SORIOS

A method for evaluating and selecting certificates and labels

31-05-2011

Aalborg University
Dennis Kikkenborg Pedersen

Study Board of Industry and
Global Business Development
Fibigerstraede 16
DK - 9220 Aalborg East
Phone +45 99 40 93 09
swe@me.aau.dk
www.industri.aau.dk

Title:	**SORIOS - A method for evaluating and selecting certificates and labels**
Semester:	**10th (VS)**
Semester theme:	**Industrial management**
Project period:	**01-02-11 to 31-05-11**
ECTS:	**30**
Supervisors:	**Iskra Dukovska-Popovska and Per Højbjerre**

_____

Dennis Kikkenborg Pedersen

Number printed:	4 copies
Pages, total:	80 pages
Appendix:	N/A
Enclosures:	N/A

SYNOPSIS:

The purpose of this thesis is to develop a general method for evaluating and selecting certificates and labels for companies to use on products and services. The process of developing the method is based on a Grounded Theory approach, with the starting point being a case study performed in cooperation with the LEGO Group. In the case study, a model for evaluating an environmental certificate suitable for the LEGO Group is developed through broad consensus on the factors that the company expects to impact the desirability of an environmental certificate. This model is then re-examined using various studies, theories and current practices in order to establish a refined model for the evaluation of an environmental certificate that is in accordance with existing scientific knowledge.

Then, a generalized model for evaluating and selecting certificates and labels was created through the re-evaluation of the refined model, where the scope of each step in the evaluation process was expanded to accommodate the motivation for wanting certification of different companies. The scope was also expanded to allow the use of the method for evaluation any type of certificate or label. Finally, as the conclusion of the development process, an illustrative explanation of the final method was created for easy implementation and use by companies wanting certification.

Preface

This thesis was composed by Dennis Kikkenborg Pedersen at Aalborg University, Denmark in the period from 01-02-11 to 31-05-11.

Source reference is based on the ISO 690 standard for bibliographic referencing and is shown as [Author; Year]

I would like to thank Ulla Nørtoft of the LEGO Group for working closely with me during the case study portion of the thesis, and I hope that my contributions will help ease the work with environmental certificates at the LEGO Group. Likewise, I would like to thank Iskra Dukovska-Popovska for mentoring me through the overall writing process, especially during the hectic final weeks of the process. Finally I would like to thank Hanne Jensen for her insights into the Grounded Theory framework and help with the visual presentation of the thesis.

Resumé

Denne projektopgave søger at udvikle en generel metode til vurdering og udvælgelse af certifikater og mærker. Projektforløbet er baseret på Grounded Theory, der er en metode til udvikling af teorier og metoder på basis af en kombination af kvalitative og kvantitative data. Denne fremgangsmåde vælges som følge af, at der under udviklingen af strategiske beslutnings-værktøjer er ringe mulighed for at anvende den almindelige videnskabelige fremgangsmåde hvor en teori testes gennem forsøg. Dette skyldes besværet med at genskabe de nøjagtigt samme omstændigheder ved hvert forsøg, når forsøget udføres i en så dynamisk kontekst som en virksomhed. Yderligere tillader Grounded Theory at forskeren ikke forholder sig upartisk til forskningsområdet, men er en aktiv deltager i de relevante processer, med egne fordomme og præferencer.

Udviklingen af metoden tager således udgangspunkt i et forløb med aktiv deltagelse i en udvælgelsesproces omkring miljømærker til to af LEGO Koncernens produkt-grupper. Den første produkt-gruppe er virksomhedens kerneprodukter; plast legetøj med elementer af tekstil og elektronik. Den anden produktgruppe er virksomhedens største licensprodukt; børnetøj. Under dette forløb anvendes de overvejelser og forbehold virksomheden har omkring certificering, til at opbygge en vurderingsproces hvor alle disse overvejelser og forbehold kan blive behandlet. Grundet den aktive deltagelse i udvælgelsesprocessen, er alle overvejelser og forbehold også repræsentative for forfatterens egne overvejsler, for på denne måde at redegøre for egen bias i forhold til emnet, sådan at udviklingen af metoden placeres i den faktiske kontekst.

Efterfølgende tilføjes metoden yderligere data i form af en gennemgang af alle de antagelser der ligger til grund for den opbyggede vurderingsproces. Hver antagelse søges enten bekræftet eller affærdiget på basis af eksisterende forskning og teorier. På denne måde udvikles metoden med henblik på at tilfredsstille den dels de nuværende forbehold hos virksomheden og dels at være i overensstemmelse med videnskabelig praksis. Gennem nye oplysninger fra de forskellige studier og teorier udvides metoden med relevante parametre som ikke var identificeret igennem de overvejelser og forbehold virksomheden havde angående certifikater og mærker.

Endeligt søges metoden generaliseret, så den kan anvendes af forskellige virksomheder til at vurdere og udvælge forskellige typer certifikater eller mærker til forskellige typer produkter eller tjenester. Dette gøres ved at gennemgå hver fase af den udviklede metode og udvide fremgangsmåden til at kunne håndtere parametre, som er specifikke for bestemte typer virksomheder, bestemte typer certifikater eller bestemte typer produkter. Den fuldt generaliserede metode samles afslutningsvis i et opsummerende og illustrerende afsnit, hvor den præsenteres som et færdigt værktøj der kan implementeres af virksomheder uden tidligere kendskab til de forskellige positive og negative aspekter af at bruge certifikater og mærker udviklet af en tredjepart.

Contents

1 Introduction 1

2 Methodology 3

2.1 Basis 3

2.2 Thesis structure 5

3 Phase 1 - Evaluation process at the LEGO Group 7

3.1 Structure of the evaluation process 7

3.2 Step 1 - Scope 9

3.3 Step 2 - Overview 9

3.4 Step 3 - Requirements 12

3.5 Step 4 - Incentives 13

3.6 Step 5 - Organization 26

3.7 Step 6 - Selection 32

4 Phase 2 - Examination of theoretical foundation for method 34

4.1 Step 1 - Scope 34

4.2 Step 2 - Overview 35

4.3 Step 3 - Requirements 36

4.4 Step 4 - Incentives 36

4.5 Step 5 - Organizations 38

4.6 Revision of method 39

5 Phase 3 - Generalization of method 44

5.1 Step 1 - Scope 44

5.2 Step 2 - Overview 47

5.3 Step 3 - Requirements 48

5.4 Step 4 - Incentives 51

5.5 Step 5 - Organization 54

5.6 Step 6 - Selection 59

6 Visual presentation of final model 60

7 Conclusion 63

8 Perspectives 65
8.1 Thorough testing of the presented hypotheses 65
8.2 Improved search process 65
8.3 Elimination-based selection process 66

List of figures

Figure 1 - New environmental certificates per year from 1979-2010 (Big Room Inc., 2010) 1
Figure 2 - The workflow of Grounded Theory 4
Figure 3 - Model of thesis structure 5
Figure 4 - Evaluation process overview 8
Figure 5 - List of certificates 11
Figure 6 - Requirement matrix 12
Figure 7 - Visualization of requirements 12
Figure 8 - Number of failed requirements per certificate for plastic toys 13
Figure 9 - The EU Flower logo (European Commission, 2011) 14
Figure 10 - Nordic Swan logo (Miljømærkning Danmark, 2010) 15
Figure 11 - Cradle-to-Cradle logo (MBDC, 2011) 16
Figure 12 - SCS certificate logo (Scientific Certification Systems, 2011) 16
Figure 13 - GECA certificate logo (Good Environmental Choice Australia Ltd., 2011) 17
Figure 14 - Green Tick certificate logo (GreenTick Certification Ltd., 2008) 18
Figure 15 - Ecomark India certificate logo (Central Pollution Control Board, 2007) 18
Figure 16 - GOTS certificate logo (International Working Group on Global Organic Textile Standard, 2010) 19
Figure 17 - ÖkoTex 1000 certificate logo (Oeko-Tex Association, 2011) 20
Figure 18 - IVN certificate logo (International Association of Natural Textile Industry , 2011) 20
Figure 19 - Thai Green Label certificate logo (Thailand Environment Institute, 2011) 21
Figure 20 - Ecomark Japan certificate logo (Japan Environment Association, 2007) 21
Figure 21 - ECNZ certificate logo (ECNZ, 2010) 22
Figure 22 - SMaRT certificate logo (MTS, 2008) 23
Figure 23 - Bra Miljöval certificate logo (Swedish Society for Nature Conservation, 2010) 23
Figure 24 - Rating system for incentives 25
Figure 25 - Incentive ratings 25
Figure 26 - Formula for empirical standard deviation 25
Figure 27 - Rating system for organizations 31
Figure 28 - Organization scores 32
Figure 29 - Selection scoring model 32
Figure 30 - Final scores for plastic toy products 32
Figure 31 - Process structure from case study 40
Figure 32 - Search process from case study 40
Figure 33 - Revised requirement evaluation model 41
Figure 34 - Difficulty rating model 41
Figure 35 - Revised incentive evaluation model 42

Figure 36 - Revised organization evaluation model 43
Figure 37 - Selection scoring model..... 43
Figure 38 - Initial purposes and examples of targets..... 44
Figure 39 - The impact of purpose on other steps 47
Figure 40 - Search process in case study 47
Figure 41 - Generalized search methodology..... 48
Figure 42 - Requirement types from case 50
Figure 43 - Additional requirement types 50
Figure 44 - Grouping of certificates according to requirements 51
Figure 45 - Example of incentives ratings..... 53
Figure 46 - Organization rating model for credibility 58
Figure 47 - Organization rating model for efficiency..... 58
Figure 48 - Selection model from case study..... 59
Figure 49 - Value of requirement groupings..... 59

1 Introduction

Environmental certificates represent an attempt to improve the environmental performance of companies above and beyond the current legal requirements, by rewarding companies for fulfilling more stringent environmental requirements than those found in national legislation. Environmental certification also represents an additional way for companies to differentiate their products from competing products. As such, environmental certificates have many similarities with other certificate types such as those for quality, safety and social responsibility. Certificates covering quality and safety have been in use for a longer period of time, and are today dominated by a few, widely adopted certificates such as the ISO and OHSA certificates.

The subject of environmental certificates has been broached from several angles during the last decade or so. There have been numerous studies on the reason for acquiring environmental certificates (Nakamura, et al., 2001) (Mera, et al., 2004), on the development of environmental certificates for specific products and services (Buckley, et al., 2001) (Font, 2001) and on customer response to environmental certificates (Howard, et al., 2010) (Chow, 2002) (Nguyen, et al., 2010). There have, however, only been limited attempts at comparing and evaluating such certificates (Banerjee, et al., 2003).

Even so, the use of environmental certificates has increased in the 21st century, see Figure 1, especially due to the issue of global warming which has received a great deal of attention (Hanas, 2007). As the environmental impact of individual products is hard for customers to perceive directly, they must either rely on environmental labels or the producer own statements. According to the ISO 14020 standard, such environmental labels can be divided into three main types. Type 1 labels are awarded by an independent organization based on one or more criteria. Type 2 labels are created by the company producing the product, or a sister company. Type 3 labels are awarded by an independent organization based on a full lifecycle-analysis (LCA) of the product.

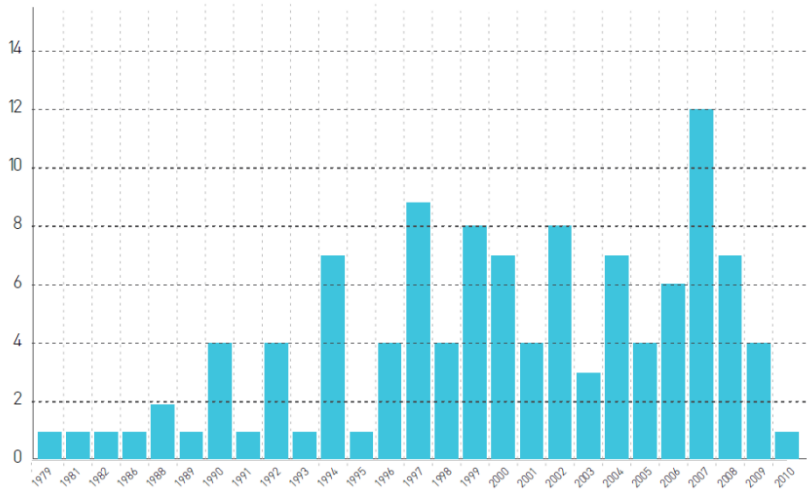


Figure 1 - New environmental certificates per year from 1979-2010 (Big Room Inc., 2010)

An entire industry has been built around providing third party certificates. Each certificate is based on different criteria that are either applicable to the end-product or to the lifecycle of the product. Typically, type 1 labels are based on the limiting the presence of certain substances in the product itself, or in the production facilities where the product is produced, while type 3 labels usually require that the company or product fulfill certain requirements such as limiting the emission of harmful substances, limiting the energy used during production and promoting recycling to limit the generation of waste.

