supply Plan Accuracy might be difficult for some co-workers to understand, since it can be difficult to realize what it is that affects the result. It is a very centrally used measure, but many different units affect the result. For example work that is performed in Trading to increase the efficiency might affect the Supply Plan Accuracy negatively.

8.1.2 DD share

One of the objects out from Plan & Secure Supply is “Increased DD share”, which is aligned with Supplying’s goal to increase the DD share. DD share is therefore an obvious measure for Plan & Secure Supply. Increased DD share decreases the need to stock articles in central warehouses. This saves money, but also increases the stock levels in the stores, which increases the stock keeping costs in the stores. The time from order to delivery is probably longer with DD than without, since the goods are delivered from the suppliers and not from a DC. DD also requires more of the supply chain than if a DC is used. For example both the suppliers’ and the stores’ opening hours need to be taken into consideration when planning a DD. Consequently, it is important to find an optimal DD share that makes the benefits possible but that the supply chain can handle. Finding an optimal DD share does not necessarily equal increasing the DD share and the object out should possibly be changed to Optimal DD share.

Today DD share is measured from a receiving perspective, which is a solution that can be discussed. When using a receiving perspective, it is possible to see how the DD share affects the stock levels in store. However,

another way to look at DD share is to use a sending perspective with the purpose to see how much clusters of suppliers affects the DD share. The fact that DD share mostly depends on the ones that send the goods, and not the stores that receive it, is another reason for measuring DD share from a sending perspective. That would also simplify comparisons between suppliers, geographical areas and clusters to see which are good at DD. One idea would be to follow up the DD share from both a receiving and a sending perspective.

8.1.3 Filling rate

The filling rate in trucks affects how much transport capacity that needs to be secured. Since it is difficult to reach an average filling rate of 100 %, more transport capacity than what covers the need has to be secured. This measure is very important to the sub process Plan & Secure Capacity.

The definition of filling rate is a comparison between the water volume, that it is possible to load on a truck, and the used volume. However, the used volume is compared to a fixed maximal volume, not volume that the truck in question is able to load. Since the volume of the trucks vary this might result in misleading results. The fixed truck volume IKEA uses is smaller than what many of the trucks can actually load, which means that the filling rate is probably lower than the results show. This might lead to a situation where work to increase the filling rate is not prioritized enough. Based on this, it would be a good idea to measure the filling rate compared to the actual size of the truck, and not a fixed size. Results that are more truthful would also enable a better capacity planning.

8.1.4 Stock measures

As calculations of the safety stock are made in the sub process Plan Supply, the measure “Original Safety” is very important for Plan & Secure Supply

and should be in their ownership. Also as minimized inventory costs is one of the objects out of Plan & Secure Supply, other stock measures are of vital importance.

If a process owns one, or a few, definitions of closely related measures, it could be reasonable for that process to own all measures in that group. This would make it easier to get an overview and guarantee a consistent use of terminology. One example where this could be a good solution is for Plan & Secure Supply and stock measures. None of the other three core processes within Supplying are more suitable for the ownership of stock measures, which justifies this suggestion. However, there are some function specific stock measures, e.g. HM inventory, which possibly not need to be owned by Plan & Secure Supply. The recommendation is therefore that all non-function specific stock measures should be owned by Plan & Secure Supply. However, the HFBs should still be responsible for the actual stock keeping.

8.1.5 Fixed order type share

Fixed orders affect the Supply Plan Accuracy negatively and bad results are in turn likely to increase the fixed order type share. Even if Plan & Secure Supply should not own the measure, they can use the result from fixed order type share to improve the Supply Plan Accuracy, which can lead to decreased fixed order type share. Since Plan & Secure Supply is able to affect the result, and it is very important information, this measure should be included in Plan & Secure Supply's measurement structure.

8.1.6 Service Level and Total cost

Availability and Reduce Total Supply Costs are two of the outcomes from Plan & Secure Supply. Therefore the measures service level and total cost should be followed up by Plan & Secure Supply. However, availability and reduced total supply cost are outcomes from some of the other core

processes within Supplying as well and should therefore not be owned by Plan & Secure Supply. A recommendation is that they should be owned by Supplying.