For companies, such certificates can fulfill a variety of needs. In some cases, the communication of an image of environmental responsibility is the primary objective, while other companies use certification as a means of benchmarking their environmental efforts against those of their competitors. In yet other cases certificates are used to provide a standard for environmental responsibility that is easy to communicate to suppliers and license partners. As the need filled by an environmental certificate can vary greatly from company to company, it is likely that some certificates are more suited for fulfilling some needs than others.

As such, international companies will often have to choose such a certificate from among hundreds found worldwide, each applicable to specific products or services and of varying suitability based on the intentions of the company. With no standardized method for choosing a certificate, the decision can vary widely depending on the amount of resources allocated to making the choice and the personal experiences of the people involved. The initiating purpose of this thesis can therefore be described as:

The development of a documented evaluation process for the selection of a certificate or label from current practice.

2 Methodology

This chapter will briefly outline the methods used for research and synthesis of a general method of evaluation. This is done both to demonstrate the validity of an approach which is used mostly in social science studies, and to provide the reader with some background on the iterative processes used in the development of the end method.

2.1 Basis

The approach of this thesis is based on the systematic methodology known as Grounded Theory. This methodology emphasizes the generation of an overarching theory from individual data and experiences gained through research and practice (Guvå, et al., 2005). Developed in 1967 by the two sociologists Barney Glaser and Anselm Strauss, Grounded Theory was developed for use in sociology, though it has later found application in areas such as social psychology and organization theory.

A key advantage of Grounded Theory is its flexibility with regards to the type of data that can be included in the research process (Guvå, et al., 2005). Both qualitative and quantitative data provide valuable insights that contribute to the generation of an overarching theory that seeks to combine the data found during the research process with the experience and perspective of the researcher. As such, all collected data is related to the researcher collecting the data, in order to understand the full context of the data. The context includes what the purpose of collecting the data was, what the expected outcome was and how the data impacted the researcher's understanding of the overall area of research.

Due to its equal focus on practical experiences and quantitative data in the research process, Grounded Theory is suitable for the generation of general theories based on case studies in which the researcher participates in the case. Coupled with the use of the experiences and perspective of the researcher developing the theory, this means that a natural progression of the theory is documented, which follows the evolution of the theory from the original idea that is based on the researchers initial knowledge and experiences, through to the final theory which is based on new research and relevant source-material uncovered during the Grounded Theory process.

Like with basic scientific method it is based on a reiterative process, though Grounded Theory does not typically include experiments to verify theories. Instead it relies on deductive and inductive reasoning to build theories layer by layer on the basis of an increasing amount of gathered data.

A secondary benefit of using Grounded Theory with regards to the development of an evaluation process for certificates is its focus on social interactions and their influence on the individual's perception of reality. This focus is useful for describing the interactions between the various organizations and individuals that interact with a certificate in one way or another. This is suitable for describing the interactions in an organizational "ecosystem" consisting of the consumers, the organizations deciding the contents of the certificate, the organizations evaluating and issuing

certificates, the organizations seeking certification and the organizations providing consulting services to those seeking certification.

Grounded Theory divides the formulation of a theory into an iterate process, as shown in Figure 2.

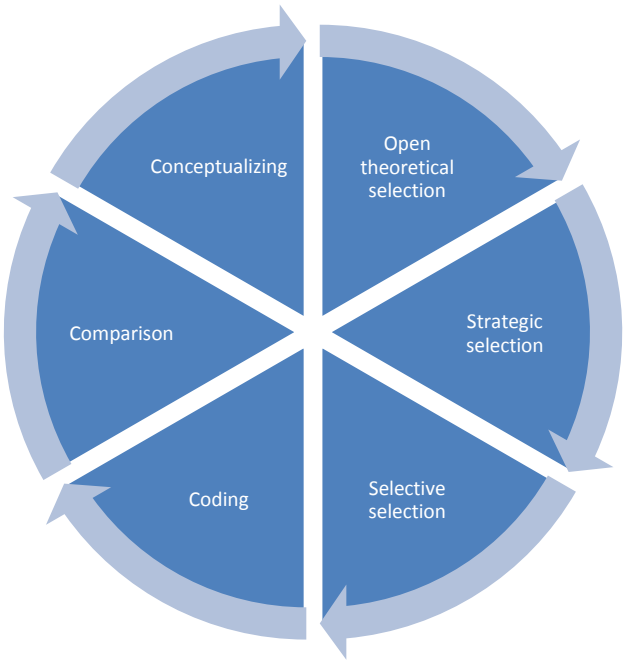


Figure 2 - The workflow of Grounded Theory

Initially, a process of open theoretical selection is performed, where the most likely sources of data relevant to the theory being constructed are identified and examined. In this process, it is acknowledged that the researcher's knowledge of the subject has a great impact on what areas will be included in the open theoretical selection. This inherent bias is part of the data gained from the open theoretical selection (Guvå, et al., 2005).

Next, a process of strategic selection is performed, where areas of research are selected based on the findings of the open theoretical selection. This includes any new lines of research that were identified during the exploration of the areas found in the open theoretical selection, as well as any lines of research that would serve to make sure all areas of the subject matter are explored to some extent.

Following this, a process of selective selection is performed, where avenues of research are selected based on the data gathered through the two previous selection processes. As such, avenues as selected according to where data which will support the conclusions of previous selections is likely to be found. As the theory evolves, additional processes of selective selection can be performed, until no further avenues of research are present that would contribute to the theory.

Coding is the process of creating codes, which are the foundation for the development of a theory. Rather than the data itself, codes are what the data *means* in the context of the area of research. As such, codes represent the individual dependencies, preferences, motives and capabilities of all actors that come into contact with certificates.

Comparison is the process of creating categories that represent groupings of codes which allows the collected data to be arranged according to common factors, causes or effects. By arranging codes in this way, the connections between codes and the data they originate from slowly become clear, giving an increased understanding of key types of data.

Conceptualizing is the process of generating concepts which represent generalized trends and patterns based on interconnections in groups of categories. Where codes and categories are based on specific data and similarities between data, concepts are abstracted patterns and systems that do not connect to any specific data, but provide an understanding of the data that was collected. When put together, the concepts form an overall theory. By drawing together all the concepts created on the basis of the gathered data, the theory becomes an overarching model that describes the area of study and accounts for the presence of all the found data thus enabling the prediction of additional data.

Rather than being a strict iterative process where each step must build directly on the previous step, it is not uncommon for processes to be performed out of sequence or concurrently. For example, it can often be useful to complete a sequence of coding, comparison and conceptualizing after each selection process, as the creation of an early prototype of the end theory can help generate additional input for further selection stages. Also, it can sometimes be preferable to follow an avenue of research through to its conclusion immediately after identifying it, due to time constraints or other concerns.

2.2 Thesis structure

The thesis is based on the principles of Grounded Theory as described in the previous section and is divided into three main phases or parts; case study, theory study and generalization, corresponding with open theoretical selection, strategic selection and selective selection, as seen in Figure 3.

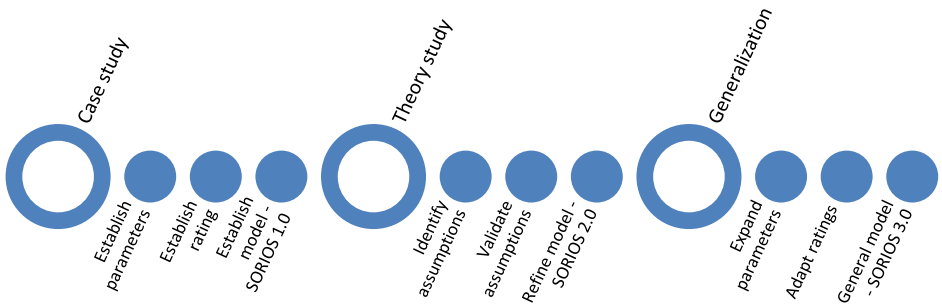


Figure 3 - Model of thesis structure

First, a case study allows for open theoretical selection and acts as an example of the type of process that is sought documented and standardized, which results in the development of a preliminary evaluation method. This is done with the author participating as a practitioner in an evaluation process regarding certificates. This phase will also serve to clearly identify the author's bias and experiences, as the phase will be primarily based on a consensus reached between the participating company and the author. In the case study, coding will be done through the establishing of parameters thought relevant when evaluating certificates. This is followed by a process of comparison, where rating systems are developed in order to compare certificates across multiple parameters. Finally, conceptualization is performed, where an initial model is built of the evaluation and selection method.

Second, the initial evaluation method is refined through strategic selection based on a theory study, which draws on existing studies and literature. This phase serves to ensure consistency between the developed method and established theory. Coding is done in the form of identifying the assumptions made in the development of the initial evaluation method. These assumptions are then sought validated or invalidated through a comparison between the assumptions and established theory. Finally, a process of conceptualization modifies the initial evaluation method, making it consistent with both practice and theory.

As the third and final phase of the thesis, the model of the evaluation method is sought generalized through a process of selective data selection, in order for it to be usable outside the specific case from which it originated. This is initially done through a coding process where each of the parameters of the refined evaluation method, are expanded with the aim of accommodating a wider variety of certificates, users and products. This is followed by a process of comparison, where the systems of rating and comparing certificates to each other are adapted to the expanded parameters. This results in a conceptualization process leading to the final evaluation and selection method being developed.

3 Phase 1 - Evaluation process at the LEGO Group

In order to provide a practical basis for the development of a general evaluation method, a case study is done in cooperation with the LEGO Group. Based on the company's intention to acquire one or more environmental certificates for use on products or components produced by suppliers, an evaluation process is established that will investigate and address the relevant factors of a certificate as determined in cooperation with the LEGO Group.

The factors that impact the selection of a certificate can be divided into two main categories; barriers and incentives. Barriers represent the amount of effort required to obtain the certificate, typically in the form of both initial and recurring costs. Meanwhile, incentives represent the benefits of having the certificate in the form of increased security, income, savings or other relevant parameters.

The public debate regarding the Cradle-to-Cradle certificate, where some companies disliked the certificate and some environmental activists distrusted it (McIntire, 2008) (Sacks, 2008), gives rise to another possible avenue of inquiry. In this case, the problem is not the balance of requirements versus incentives, but rather the organizations that surrounded the certificate. In the case of Cradle-to-Cradle, the accusations are that the highly centralized structure and ownership by a select few individuals create a monopoly where the same organization is responsible for dictating the requirements, consulting companies on how to fulfill the requirements and finally evaluating if the companies will achieve certification. Based on this debate, the organizations involved in a certificate will also be examined to identify potential issues.

3.1 Structure of the evaluation process

The evaluation process is formulated in cooperation with the LEGO Group to evaluate a range of certificates in order to determine the certificate most suitable for fulfilling the needs identified by the company. Following discussions with the LEGO Group, the parameters likely to influence the choice of certificate are determined to include the level of requirements for a certificate relative to the current capabilities of the LEGO Group. Further parameters are the benefits of maintaining a given certificate and a favorable organizational structure linked to the certificate. Based on information from the LEGO Group, it is known that the company's products are in full compliance with any national legislation, that the certificate will be used on products regardless of which market they are sold on and that licensed partners and suppliers can be situated in any industrialized country.

Based on these parameters, a process is built to collect the necessary data to perform an evaluation of each parameter, with each evaluation feeding into a final selection of the most ideal certificates. The entire process is divided into six steps, as seen in Figure 4.

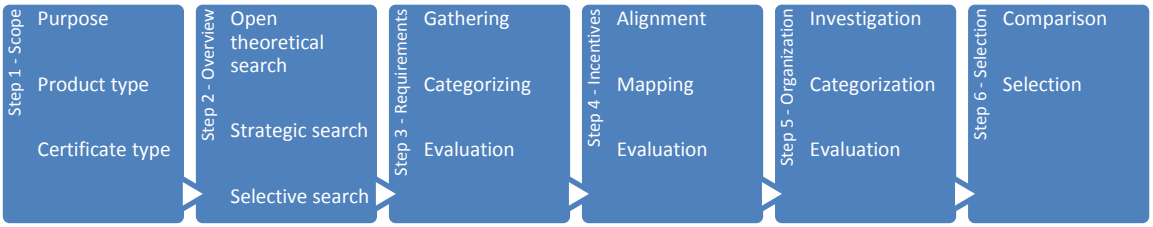


Figure 4 - Evaluation process overview

The first step of the evaluation process is to determine the purpose of acquiring a certificate. This consists of establishing three initial parameters; the intended effect, the product type and the certificate type. The intended effect can be anything from increasing sales and standardizing products across a supply chain to improving customer satisfaction and keeping ahead of legislation. The product type is an important factor, as it helps limit the amount of certificates that need to be evaluated. Nearly all certificates are limited to what type of products or services they can be applied to, and most have different requirements for different products or services. Finally, the intended focus area of the certificate must be determined as specifically as possible, in order to provide a limited selection of potential certificates. Certificates typically focus on areas such quality, safety, environmental responsibility and social responsibility.

The second step of the evaluation process is the creation of an overview of the certificates that are to be evaluated. In this step, the previously established certificate type and product type are used to select only those certificates that are relevant for the situation at hand. Certificates are found through a three-tiered search, based on the Grounded Theory philosophy of open theoretical, strategic and selective selection. Initially, the search focuses on where such certificates are most likely to be found; products of the same type as the one which is to be certified. This is followed by a search that focuses on the certificates more directly, exploring the certificates found to establish links to other certificates. Finally, a broader search is performed where certificates identified by key words and phrases learned from the certificates that have already been found.

The third step of the evaluation process is to collect and organize the requirements or criteria of each of the certificates. Initially, the raw amount of applicable criteria is collected, after which the criteria are ordered according to their area of application. This eases the following evaluation of the difficulty of the certificates relative to each other. Ideally, the comparison is made against current performance, to determine which certificates represent the greatest operational changes. Alternately, the comparison can be made between the individual certificates, if all certificates share the same types of criteria with only the specific values of each criteria differing between certificates.

The fourth step of the evaluation process is the comparison of the incentives for the LEGO Group to choose each of the certificates being evaluated. As what constitutes an incentive is dependent on what benefits the company directly, it is first necessary to align the purpose for acquiring the certificate, defined in the first step of the evaluation process, with the factors that help a certificate fulfill this purpose. These factors must then be mapped for each certificate, after which the degree to

which the comparative strength of these factors for each certificate compared to the other is evaluated.

The fifth step of the evaluation process is the evaluation of the organizations involved in a given certificate. This initially consists of the investigation and description of the organizational constellation supporting the certificate, including how criteria are formulated, how products are certified and tested, as well as how auditing is performed. The certificates are then categorized according to the similarity of their organizational foundations, after which any common traits of such organizational constellations are described. Depending on the purpose stated in the initial step of the evaluation process, these traits are then graded as being either positive, negative or without influence. This culminates in an evaluation of the alignment of the organizational foundation for a given certificate and the goals of the company seeking certification.

The sixth and final step of the evaluation process is the selection process itself. This is where all the previous steps are summarized and the results are analyzed collectively in order to rank the evaluated certificates according to their desirability.

3.2 Step 1 - Scope

In collaboration with the LEGO Group, it is decided that the focus of the evaluation process should be the selection of two environmental certificates, each covering a distinct product type. The first certificate will cover children's clothing, while the second will cover plastic toys containing textiles and electronic components.

The first certificate is to be used both as an advertising aid to further sales, in addition to facilitating standardization of licensed products and finished components made by suppliers by providing an easily accessible standard that can be applied to licensed children's clothing and other clothing products outside the core competencies of the LEGO Group. The second certificate is primarily intended to promote sales by providing a visible indication of the environmental efforts of the LEGO Group. Finally, both certificates are intended to provide greater clarity within the company regarding how environmentally friendly LEGO products are in comparison to other products.

3.3 Step 2 - Overview

In order to gather a list of applicable certificates, three types of search are performed. First a product search is performed where toys and clothing products are sought out and any environmental certificates held by such products are added to the list. This should not only provide a starting point for the list, but also an insight into what certificates are the most used by competing products and thus what certificates the customers encounter most often.

Second, an industry search where the focus is on the environmental certification industry is performed. By identifying any groups or associations in the environmental certification industry, the member lists of such organizations should provide a large number of environmental certifications for consideration. In addition, the membership of a certificate in such groups or associations typically indicates that the certificate is actively engaged with the rest of the environmental certification industry.

Third, a free search is performed in order to identify any relevant environmental certificates that are not currently used by competing products and have no significant industry presence. The free search is performed by way of a Boolean search including keywords regarding environmental certification.

Finally, the relevance of the full list of certificates is verified, as some certificates gathered during the three search processes may not apply to the selected product types. As such, the list is to be sorted according to what certificates apply to which product.

3.3.1 Product search

Following a thorough search of the Danish retailers selling children's clothing, the following certificates were found to be used by several brands of clothing promoted as being especially environmentally friendly; GOTS, ÖkoTex 1000, the EU Flower, the Nordic Swan, Demeter and IVN. A similar search among plastic toys revealed no additional certificates, as only the EU Flower and the Nordic Swan were found. Additionally, a large number of products promoted their environmental friendliness through an evaluation by the German magazine ÖKO-TEST.

Expanding the search to the international market for plastic toys and children's clothing initially yielded no additional certificates, as all the found products either had no certificates, or ones already added to the list. Finally, a search of online marketplaces exclusively dealing in environmentally friendly products yielded a number of additional certificates through their list of certificates that would grant a product admission into the marketplace. These certificates included; SCS Environmentally Preferable Products, Cradle-to-Cradle and Green Seal.

3.3.2 Industry search

A search for groups or associations was performed using the already identified certificates as a starting point. The first such association was the Global Ecolabelling Network, whose members-list contributed the following certificates; Good Environmental Choice Australia, ABNT Ecolabel, Blue Angel, Hong Kong Green Label, Ecomark India, Ecomark Japan, Environmental Choice New Zealand, EcoLogo and Vitality leaf.

A search of websites dedicated to the discussion of environmental certification resulted in many of the same certificates, along with a few previously undiscovered certificates. These include; SMaRT and Green Mark Program.

3.3.3 Free search

A final free search was conducted in the form of a Boolean search drawing on common terms and phrases found on previous certificates homepages. This led to the discovery of few new certificates, but more importantly it led to the discovery of an independent website maintaining an index of environmental certificates. Analyzing the sections of this database marked relevant for the intended product types provided a wide range of new environmental certificates including; Greenguard, Singapore Green Label, Japan Green Leaf, Thai Green Label, Green Tick and Bra Miljöval.

3.3.4 Relevance of certificates

Following the listing of possible certificates, each certificate is evaluated more closely to determine if each certificate is fully applicable to the exact products specified by the LEGO Group: a plastic toy containing electronic and textile components, as well as clothing for children. The result is a list of environmental certificates sorted by applicability, see Figure 5.

Certificate	**Applies to**
Nordic Swan	Both
SCS Environmentally Preferable Products	Both
Cradle-to-Cradle	Both
Good Environmental Choice Australia	Both
Green Tick	Both
Ecomark India	Children's clothing
GOTS	Children's clothing
ÖkoTex 1000	Children's clothing
EU Flower	Children's clothing
IVN	Children's clothing
Thai Green Label	Children's clothing
Ecomark Japan	Children's clothing
Environmental Choice New Zealand	Children's clothing
SMaRT	Children's clothing
Bra Miljöval	Children's clothing
Blue Angel	Neither
Green Seal	Neither
ABNT Ecolabel	Neither
Hong Kong Green Label	Neither
EcoLogo	Neither
Vitality leaf	Neither
Green Mark Program	Neither
Greenguard	Neither
Singapore Green Label	Neither
Japan Green Leaf	Neither

Figure 5 - List of certificates

3.4 Step 3 - Requirements

In this phase, a complete list of requirements contained in each certificate is compiled to enable the evaluation of the gap between the current products produced by the LEGO Group and the requirements of each environmental certificate. This functions as a way to evaluate the cost of certification, though the cost that comes from certification fees cannot be compared as they are sometimes calculated specifically for a given company, product or situation. In addition, access to exact pricing of certificates requires cooperation with the certification organization, which is sought avoided due to the number of certificates involved and the time constraints of the project. As the list of requirements is built, they are grouped of according to similarity in order to determine any general types of requirements found in environmental certificates.

Initially, raw data is compiled in the form of unordered lists of requirements for each certificate. The requirements are drawn from whatever material is available regarding each certificate. The gathered raw data is assembled into a matrix listing each requirement type in one column with the specific requirements of each certificate listed in the adjacent columns, as shown in Figure 6. The requirements column is adjusted as the requirement list for each certificate is entered into the matrix, in an effort to combine similar requirements to avoid duplicate requirements that differ only due to semantics.

	Certificate A	Certificate B	…	Certificate Y
Requirement 1	Requirement 1A	Requirement 1B	…	Requirement 1Y
Requirement 2	Requirement 2A	Requirement 2B	…	Requirement 2Y
…	…	…	…	…
Requirement X	Requirement XA	Requirement XB	…	Requirement XY

Figure 6 - Requirement matrix

3.4.1 Gap

In order to determine which certificates represent the greatest challenge for the LEGO Group to implement, the requirements in the matrix are compared to the current performance of the relevant products and components. In order to visualize the number of operational changes necessary to fulfill the given certificates, all requirements that are below current performance are marked in green, while those above current performance is marked in red, as illustrated in Figure 7. Due to the sensitive nature of information regarding the current environmental performance of the LEGO Group, the compiled list itself is not enclosed.

	Certificate A	Certificate B	…	Certificate Y	Current performance
Requirement 1	Requirement 1A	Requirement 1B	…	Requirement 1Y	Current 1
Requirement 2	Requirement 2A	Requirement 2B	…	Requirement 2Y	Current 2
…	…	…	…	…	…
Requirement X	Requirement XA	Requirement XB	…	Requirement XY	Current X
Amount of failed requirements	1	3	…	2	

Figure 7 - Visualization of requirements

From the evaluation and visualization of the requirements found in the individual certificates compared to the current performance of the relevant LEGO products, an abbreviated list can be formed listing the number of unfulfilled requirements for each certificate, see Figure 8. Due to time constraints, only the requirements for certificates applicable to plastic toys were processed by the LEGO Group. As such, only these certificates can be fully evaluated, though all certificates will be used in further steps in order to provide more data.

Certificate	Number of unfulfilled requirements
Nordic Swan	162
Cradle-to-Cradle	141
Good Environmental Choice Australia	156
Green Tick	0
SCS Environmentally Preferred Products	10 (estimated)

Figure 8 - Number of failed requirements per certificate for plastic toys

As the SCS certificate did not have requirements per se, but rather required the product to be more environmentally friendly than the average similar product, an estimation is made based on the current environmental friendliness of LEGO products compared to their direct competitors. It then becomes apparent that three certificates, Nordic Swan, Cradle-to-Cradle and Good Environmental Choice Australia, require substantial effort to implement. Meanwhile, the SCS EPP certificate only requires minor effort to implement and the Green Tick certificate requires no effort at all.

3.5 Step 4 - Incentives

In order to better convince companies to live up to the increased requirements, all certificates offer some amount of incentives. These incentives take a variety of forms depending on the individual certificate. Most incentives are actively advertised by the certifying organization, making forming an overview of such incentives straightforward. For each certificate, an initial list of incentives is compiled, after which the incentives are structured in a list according to type.