8.2 New measures

Using only the existing measures is not enough to support Plan & Secure Supply, but also some new measures need to be developed. As mentioned in section 7.2.3, the process's objects out are important to measure. Some possible new measures are:

- Cost of Poor Planning
- Order Proposal Accuracy
- On time measures
- Other measures

These measures are considered to be able to support the process and steer it in the right direction. However, when the process is completely defined, i.e. when all objects and activities are decided, other suitable measures can probably be found. Below, short discussions about the measures are held. A complete definition of each measure is not provided, but the recommendations can be the basis of further investigation.

8.2.1 Cost of Poor Planning

To have costs as an indicator of performance has been shown to be effective (it is right now used for e.g. cost of poor quality). Cost of Poor Planning mediates the importance of the planning process, and would be easy for everyone to understand. Cost measures can also work as a motivator, as it is easy to see how changes in performance affect the result. Also the fact that there is large focus on costs throughout the whole IKEA, supports the idea of Cost of Poor Planning.

However, to allocate and measure the costs generated from poor planning can be difficult. The most costly effect from a poor plan is probably poor availability, which can be hard to translate into money. Furthermore, it can be very difficult to discern if poor availability depends on a poor plan or poor execution. Even if hard to define, a measure like Cost of Poor Planning, would give everyone within PPS an indication of how well their process perform.

8.2.2 Order Proposal Accuracy

One of the objects out from Plan & Secure Supply is “order proposal on time”, and it should, like all other objects out, be measured. One way to measure the quality of the order proposals is to see how well the proposals are in accordance with the actual orders. High Order Proposal Accuracy would facilitate the suppliers’ work and planning, and by that imply improvements of the supply chain.

8.2.3 In time measures

Some of the objects out from Plan & Secure Supply have a time restriction, e.g. Order proposals on time and Availability Info on time. For example, the order proposals should be sent before certain time every day. As the time is important, measures to guarantee that things are made in time should be developed.

8.2.4 Other measures

The new measures that are suggested above do not cover all of the objects out and outcomes from Plan & Secure Supply. The objects out “One Common Plan”, Availability Info on time, SC Deviations resolved on time, and Precision in phasing in/out as well as the outcome Excellence in Operations are the ones that do not have a suggested measure. However, these objects out/outcomes are not yet completely defined by IKEA, why it

is difficult to make any suggestions about what should be measured. Therefore it is only suggested that measures connected to them should be developed in the future.

9 Conclusions

This chapter aims to present the conclusions that this master thesis has resulted in.

In the first part of this thesis all measures connected to IKEA's Supplying process is mapped to provide an "as-is" picture of the measurement structure. In the mapping, the measures were divided into five groups based on Supplying's five goals. The map contains 226 measures in total, and it provides an overview of how Supplying's measurement structure is built up. Some observations from the map are presented below:

- Not all measures can be connected to the core processes within Supplying, but they are functional measures.
- There are significant differences between the measurement structures of different organizational units, both concerning the presentation of the measures and the number of measures used.
- The goal areas availability and total cost are the ones that have the highest number of measures connected to them.

The second part of the thesis is focused on Plan & Secure Supply. The conclusion is that not all measures needed for Plan & Secure Supply can be found among Supplying's existing measures, but some new ones have to be developed. The existing measures that can be used to support Plan & Secure Supply are:

- Forecast Accuracy
- Supply Plan Accuracy
- DD share
- Filling rate
- Stock measures
- Fixed order type share
- Service Level
- Total Cost

As the process is not yet completely defined, the list below, showing new possible measures for the process, is not complete or precise. When definitive decisions about the processes' objects out are taken, some changes may have to be done.

- Cost of Poor Planning
- Order Proposal Accuracy
- On time measures
- Other measures

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Appendix 1 – Interview guide

PERSONAL BACKGROUND

- 1.1 Name?
- 1.2 Title?
- 1.3 Tasks?

MEASURES

- 2.1 Do the measures support/fit the (supplying) process?
- 2.2 Have the measures been adjusted to fit the processes?
- 2.3 Will the measures be adjusted to fit the processes?
- 2.4 How many measures are used within Supplying? Are they too many/too few?
- 2.5 Which measures are used within Supplying / your unit?
 - Definitions
 - Organizational Unit
 - Data source
 - Unit of analysis (article, geographic area, supplier etc.)
 - Measurement frequency (24/7, day, month, year)
- 2.6 Do the measures measure what they are intended to do?
- 2.7 Are there any measures that are never analyzed/used?
- 2.8 Are there any measures that you think are missing?
- 2.9 When and how are the different measures developed?
- 2.10 Are the measures often revised?
- 2.11 What is the choice of measures based on?