As the stated aim for achieving certification is to increase sales, provide an easily applicable standard for clothing products and to measure the company's environmental friendliness compared to competitors, the first two parameters, sales and standardization, are selected as the initial incentives to be identified. The benchmarking function is more dependent on external factors such as competitors' willingness to sign up for certificates or share information regarding their environmental efforts. As such, this goal is to be fulfilled through the evaluation of certificate difficulty performed in Step 3 - Requirements.

With regards to increasing sales, the factors that are expected to be relevant is the amount of customers that known about a certificate and how much they know, along with the ability of the certificates logo to communicate environmental friendliness to customers who do not know its

significance. This can be done through the use of imagery, the color green or text, though only English text is assumed to be widely understood. For standardization, the factors expected to be important is the availability of support and the obscurity of requirements, as requirements that are commonplace are thought to be more likely to be accepted by suppliers and license partners.

3.5.1 EU Flower

This certificate is promoted throughout Europe on account of being the European Commission's official environmental certificate (European Commission, 2011). As such, it is known throughout Europe and has the potential to increase sales in this part of the world through knowledge of the certificate and what it stands for. The lack of worldwide promotion means that there is likely to be little knowledge of the certificate in other parts of the world, though the logo of the certificate is easily recognizable as being environmentally focused as seen in Figure 9. In addition, products carrying the certificate will be entered into a Europe-specific homepage run by the European Commission that lists and promotes all products that have obtained the certificate.

Figure 9 - The EU Flower logo (European Commission, 2011)

The certificate ought to be known to most European based companies or companies doing a large amount of business in Europe, and it was observed during the compiling of requirements for the different certificates that several of them use part of the requirements for the EU Flower, sometimes word for word. With regards to the use of the certificate as a standard in the supply chain, this becomes an advantage, as many suppliers are likely to be familiar with the type of requirements found in the certificate, if not with the specific requirements. In addition, due to the presence of multiple certifying organizations across Europe, there is ample access to support during implementation.

Finally, the fact that the certificate originates directly from the European Commission means that there is a strong connection between the requirements found in the certificate and the legislation formulated and enforced by the European Union. As such, the certificate is formally recognized by European legislation as being a guarantee for good environmental performance and compliance with existing legislation.

3.5.2 Nordic Swan

This certificate is, apart from the EU Flower, the only environmental certificate officially recognized by the Danish government (Miljømærkning Danmark, 2010). It is promoted throughout Scandinavia, although no such promotion has been done in the rest of Europe or worldwide. This means that the certificate is likely to only increase sales in Scandinavia through recognition of the certificate and the values it represents. In the rest of the world, the promotional effect will be driven mostly by the logo itself, which apart from its green color is not readily recognizable as being environmentally related, see Figure 10.

Figure 10 - Nordic Swan logo (Miljømærkning Danmark, 2010)

The certificate is primarily known to companies based in Scandinavia or those for whom this is one of their key markets. For other companies, the requirement types found in the certificate should still be at least partially known as the Nordic Swan certificate bases much of its requirements on those found in standards such as the EU Flower and ÖkoTex 100, which are well established internationally. Meanwhile, the fact that the Nordic Swan is primarily a Scandinavian certificate, means that access to support during implementation will be more difficult for suppliers without departments in this region, though support is more readily available for the requirements also found in the EU Flower or ÖkoTex 100.

3.5.3 Cradle-to-Cradle

The Cradle-to-Cradle certificate has been the center of many debates in recent years (Cox, et al., 2009) (Sacks, 2008). The founders of the certificate, Michael Braungart and William McDonough, have managed to generate a great deal of enthusiasm among environmentally conscious consumers, with their vision of a green revolution that would solve many of the environmental issues that are in the public eye (Braungart, et al., 2009). This “movement”, coupled with the strong international promotion of the certificate by the founders’ company MBDC means that there is good potential for a sales increase among environmentally conscious consumers. For consumers without knowledge of the Cradle-to-Cradle certificate and its background, there is little promotional value, as the logo does not directly communicate environmental friendliness, apart from partial use of the color green, see

Figure 11. Additionally, the certificate grants products access to a specialized sales-front on the Amazon internet-store, reserved for products of exceptional environmental standard.

Figure 11 - Cradle-to-Cradle logo (MBDC, 2011)

In stark contrast to its popularity among environmentally conscious consumers, the Cradle-to-Cradle certificate has earned an unfavorable reputation among producers and suppliers. As such, it is not well suited for use as a standard for licensed products or other products outside the core competencies of the LEGO Group. Due to closed nature of the certification process and the limited information regarding requirements that are made publicly available, the use of the certificate as a standard for suppliers is also difficult. Further compounding the issue is the fact that only MBDC and the German IPEA run by Michael Braungart, can offer support regarding certification.

3.5.4 SCS Environmentally Preferable Product

This certificate is based in the US with a branch in Mexico, and as such is primarily promoted in these regions (Scientific Certification Systems, 2011). The certificate is mostly applied to products related to housing, so the certificate is best known by professionals working within this field. Due to its lack of direct promotion towards consumers, knowledge of the certificate is likely to be low in the US and Mexico, while being largely non-existent elsewhere in the world. The logo of the certificate somewhat evokes an image of environmental awareness through the use of a green cross beside a blue planet Earth, see Figure 12.

Figure 12 - SCS certificate logo (Scientific Certification Systems, 2011)

As the certificate is based on a comparison of a product with similar products, it lacks clearly defined criteria. This makes it necessary to consult SCS directly before the specific requirements for a given product or component can be determined. As SCS only have offices in the US and Mexico, this makes support difficult for suppliers based in other regions. Similarly, the fluid nature of the requirements for this certificate makes it unlikely that suppliers are familiar with the types of requirements presented to them, leading to additional need for support.

3.5.5 Good Environmental Choice Australia

This certificate is exclusively promoted in Australia, where it is the primary environmental certificate (Good Environmental Choice Australia Ltd., 2011) Therefore, only customers in this country are likely to know the certificate and the environmental performance it requires. The logo itself conveys the message of environmental friendliness by clearly stating “environmental choice” on the logo, though this is only of use to customers who can read English, see Figure 13. For customers who cannot read English, the depiction of leaves combined with the use of the color green conveys some sense of the certificates purpose, though it is far from clear.

Figure 13 - GECA certificate logo (Good Environmental Choice Australia Ltd., 2011)

The certificate uses many requirements represented in the EU Flower certificate, often word-for-word. Due to this, the requirement types are likely to be known to most suppliers and producers, though the specific requirements differ slightly from those found in the EU Flower certificate. Meanwhile, the fact that the certificate is exclusively based in Australia means that support is not easily accessible to producers and suppliers in other countries.

3.5.6 Green Tick

This certificate is based in New Zealand and is also promoted in the US, Australia and to a lesser extent worldwide (GreenTick Certification Ltd., 2008). Additionally, the certificate is relatively new, having only been initiated in 2005 while certificates such as the EU Flower have been around since 1992 (Miljømærkning Danmark, 2010). The Green Tick certificate has seen limited albeit steadily growing use since its initiation. Therefore, consumer knowledge of the certificate is likely to be low in the US and Australia, somewhat higher in New Zealand and more or less non-existent in other

regions. The logo itself conveys little in the way environmental friendliness, apart from the use of the color green and the word “sustainable”, a term that is often used regarding environmentally friendly products, see Figure 14.

Figure 14 - Green Tick certificate logo (GreenTick Certification Ltd., 2008)

The certificate is based primarily around legal issues pertaining to the observance of local environmental, quality and workplace legislation. This means that the requirements for the certificate vary with the location of the producer’s facilities. This means that the use of the certificate as a standard would be easy to implement, though the varying requirements mean the value of doing so is doubtful.

3.5.7 Ecomark India

This certificate is promoted only in India and even there it is not well known (Mehta, 2006). Customer knowledge of the certificate is likely to be almost non-existent on a global scale. The certificate’s logo also does not possess sales promoting properties, not directly evoking a connection to environmental friendliness, see Figure 15.

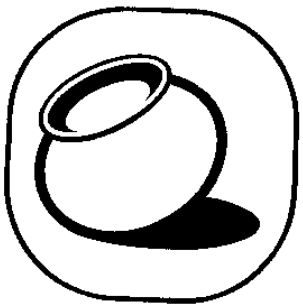


Figure 15 - Ecomark India certificate logo (Central Pollution Control Board, 2007)

The requirements types of this certificate do not originate from any other certificate directly, though some of the parameters also appear in other certificates. Additionally, some parameters and ways of measuring environmental impact are unique to this certificate. Coupled with the fact that support is only accessible through the Indian Central Pollution Control Board and the Indian Ministry for Environment and Forests, this means that it is impractical to use the certificate as a standard within the supply chain.

3.5.8 GOTS

This certificate is initiated as a cooperative effort between environmental associations from the US, Germany, Great Britain and Japan (International Working Group on Global Organic Textile Standard, 2010). As such, the certificate is promoted worldwide by its founders and more than 200 major clothing manufacturers worldwide. This means that the consumers' knowledge of the certificate is likely to be high in most regions. Additionally, the certificates logo at least partially evokes the idea of environmental responsibility through the use of the word "organic" and the color green, see Figure 16.

Figure 16 - GOTS certificate logo (International Working Group on Global Organic Textile Standard, 2010)

Due to its widespread promotion and application, as well as the fact that the certificate uses requirements from other well established certificates such as the EU Flower and ÖkoTex, the requirement types found in this certificate should be familiar to most suppliers and producers. In addition, the world-wide nature of the certificate means that suppliers and producers in most countries have access to support regarding the certificate, making the use of it for standardization more practical.

3.5.9 ÖkoTex 1000

This certificate is directly linked with the ÖkoTex 100 standard, a quality certificate that sees worldwide use (Oeko-Tex Association, 2011). As such, many of the basic requirements are similar, and thus should be known to costumers. The additional requirements for the ÖkoTex 1000 certificate are less well known, and the similarity in name of the two certificates could lead to some degree of confusion. The sales promotion value of the ÖkoTex 1000 certificate is likely to be no greater than the less demanding ÖkoTex 100 certificate. Finally, the logo of the certificate directly states that the product is environmentally friendly and uses an image of a butterfly as a visual representation of environmental awareness, see Figure 17

Figure 17 - ÖkoTex 1000 certificate logo (Oeko-Tex Association, 2011)

As the certificate builds on the widely used ÖkoTex 100 certificate, many of the product related requirements should be familiar to suppliers and producers. Meanwhile, the facility related requirements are specific to the ÖkoTex 1000 certificate, and might therefore be new to many producers and suppliers. Due to the international nature of the Oeko-Tex Association, support is available in over 50 countries (Oeko-Tex Association, 2011).

3.5.10 IVN

This certificate is promoted primarily in Germany and to a lesser degree in countries such as Belgium and the Netherlands (International Association of Natural Textile Industry , 2011). As a result, customer knowledge of the certificates is consigned to these regions. This appears to be by choice, as IVN is one of the participants in the GOTS environmental certificate, which has a more international focus. By only promoting the IVN certificate in Germany, where it is already well established, competition with the GOTS certificate is largely avoided in other countries. Additionally, the logo of the IVN certificate does not directly evoke the idea of environmental friendliness, apart from using the word “naturtextil”, see Figure 18.

Figure 18 - IVN certificate logo (International Association of Natural Textile Industry , 2011)

Several of the requirement types found in the IVN certificate also appear in certificates such as the EU Flower and ÖkoTex 100. Most requirements are formulated rather uniquely, for example by listing what methods are allowed, rather than what methods are not as is done in all other certificates examined so far. This means that producers and suppliers are unlikely to have encountered similar restriction types, increasing the need for support if the certificate is to be

applied as a standard. As IVN only has offices in Germany, access to such support is difficult for companies not based in this region.

3.5.11 Thai Green Label

This certificate is mainly promoted in Thailand as being the first and, so far, the only Thai environmental certificate (Thailand Environment Institute, 2011). As such, customer knowledge of the certificate is likely to be low in all other regions. The logo of the certificate is evocative of environmental issues, through the use of the color green combined with a flower and bird motif over a globe, see Figure 19.

Figure 19 - Thai Green Label certificate logo (Thailand Environment Institute, 2011)

The Thai Green Label certificate contains requirements that use parameters that are found in a majority of environmental certificates. As such, the requirement types should be familiar to most producers and suppliers, though the fact that the certificate is not present in countries other than Thailand means that support can be hard to access.

3.5.12 Ecomark Japan

This certificate is exclusively promoted in Japan (Japan Environment Association, 2007), and is as a consequence only known to consumers in that specific region, with consumer knowledge of the certificate being low in other regions. The logo of the certificate does not specifically evoke a connection to environmental awareness, see Figure 20.

Figure 20 - Ecomark Japan certificate logo (Japan Environment Association, 2007)

Most of the parameters used for requirements in this certificate, are drawn from other certificates such as the EU Flower, though some are specific to the Ecomark Japan certificate, and likely reflect the unique Japanese policies regarding the environment, especially concerning waste and packaging. As the certificate is solely used in Japan, support is difficult to access for suppliers and producers in other regions.

3.5.13 Environmental Choice New Zealand

This certificate is the primary environmental certificate in New Zealand, created and promoted by the New Zealand government (ECNZ, 2010). As such, it has a high degree of customer knowledge regarding the certificate in that country, though the lack of international promotion means that customer knowledge in other countries is likely to be low. The certificate logo is similar to that of the Good Environmental Choice Australia certificate, and communicates the environmental nature of the certificate to consumers able to read English. Meanwhile, the lack of a symbolic representation apart from a green globe, see Figure 21, means that other customers are not likely to associate the logo with environmental awareness.

Figure 21 - ECNZ certificate logo (ECNZ, 2010)

Like the Good Environmental Choice Australia certificate, the Environmental Choice New Zealand certificate uses many of the requirements found in the EU Flower and ÖkoTex 100, often word-for-word. This means that the requirement types found in the certificate are likely to be familiar to a large amount of producers and suppliers. Meanwhile, like its Australian counterpart, this certificate offers no international support, meaning companies in other countries may have difficulty using the certificate as a standard.

3.5.14 SMaRT

This certificate is promoted world-wide, though it has so far only been used for construction materials and textiles used for furniture and carpets (MTS, 2008). As such, consumer knowledge of

the certificate is likely to be low across all regions. At the same time, the certificates logo does not evoke environmental friendliness apart from some use of the color green, as seen in Figure 22.

Figure 22 - SMaRT certificate logo (MTS, 2008)

The requirement types found in this certificate largely correspond to those found in major certificates such as the EU Flower and Cradle-to-Cradle, though the methods of measurement often differ. As such, suppliers and producers are likely to be familiar with the types of requirements found in the certificate, though they may need support in order to adopt new measuring methods. Support is available world-wide through certified auditors such as Ernest & Young and Redstone Global, making use of the certificate as a standard easier.

3.5.15 Bra Miljöval

This certificate is created and managed by the Swedish Society for Nature Conservation (Swedish Society for Nature Conservation, 2010). It is primarily promoted towards Swedish consumers, though it has been used in the rest of Scandinavia as well. As such, consumer knowledge of the certificate is likely to be high in Sweden, low in the rest of Scandinavia and more or less non-existent in the rest of the world. The certificate's logo somewhat evokes the idea of an environmental certificate through the use of the color green and the depiction of a falcon, see Figure 23.

Figure 23 - Bra Miljöval certificate logo (Swedish Society for Nature Conservation, 2010)

The requirements in the certificate are based on a wide range of other certificates as well as original research, though the specific requirements almost always ban substances outright instead of imposing a content limit. The requirements might not be familiar to producers and suppliers, but should be simple to communicate due to not requiring that specific measurement types be used. As the certificate is based solely in Sweden, access to support for companies in the rest of the world is limited.

3.5.16 Comparison of certificates

Following the description of the individual certificates, they must now be compared to each other to determine if some are more preferable than other. For the sales promotion aspect, worldwide consumer knowledge of the certificate is compared, due to its impact on environmentally focused consumers who care about what a given certificate stands for in terms of requirements. For less environmentally focused consumers, the ability of the certificates logo to communicate environmental friendliness is compared, as this helps less environmentally focuses customers identify the product as being environmentally friendly at a glance.

For the standardization aspect, the likely familiarity of partners and suppliers with the types of requirements found in the certificate is compared. This could either be based on the certificate itself being well known, or from the certificate containing requirements also found in other, more well-known certificates. In addition, the availability of support is compared for those suppliers and producers who would have to apply the certificate in order for it to be used as a standard throughout the supply chain. This is due to more potential providers of support, either in the form of regional offices, licensed certifiers or licensed auditors, making it easier for any difficulties in implementing the certificate to be resolved, regardless of the geographical location of the producer or supplier.

In order to properly evaluate the certificates in relation to each other, a rating system needs to be set for each issue. This is, in essence, a numerical representation of the performance of a given certificate relative to the ideal, see Figure 24.

Rating	**Criteria**			
	Consumer knowledge	Logo	Requirements	Support
1	Not well known in any country	No use of environmental symbols, terms or the color green.	All unique to certificate or very vague	Only access in a single country
2	Well known in one country only	Use of either environmental terms or the color green	Most unique to certificate or vague	Limited access in multiple countries
3	Well known in one of Asia, Europe or North America	Use of environmental symbols and the color green	Most are either typical requirements, or are well defined	Good access in multiple countries
4	Well known in two of Asia, Europe or North America	Use of environmental terms and the color green	Most are typical environmental requirements and are well defined	Limited access world wide

5	Well known in both Asia, Europe and North America	Use of both environmental symbols, terms and the color green	All are typical environmental requirements and are well defined	Good access world wide

Figure 24 - Rating system for incentives

The rating system is then used to get an idea of the relative performance of the certificates using this evaluation metric, see Figure 25.

Certificate	Sales promotion		Standardization		Sum
	Consumer knowledge	Logo	Requirements	Support	
EU Flower	3	5	5	5	18
Nordic Swan	3	3	4	3	13
Cradle-to-Cradle	5	2	2	5	14
SCS EPP	1	2	1	4	8
GECA	2	5	4	1	12
Green Tick	2	4	5	2	13
Ecomark India	1	1	3	1	6
GOTS	5	4	4	5	18
ÖkoTex 1000	4	5	4	5	18
IVN	2	2	2	1	7
Thai Green Label	2	5	4	1	12
Ecomark Japan	2	1	4	1	8
ECNZ	2	4	4	1	11
SMaRT	1	2	4	4	11
Bra Miljöval	2	3	4	1	10

Figure 25 - Incentive ratings

To sort the certificates based on these ratings, the upper and lower limits for the standard deviation are calculated using the typical formula for empirical standard deviation, see Figure 26.

$$\hat{\sigma} = s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

Figure 26 - Formula for empirical standard deviation

It then becomes apparent that three certificates emerge as being preferable based on their ability to increase sales and be used for standardization in the supply chain; the EU Flower, GOTS and ÖkoTex 1000. It also becomes apparent that several of the certificates are very poorly suited according to this metric, these include; SCS EPP, Ecomark India, IVN and Ecomark Japan.

3.6 Step 5 - Organization

As became evident in the case of the Cradle-to-Cradle certificate, the organizations involved in the management of a certificate can have a significant impact on the desirability of the certificate. As such, an organizational analysis is performed on each certificate in order to determine how the criteria contained in the certificate are created and modified, how certification of companies and products is performed, as well as whether subsequent auditing is performed to verify that companies or products continue to fulfill the criteria of the certificate.

3.6.1 EU Flower

This implementation of this certificate at the EU-level is overseen by the EU-commission in order to assure that the label is tied-in correctly with national legislation in the member countries (European Commission, 2011). Criteria are formulated by panels of experts and stakeholders from industry groups, consumer groups and other NGO's. These criteria are then approved by the European Union Ecolabeling Board, which consists of representatives from the government of each member states and the organizations authorized to award the EU Flower certificate.

Certification is performed by independent bodies awarded the right to certify according to the current EU Flower criteria by the European Union Ecolabeling Board. A certificate lasts until the relevant criteria are updated or expire, which usually takes 3-4 years. In this period, the certifying organization performs audits to ensure continued compliance with the criteria of the certificate. These audits can take the form of visits to the production facilities where the certified products are manufactured, or the purchase and testing of certified products (Miljømærkning Danmark, 2010).

3.6.2 Nordic Swan

Criteria for this certificate are formulated by the organizations responsible for awarding the certificate in each member country, with the member countries being Denmark, Sweden, Norway, Finland and Iceland. Once the criteria have been formulated, they are evaluated and approved by the Nordic Board, which is composed of representatives from the certifying organizations in each member country.

Certification is performed at the national level by the responsible organization and can then be extended to all member countries without additional testing, though a fee must be paid for each country. Like with the EU Flower, the certificate lasts 3-4 years until the relevant criteria are updated or expire. Likewise, the certifying organization performs audits in the form of visits to the production facilities where the certified products are manufactured, or the purchase and testing of certified

products (Miljømærkning Danmark, 2010), to ensure continued compliance with the criteria of the certificate.

3.6.3 Cradle-to-Cradle

The criteria for this certificate are created by the company McDonough Braungart Design Chemistry (MBDC). The company is owned and run by Michael Braungart and William McDonough, the creators of the Cradle-to-Cradle concept on which the certificate is based (MBDC, 2011). While the certificate is founded on the ideas of the original Cradle-to-Cradle concept, concessions have been made to create a more traditional certification model composed of tiers of increasing environmental performance.

Certification is performed by either MBDC or the Environmental Protection and Encouragement Agency (EPEA), a company founded and run by Michael Braungart. The certificate lasts a year, after which the product must be re-certified. If no changes have been made to the product composition, then re-certification is purely and administrative matter, while any changes in composition require that the product be reevaluated to ensure it still fulfills the relevant criteria. No auditing is performed, and the certifying organizations rely fully on the credibility of the company seeking certification, as no control is done of the data provided by the company (MBDC, 2011).

3.6.4 SCS Environmentally Preferable Product

This certificate does not use criteria in the traditional sense, as all products are compared to a representative selection of similar products to determine if the product is the most environmentally friendly product of their type (Scientific Certification Systems, 2011). What parameters are measured to evaluate this and which products constitute a representative selection of similar products, is decided through multi-stakeholder consensus led by SCS. Once the parameters of evaluation and the selection of products to be compared have been determined, the testing and certification is performed by one of SCS's facilities.

3.6.5 Good Environmental Choice Australia

The criteria for this certificate are developed by Good Environmental Choice Australia (GECA), a non-profit organization dedicated to the promotion of environmentally friendly products (Good Environmental Choice Australia Ltd., 2011). The criteria are developed based on other major environmental certificates such as the EU Flower, with input from published scientific research, environmental performance reviews, lifecycle-assessments and original research by GECA. The Standards Development Committee of GECA selects candidates from the scientific community, environmental groups as well as the relevant industry to work on the individual standard for each product type. In addition, GECA often contributes its own staff to help facilitate the development process.

Certification and the subsequent auditing to ensure continued compliance with the criteria of the GECA certificate, is performed by independent auditing companies. Currently, only two such companies are authorized to award the certificate, though efforts are being made to make more auditing companies able to award the certificate.

3.6.6 Green Tick

Unlike other certificates, the criteria in the Green Tick certificate are centered on the amount of complaints the company receives from a number of sources and how it deals with such complaints, no real development of criteria takes place (GreenTick Certification Ltd., 2008). Instead the guidelines on what constitutes reasonable handling of complaints are developed by Green Tick Certification Ltd., an independent certification company. These guidelines are then used by independent auditors based in New Zealand, Australia and the US to determine whether a given company can be certified, and if any future complaints make it necessary to revoke the certification.

3.6.7 Ecomark India

This certificate is a result of a combined effort by the Indian government, industry groups and the Bureau of Indian Standards (BIS) to create a national certificate to clearly mark products that are environmentally friendly (Central Pollution Control Board, 2007). The certificate is primarily administrated by the Central Pollution Control Board (CPCB), a part of the Indian Ministry of Environment and Forests. As such, the overall strategy of environmental certification is decided by the ministry, while the CPCB oversees the formulation of criteria and measurement methods. Testing and certification is performed by the BIS according to the established criteria and methods. In addition, BIS also handles auditing which is done at regular intervals at their discretion.

3.6.8 GOTS

The criteria of the GOTS certificate are created by the International Working Group on GOTS (IWG), which is a joint venture between the German IVN, the British Soil Association, the American Organic Trade Association and the Japan Overseas Cooperative Association (International Working Group on Global Organic Textile Standard, 2010). Development and modification of criteria is performed by a technical committee consisting of one member from each organization.

Certification and auditing is performed by so-called Certification Bodies, which are independent companies licensed to perform the necessary testing for the GOTS certificate, and award the certificate if the tests are passed. Auditing is performed through on-site inspections and residue testing of certified products. Both these procedures are done according to the guidelines supplied by GOTS, though some degree of freedom is given in regard to the timing of such procedures.

3.6.9 ÖkoTex 1000

The ÖkoTex 1000 certificate is, like the ÖkoTex 100 certificate, developed and maintained by the International Oeko-Tex Association, which consists of 15 research and test institutes located in Europe and Japan (Oeko-Tex Association, 2011). The institutes that make up the association individually handle testing, certification and auditing for clients according to the criteria determined by the association as a whole. In addition, the International Oeko-Tex Association has representative agencies and contact offices located worldwide to provide close contact with clients.

3.6.10 IVN

The criteria of the certificate are developed by a technical committee within the International Association of Natural Textile Industry (IVN). This association consists of a variety of member companies and interest groups, all with the common goal of providing customers with environmentally friendly products (International Association of Natural Textile Industry , 2011). The technical committee is supervised by a board of directors, which approve the criteria developed by the committee.

Certification according to the established requirements is handled by the regulatory committee of IVN, who also handle subsequent control of certified producers through inspections and testing of certified products.

3.6.11 Thai Green Label

This certificate is managed by a board of representatives, with members from a wide range of government institutions, industry organizations and other interested parties in Thailand (Thailand Environment Institute, 2011). The criteria for the certificate are developed and updated by a technical subcommittee consisting of specialists on the subject of the criteria currently being worked on.

Certification is performed by the Thailand Environmental Institute (TEI), in cooperation with the Thai Industrial Standards Institute (TISI). As such, some tests are performed at TISI, with TEI performing other tests and evaluating the combined results. Subsequent audits are performed by TISI to ensure that the certified products remain within the limits set in the criteria.

3.6.12 Ecomark Japan

The Ecomark Japan certificate is developed by the Japan Environment Association (JEA), which is a certification company working with the Japanese Ministry of the Environment (Japan Environment

Association, 2007). As such, all criteria of the certificate are developed by JEA with input from the ministry regarding certain product types that should be avoided in certified products. Certification according to these criteria is performed by JEA itself or one of their partners in Korea, Thailand, Taiwan or New Zealand. Likewise, auditing is performed by the certifying company.

3.6.13 Environmental Choice New Zealand

The criteria in this certificate are developed and updated by Environmental Choice, which is a non-profit certification company fully owned by the New Zealand government. As such, the overall direction of the requirements found in the certificate is largely decided by the New Zealand Ministry for the Environment. Certification according to the criteria established by Environmental Choice is performed by select third party companies which handle all testing, certification and auditing.

3.6.14 SMaRT

The SMaRT environmental certificate is owned and administrated by the Institute for Market Transformation to Sustainability (MTS). MTS develops the criteria for the certificate based on other leading environmental standards, publicized scientific research into the effect of products and production on the environment and original research by MTS (MTS, 2008). All certification is performed by MTS, based on testing performed by third party laboratories. Auditing is performed by two main auditors; the Ernest & Young Global Sustainability Auditing Group and Redstone Global Auditing.

3.6.15 Bra Miljöval

This certificate is managed by the Swedish Society for Nature Conservation (SSNC), an independent interest group working to improve environmental awareness and protect the environment (Swedish Society for Nature Conservation, 2010). The criteria for the certificate are developed by a panel of experts, after which industry groups, trade associations and the Swedish government provides input for the criteria based on their individual knowledge and interests. Finally, the revised criteria are approved and implemented by the SSNC. The certification process consists mainly of a declaration of conformity with the established criteria of a given product. Following this, inspections are performed by the SSNC based on random sampling. Additional inspections may be performed in the event that the SSNC have reason to suspect a product does not fulfill the requirements of the certificate.

3.6.16 Certificate comparison

In order to evaluate the different certificates according to the organizational structure that surrounds them, a rating system must be created. The three main areas of interest are the developers of the criteria, the certification process and the following auditing.

In order to discern what, if any, effects the different organizational constellations for certificates have, it is necessary to attempt to predict the behavior of the individual participants in the certification process. As the exact motives of the participants are unknowable, it is assumed that each of them always acts in their own interest. This is also known as rational action theory and is a common assumption used for predicting the behavior of organizations, even though several critics point out that the decisions are more often than not irrational, as the organization does not have the complete knowledge necessary to always make rational decisions. However, accounting for irrational decisions due to incomplete information is exceedingly difficult, making the assumption of rationality and self-interest a necessary step in establishing the natural disposition of organizations.

If the developers of the criteria have a direct financial interest in the number of certificates sold, then it stands to reason that this creates a conflicting interest with limiting certification solely to those products that are especially environmentally friendly. Likewise, if the developers of the criteria have an indirect financial interest in the number of certificates sold, like for instance a government benefitting from the increased industry growth resulting from the use of environmental certification, then this also creates a conflicting interest with ensuring the environmental friendliness of the individual company. Indirect financial interest might also occur where financially affected parties such as companies are indirectly involved in the creation of criteria through participation in the board creating the criteria.

Based on these considerations, a rating system is created in order to compare the individual certificates based on the organizations involved in their management. The constructed rating system is seen in Figure 27.

Score	Developers of criteria	Certification	Auditing
1	Direct financial interest	No control of supplied information	Certifier auditing
2	Indirect financial interest	Single certifier charged with checking supplied information	Single third party auditor
3	No financial interest	Multiple certifiers charged with checking supplied information	Multiple third party auditors

Figure 27 - Rating system for organizations

Using the created rating system, the certificates are then evaluated and a summarized score is assigned to each certificate, see Figure 28.

	Developers of criteria	Certification	Auditing	Sum
EU Flower	2	3	1	6
Nordic Swan	1	3	1	5
Cradle-to-Cradle	1	1	1	3
SCS EPP	1	2	1	4
GECA	3	3	1	7

Green Tick	1	3	1	5
Ecomark India	2	2	1	5
GOTS	2	3	1	6
ÖkoTex 1000	1	3	1	5
IVN	2	2	1	5
Thai Green Label	2	2	1	5
Ecomark Japan	1	3	1	5
ECNZ	2	3	1	6
SMaRT	1	2	3	6
Bra Miljöval	3	1	2	6

Figure 28 - Organization scores

As in the previous examination of the incentives of each certificate, the upper and lower bounds of the standard deviation are calculated using the formula for empirical standard deviation. It is then seen that there is a large similarity between most certifiers, with the only positive outlier being GECA and the only negative outliers being Cradle-to-Cradle and SCS Environmentally Preferable Products.

3.7 Step 6 - Selection

On the basis of the evaluations performed in the previous steps, it is now necessary to select the preferable certificates suitable for the LEGO Group and their products. As the requirements step was only completed for plastic toys with textile and electronic components, only a certificate for this product type will be selected. In order to compare the certificates, they are each assigned a score based on their performance in the previous three steps of the evaluation process. Due to the primary purpose of certification being to increase sales, and the secondary reason being to establish a benchmark of company environmental performance compared to competitor, it is preferable to select a certificate with a level of requirements close to current performance, combined with favorable incentives and organizational suitability. This is reflected in the way certificates are scored based on the previous steps, see Figure 29. After this, the final score of each certificate is calculated, see Figure 30.

Score	Requirements	Incentives	Organization
1	High effort	Below average	Below average
2	No effort	Average	Average
3	Low effort	Above average	Above average

Figure 29 - Selection scoring model

	Nordic Swan	Cradle-to-Cradle	GECA	Green Tick	SCS - EPP
Requirements	1	1	1	2	3
Incentives	2	2	2	2	1
Organization	2	1	3	2	1
Total	5	4	6	6	5

Figure 30 - Final scores for plastic toy products

As the result of the evaluation process constructed in cooperation with the LEGO Group, it is seen that the most suitable certificates are Good Environmental Choice Australia and Green Tick. It is therefore recommended that the company's future efforts with regard to environmental certification of their core product be focused on these two certificates.

4 Phase 2 - Examination of theoretical foundation for method

In order to develop a fully defined evaluation process for environmental certificates from current practice, it is necessary to investigate whether there is a valid theoretical basis for the aspects of a certificate that are currently considered important. As such, each step of the evaluation process is broken down into the core assumptions it is based on, with each assumption being sought either confirmed or denied by existing studies.

4.1 Step 1 - Scope

The core assumptions made in the first step of the evaluation process are that multiple purposes for environmental certification exist and that depending on the purpose, a company will approach certification in a different manner.

Regarding the first assumption, that there are multiple reasons why a company would want to acquire environmental certification for its products, two main studies prove relevant. In the first study (Nakamura, et al., 2001) a complex statistical model is created in order to determine what factors influence the adoption of the ISO 14000 environmental management standard among Japanese manufacturing companies. The study creates two classes of models in order to explain four core variables. In the first model class, it is assumed that companies are focused on profit maximization, and the core variables that are examined with regards to their influence of seeking environmental certification are therefore related to the costs and benefits that accrue from the particular level of environmental commitment.

In the second model class, it is assumed that the companies are focused on utility maximization where the focus is on having good environmental performance. As such, the factors that are included in the model vary from company size, debt ratio and export ratio to advertising expenditures, average employee age and control beliefs. The study finds that there are companies that fit within both model classes, with the majority being motivated by utility maximization rather than profit maximization.

Similarly, a study researching what induces company ecological responses found that there were multiple motivational and contextual factors (Bansal, et al., 2000). Through the application of analytical induction to data from 53 companies in the United Kingdom and Japan, it was determined that there were three primary motivational factors for company ecological responses; competitiveness, legitimization and environmental responsibility. Similarly, it was determined that there were three contextual factors affecting company ecological responses in the form of field cohesion, issue salience and individual concern for the environment. Finally, a study into the factors that determine the adoption of environmental certificates as a marketing tool concludes that at least 14 pressure factors exist that exert varying degree of influence (Mera, et al., 2004). The study concludes that the most prominent factors are environmental commitment, the pursuit of environmental excellence and pressure from customers. In all, the initial assumption, that there are

multiple purposes for seeking environmental certificate, is found to be supported by a variety of existing studies.

The second assumption, that companies will approach environmental certification differently depending on their motivation, is based on the rudimentary notion in behavioral science that behavior is directly influenced by motivation (Deci, et al., 1985). This notion is naturally relatable to most people, as the concept of changing one's behavior to better fulfill one's needs is an easy one to grasp. Slightly more complicated is the application of behavioral science to the social constructs that companies represent (Hersey, et al., 2000). As the motivation of employees is not always the same as that of the company's management, the behavior of the company can at times seem erratic considering its stated motivation. However, companies will at least formally try to behave according to their motivation, in much the same way as a person might. As such, it is found that the assumption of company motivation influencing behavior with regards to certification is supported by general behavioral theory.

4.2 Step 2 - Overview

As the generation of an overview of the relevant environmental certificates is done through a web-based search, it is a core assumption of this step that the majority of environmental certificates have an internet presence, as the search process would otherwise provide incomplete data at a crucial point in the selection process.

No studies have been done of the use of websites by organizations offering environmental certification specifically. As such, it is necessary to look at more broad studies of the use of websites by companies in general. According to a survey done by Barlow Research in September 2008, 49% of small businesses in North America had a website at that time, with a further 13% planning to implement a website within the next year (Campbell, 2009). A similar survey, done by Vistaprint in December 2009, estimates that 38% of small businesses in North America had a website at that time, with a further 33% working on implementing a website (Vistaprint and Hawk Partners, 2009). Surveys in Europe yield similar results, with a survey done by the British Office for National Statistics in 2005 showing that 70% of British companies had a website (Office for National Statistics, 2005).

Though the North American surveys only look at the use of websites among small businesses, the survey by Barlow Research shows that the likelihood of companies having websites is proportional to the company's revenue (Campbell, 2009). This, along with the substantially higher percentage of companies with websites found in the British survey, where companies of all sizes were included (Office for National Statistics, 2005), supports the notion that nearly all large companies, the majority of medium size and around half of small companies have a website. The assumption that a web-based search can provide a reasonably complete overview of environmental certificates is found to be supported by existing studies, as long as government bodies and non-profit organizations do not show substantially reduced use of websites compared to for-profit companies.

4.3 Step 3 - Requirements

The only initial assumptions of the requirements step were that the criteria or values for different environmental certificates would different, and that each criterion represented an approximately equal effort on the part of the company to accommodate. The first assumption was easily validated through the case study, as a variety of criteria was found for each environmental certificate, with only partial overlap.

The second assumption proved more troubling. During the evaluation of criteria against current performance, the LEGO Group noted that some criteria would be excessively hard to fulfill, while others represented relatively minor adjustments in material composition or simply required minor administrative changes. An example is the SCS-EPP environmental certificate, where instead of multiple requirements, there was the single, complex requirement of being more environmentally friendly than the average competing product. This problem is also noted in a study dealing with systematic comparison of advanced environmental requirements to current performance (Houe, et al., 2007). In addition, some requirements contain subjective components such as “reasonable measures”, “sufficient efficiency” and “as much as possible” (GreenTick Certification Ltd., 2008) (Scientific Certification Systems, 2011). As such, the assumption of all criteria requiring equal effort to fulfill is found to be false.

4.4 Step 4 - Incentives

The incentives step is based on four main assumptions; that consumer knowledge of a certificate and the logo of a certificate affect consumer behavior, and that familiarity with requirements and the availability of local support influences adoption of a certificate among license partners and suppliers.

The first assumption, that consumer knowledge of a certificate affects consumer behavior, is tackled in a study from 2010 (Thøgersen, et al., 2010). In this study, a mall-intercept survey is conducted to study the early adoption of a new environmental certificate on the Danish market. The certificate in question is the MSC certificate for sustainable fishery. The study finds that customer use of an environmental certificate is affected by the consumer’s general environmental awareness, past experiences with environmentally certified products and trust in the certificate.

While the first two factors are can be influenced over time by the company making use of a given environmental certificate through marketing, the issue of trust in the certificate can be addressed in the process of selecting a certificate. The importance of the credibility or reputation of an environmental certificate is also supported by an article (Nadaï, 2007), where it is argued that consumers are in most cases unable to evaluate the effect of a given environmental certificate, even when provided with detailed descriptions of the requirements of the certificate. Therefore, the credibility of an environmental certificate becomes paramount with regard to consumer perception. It is found that the first assumption is flawed in that it is not the consumer’s knowledge of the

contents of a certificate that affects its effectiveness, but rather the consumer's explicit trust in the certificate.

The second assumption made in the incentives step, that the logo of an environmental certificate influences consumer behavior, is covered by two studies focusing specifically on environmental certificates. The first study (Chow, 2002), is based on a broad survey where four fictional environmental certificate logos were presented to participants in a simulated shopping situation. It was concluded that both visual and text-based cues in the logos significantly affected the perception of the participants regarding the certificates function and credibility. The second study on the effect of environmental certificate logos was done using much the same method in the first study (Tang, et al., 2004). This time, the study was performed on a simulated web-based shopping experience, with participants being presented with four different environmental logos. The study concluded that, like the previous study (Chow, 2002), visual and verbal communication in an environmental certificate logo had significant individual and additive effects on the consumer's desire to purchase specific products. Based on these studies, it is found that the assumption of logos having an impact on consumer behavior is supported by existing studies and that it has a significant impact on customer behavior.

The third assumption, regarding that license partners and suppliers are likely to prefer familiar requirements to unfamiliar ones, is based on the notion that people in general are more comfortable with familiarity. This tendency is well known within environmentally concerned production, where individuals or organizations not used to taking advanced environmental concerns into account can resist the implementation of measures addressing these (Lockwood, 2006). Together with studies in change management into reactions to change, which show that radical changes meet much greater resistance than minor changes (Huy, 1999), it can be concluded that both prior knowledge of new environmental requirements and the severity of such requirements are likely to affect the degree of resistance met from suppliers and license partners. As requirement severity for environmental certificates is already a parameter, the assumption of requirement familiarity affecting suppliers and license partners is not changed.

The fourth and final assumption, that the availability of localized support was preferable to a centralized support service, was based on the notion that local support offices would be able to provide superior services due to proximity to the customer. This is, however, only half of a debate that has evolved as more and more companies adopt the practice of call-centers, centralized customer support facilities providing world wide support from a single geographical location. The debate centers on the balancing of centralized efficiency versus unique local needs that cannot be met by a centralized support center (Voloudakis, 2010). Additionally, a study on the use of call centers in Australia suggests that overall customer satisfaction may suffer from the use of call centers (Bennington, et al., 2000). As such, it is determined that while the assumption of localized support being preferable is true, though it is likely that centralized support will result in lower costs.

4.5 Step 5 - Organizations

The evaluation of the organizations involved in each environmental certificate is based on three main assumptions; that companies always try to increase profit, that independence of auditors from certifiers increase certificate validity and that the presence of multiple providers of a service leads to lower prices and better service.

The first assumption, that organizations will always act in their own self-interest, is made in order to predict how organizations will affect the validity and cost of an environmental certificate based on their incentives for doing so. This assumption is similar to the assumption of super rationality in economics, where it is assumed that all entities always make optimal decisions for their own gain (Hammond, 2001). While the assumption of rationality is used to some degree in multiple circumstances, there is some debate regarding the accuracy of such an assumption. Critics point out that isolated decisions made by companies or individuals are mostly irrational (Brunsson, 1982), due to hidden motives, incomplete information or flawed logic. As such, the assumption of rationality may be of use in simplifying complex decision making processes, but it provides an incomplete understanding of how decisions are actually made and as such cannot be used to accurately predict them.

Meanwhile, a study in customer behavior showed that greater trust was placed in organizations without a direct interest in the product being sold (Wiener, et al., 1986). Therefore, it is found that while the assumption of organizations always acting in their own self-interest is not objectively true, other organizations and consumers perceive it as being true. As such, the false assumption of organization self-interest can be substituted for the true assumption that organizations are perceived by customers as acting in their own self-interest whenever possible.

The second assumption made in the organization evaluation step was that the independence of certifiers from the developers of criteria. As was mentioned previously , the credibility of an organization increases when it has no direct economic interest in a subject, it follows naturally that a separation of the certification function from criteria creation function increases credibility. If certification and criteria creation is performed by the same company, that company would have an increased interest in reducing the difficulty of the criteria, as the company would not only earn a licensing fee for use of the certificate, but would also be paid for the certification procedure.

This concern extends to the auditors as well. In cases where the certification and auditing is performed by the same company, the company would benefit directly from issuing the certificate, as the future sale of auditing services is dependent on the certificate being awarded. Likewise, if the auditing and criteria creation functions are performed by the same company, then the company will have an interest in making criteria that are sufficiently lenient so that a large number of companies are certified and thus need auditing. There is also the inherent economic interest of auditing companies, where the each audit that results in a company or product being deemed unfit to carry a

certificate, directly influences the number of companies needing auditing in the future. This inherent problem cannot, however, be addressed through auditor independence or lack thereof.

The third and final assumption of the organization evaluation step was that the presence of multiple providers of either certification or auditing would lead to lower prices and better service. This assumption is based on the basic free market model where price is determined by supply and demand (Besanko, et al., 2004). While this model is well known and has been proven true for a variety of products, a different study suggests that due to the economics of scale of testing products against complex requirements, the natural state of certification is a monopoly (Strausz, 2005). This is primarily due to the lack of product development in the case of testing, as the "product", in the form of a set of tests against pre-determined criteria, cannot be changed by the company in charge of testing. The content of the "product" is fully dependent on the criteria contained in a given certificate, given that the methods of testing are non-negotiable. As such, the only way to increase profitability is through increased efficiency, which is aided immensely by economics of scale. It is therefore concluded that the assumption of multiple providers of certification and auditing reducing prices and improving service is not entirely true, as prices increase with a large numbers of suppliers due to lack of economics of scale.

It is found that theory suggests the lowest price is obtained when there is only a single provider of certification or auditing. This is similar to the debate of sole sourcing versus parallel sourcing. The advocates of sole sourcing argue that having a single supplier of a given component provides superior benefits due to economics of scale and bulk-purchasing (Larson, et al., 1998), while advocates of parallel sourcing argue that having multiple suppliers of the same component ensures better supplier performance, which outweighs the economic benefits of sole sourcing (Richardson, et al., 1995). Similarly, having multiple providers of certification or auditing increases prices due to inability to make use of economics of scale. At the same time, supplier performance becomes more reliable, as the providers compete amongst each other to attract customers. It is therefore determined that the original assumption that multiple providers are preferable to a single provider is not completely true. Instead, it is determined that small numbers of providers are preferable, as this maximizes economics of scale. At the same time, it is worth noting that this benefit is lost when there is only a single provider, due to a lack of competition allowing prices to rise.

4.6 Revision of method

Based on the new data collected through the theory study, the method developed in the case study must be revised in order to develop the optimal evaluation process for selecting an environmental certificate to be used by the LEGO Group. Overall, the process retains the structure used in the case study, as seen in Figure 31.

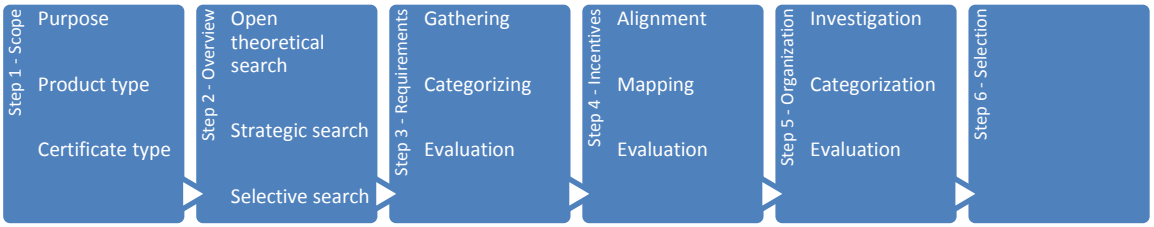


Figure 31 - Process structure from case study

The first step of the evaluation process is left largely unchanged. This is where the scope of the process is determined by specifying what the purpose of certification is, what products are to carry the certificate and what type of certificate is desired. Once these parameters have been established, the second step of the evaluation process, the establishing of an overview of available environmental certificates, is initiated. This is done through a three phased, web-based search process, as seen in Figure 32

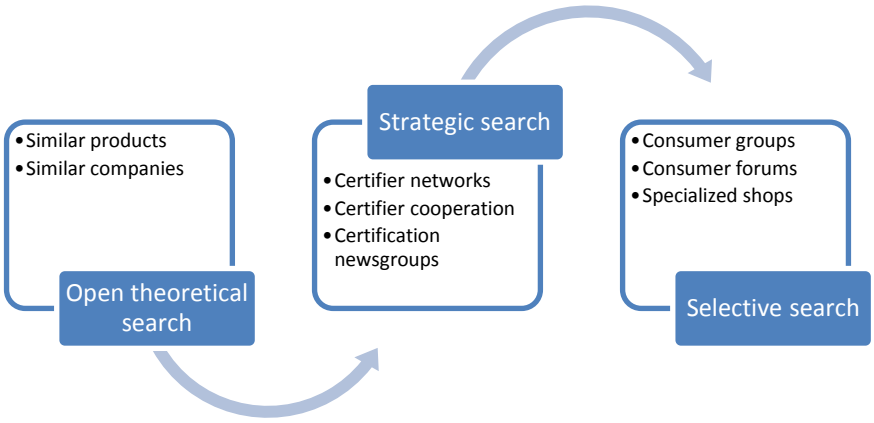


Figure 32 - Search process from case study

First, an open theoretical search is performed where the focus is on where it is most likely that relevant certificates would be found. Products similar to those that are to be certified are searched for certificates, along with the companies producing such products. Second, a strategic search is performed where the already found certificates are used as a starting point for discovering new certificates. This is done by looking at certifier networks, cooperation between already known certificates and previously unknown certificates and certification newsgroups which are found by using the already confirmed certificates as keywords in a search. Finally, a selective search is performed where keywords from the already found certificates are used in a broad Boolean search.

In the third step of selection process, as seen in Figure 31, the requirements or criteria of each of the certificates found during the second step are identified and gathered in a format that facilitates comparison with current performance, as shown in Figure 33. For each individual requirement or criteria that the company does not currently fulfill, it is assigned a difficulty rating based on the estimated amount of effort and resources it would take to fulfill that requirement. The rating model is seen in Figure 34. Any certificate that has a requirement or a criterion that is awarded an X-rating

is eliminated from further considerations, as the adoption of this certificate goes beyond the acceptable budget for certification. The certificates are then divided into three categories; those with no effort required to implement, those with low effort required and those with high effort required.

	Certificate A		…	Certificate Y		Current performance
Requirement 1	Requirement 1A	Difficulty of 1A	…	Requirement 1Y	Difficulty of 1A	Current 1
Requirement 2	Requirement 2A	Difficulty of 2A	…	Requirement 2Y	Difficulty of 2A	Current 2
…	…	…	…	…	…	…
Requirement X	Requirement XA	Difficulty of XA	…	Requirement XY	Difficulty of XA	Current X
Estimated difficulty of implementation	Sum of difficulty 1A-XA		…	Sum of difficulty 1Y-XY		

Figure 33 - Revised requirement evaluation model

Difficulty	Value
Requires no adjustment of existing operations	0
Requires minor changes in existing operations	1
Requires major changes in existing operations	2
Requires minor investments in new capabilities	3
Requires significant investments in new capabilities	4
Requires investments above budget limit	X

Figure 34 - Difficulty rating model

As the fourth step of the evaluation process, the incentives for adopting the found certificates are evaluated. This is accomplished by first identifying the parameters relevant to the purpose of obtaining certification in order to properly align the process with the intended areas of examination. Through the case study and the theory study, it was found that there were four important incentives for the LEGO Group; consumer trust, logo communicability, familiar requirements and availability of support. Each certificate is therefore analyzed with regards to what level of incentives is provided and rated using the model seen in Figure 35. Following this analysis, the average score of the certificates is calculated along with the standard deviation. Certificates are divided into three groups; those scoring below average, those with an average score and those scoring above average.

Rating	Criteria			
	Consumer trust	Logo	Requirements	Support
1	Low consumer trust	No use of environmental symbols, terms or the color green.	All unique to certificate or very vague	Only access in a single country
2	Below average consumer trust	Use of either environmental terms or the color green	Most unique to certificate or vague	Limited access in multiple countries
3	Average consumer trust	Use of environmental symbols and the color green	Most are either typical requirements, or are well defined	Good access in multiple countries
4	Above average consumer trust	Use of environmental terms and the color green	Most are typical environmental requirements and are well defined	Limited access world wide
5	High consumer trust	Use of both environmental symbols, terms and the color green	All are typical environmental requirements and are well defined	Good access world wide

Figure 35 - Revised incentive evaluation model

As the fifth step of the evaluation process, an organizational evaluation is performed on the organizations involved in each of the different certificates. In the case study and theory study, it was established that the credibility of the developers of criteria for the certificate, certifiers and auditors was a concern with regards to customer trust in the certificate. Even if the involved organizations did not use every opportunity to increase their profits, it was still determined that the degree to which the organizations had to option of doing so, and how much they benefitted from it could still affect consumer trust. It was further established that the price and service level of certification was likely to be influence by the number of available certifiers and auditors for a given certificate. While having only a single certifier or auditor resulted in the best economics of scale, the lack of competition was likely to result in unfavorable prices. Having many certifiers or auditors would result in high degree of competition, which meant that the lack of economics of scale would increase costs. As such, each certificate is evaluated using the model shown in Figure 36. Like in previous steps, the average is then calculated along with the standard deviation, so that the certificates can be divided into the three groups; below average, average and above average.

Score	Developers of criteria	Certification	Auditing	Number of certifiers	Number of auditors
1	Direct financial interest	No control of supplied information	No auditing	Single certifier	Single auditor
2	Indirect financial interest	Same as creator of criteria	Same as creator of criteria or certifier	Many certifiers	Many auditors
3	No financial interest	Independent certifier	Independent auditor	Few certifiers	Few auditors

Figure 36 - Revised organization evaluation model

Finally, the sixth step is the selection process where all the certificates are evaluated to determine the best candidates for implementation. This is done by scoring each certificate based on its performance in previous steps, as shown in Figure 37.

Score	Requirements	Incentives	Organization
1	High effort	Below average	Below average
2	No effort	Average	Average
3	Low effort	Above average	Above average

Figure 37 - Selection scoring model

5 Phase 3 - Generalization of method

As current practice, found during the case study at the LEGO Group in Phase 1, has been consolidated with available research in Phase 2, the resulting evaluation process represents what is estimated as being the optimal evaluation process for determining the environmental certificate that is most suitable for the LEGO Group, given the purpose of certification. Expanding this narrowly defined evaluation process, it is sought to transform it into a general evaluation process that can be more broadly applied.

This transformation is done primarily along three avenues of generalization. First, it is sought to expand the method to be used by companies with other reasons for wanting certification than the LEGO Group. Second, it is sought to expand the types of products or services to which the method can be applied. Third and last, it is sought to expand the method to be able to facilitate the selection of other types of certificates than just environmental certificates, including those for quality, safety and social responsibility.

5.1 Step 1 - Scope

In order to generalize the first step of the selection process, it is necessary to account for a wide range of purposes with regard to obtaining certification. Through the case study, it was established that purposes could include increased sales and standardization towards suppliers or license partners. Drawing on the various studies used in phase 2 (Nakamura, et al., 2001) (Bansal, et al., 2000) (Mera, et al., 2004), purposes such as increasing performance due to internal pressure, pressure from business partners and gaining access to new markets can be added to the list. It is observed that the different purposes vary primarily according to who the certificate is intended to communicate something to.

Drawing on the typical stakeholders for companies (Janns, et al., 2002), the list of possible targets can be expanded to include shareholders, investors and creditors. These stakeholders, while benefitting directly from increased sales, are also likely to be concerned with the security of their investments. Staying ahead of future legislation then becomes another possible concern that can be addressed through certification. In all, an overview can be formed of the likely purposes for certification, as seen in Figure 38.

Purpose	**Example of target**
Increased sales	Customers
Standardization	Suppliers and license partners
Increased performance	Own employees
Pressure from partners	Partners
Access to new markets	Governments
Early warning on legislation	Investors, creditors and shareholders

Figure 38 - Initial purposes and examples of targets

Following the mapping of a variety of possible purposes for certification, it is necessary to determine how these purposes impact steps 2 through 6 of the evaluation process. In step 2, where an overview is formed of the available certificates, the impact of the purpose of certification can only impact the search process by additionally focusing the initial search. If the purpose of certification is to increase sales, it is natural to begin the search for possible certificate in the public forums, in order to make sure that the certificates which are most exposed to consumers and discussed by them are included in further considerations. Likewise, if the purpose of certification is to impose a standard on suppliers or partners, then a natural starting point for the search process would be the certificates currently used by companies producing similar products, in order to first find certificates that are well known among companies in the relevant industry.

If the purpose of certification is simply to increase the company's performance for its own sake, the starting point for the search process would be interest groups and NGO's dealing with the issue the certificate is to address, as they are likely to promote the highest possible performance within their respective fields. On the other hand, if certification is sought due to pressure from partners, it is natural to start the search process with the certificates currently used by competitors, as these certificates are likely to be the accepted norm for the industry. If the purpose of certification is to gain access to new markets, then it follows that the search for viable certificates should begin with the legislation, rules or similar restrictions keeping non-certified products out of the market, as only certificates that satisfy these conditions are of interest. Finally, if the purpose of certification is to stay ahead of emerging legislation, the search can be focused on certificates used in the relevant countries with the strictest legislation.

In evaluating the preferable level of requirements, the purpose of certification again has a significant impact. For example, if the purpose is to increase sales or gain access to new markets, then it is most in keeping with the economic nature of the purpose to select a certificate with a low cost. It is preferable that the amount of effort needed to fulfill the requirements of a certificate be as low as possible while still fulfilling the primary purpose of certification. In contrast, when the purpose of certification is to increase performance or stay ahead of legislation, the strictest requirements are the most preferable, as they best promote the purpose of certification. Finally, if the reason for certification is pressure from partners or the need for a well-defined standard, then the requirements should reflect the intended level of performance as closely as possible.

As with the requirements of the found certificates, the evaluation of incentives is also influenced by the purpose of obtaining certification. Economically based purposes like increased sales and access to new markets are more naturally suited to incentives that are focused on the company's customers. Meanwhile, purposes where the certificates are not primarily economically based, such as standardization, increased performance and pressure from partners, are better supported by incentives that deal with easing the management of the relevant aspect of the company's operations. However, if the purpose of certification is to stay ahead of future legislation, focus needs

to be on both the facilitation of legislation into practice, as well as customer approval, as customer preference has a great impact on future legislation (Page, et al., 1983).

For the organization evaluation step, the purpose of certification can also be used to weigh the individual aspects of organizations in order to determine what is preferable in the case at hand. If the purpose is to actively promote the chosen certificate towards customers to increase sales, the credibility of the involved organizations is an important part of establishing and maintaining trust in the certificate. Likewise, the use of a certificate for standardization requires a focus on credibility, to ensure that products carrying the certificate live up to the intended standard. Similarly, if the purpose is to access new markets or to be prepared for future legislation, the credibility of the certificate helps build trust and acceptance amongst both customers and governments. Meanwhile, if the purpose of certification is increased performance, the credibility of the certificate is not as important, due to the direct measurement of performance likely to be performed by the company. Instead, the efficiency with which certification is handled becomes more important, as is the case when certification is prompted by pressure from partners to become certified, where the credibility of the certificate is of little significance if the company's partners are satisfied.

In the final step where the certificates are evaluated based on previous steps, it again becomes useful to weigh the importance of the different steps according to the purpose of certification in order to determine the preferable certificate. If the purpose is economically based, such as increasing sales or accessing new markets, the steps which have the most direct financial impact such as requirements which make up costs, and incentives which make up potential profit, are more important than the more subtle impact of organizational credibility. If the purpose is to improve performance or to stay ahead of legislation, then the requirements are most important, along with organizational compatibility, while the incentives become less important due to the purpose of certification being fulfilled by the requirements alone. Finally, for purposes such as standardization and pressure from partners, the general level of requirements is determined more by policy than by practicality. As such, the possible incentives for certification and organizational compatibility become much more important in comparison.

The full overview of the effects of the purpose step on the evaluations in the following steps is shown in Figure 39.

Purpose	Overview	Requirements	Incentives	Organization	Evaluation
Increased sales	Search should focus on public forums	Lowest effort is preferable	Focus on customers	Focus on credibility	Focus on requirements and incentives
Standardization	Search should focus on similar companies	Effort closest to current performance is preferable	Focus on company	Focus on credibility	Focus on incentives and organization
Increased performance	Search should focus on interest groups	Highest effort is preferable	Focus on company	Focus on efficiency	Focus on requirements and organization
Pressure from partners	Search should focus on similar companies	Effort closes to intended level is preferable	Focus on company	Focus on efficiency	Focus on incentives and organization
Access to new markets	Search should focus on relevant regulation	Lowest effort is preferable	Focus on customers	Focus on credibility	Focus on requirements and incentives
Stay ahead of legislation	Search should focus on countries with strictest legislation	Highest effort is preferable	Equal focus on customers and company	Focus on credibility	Focus on requirements and organization

Figure 39 - The impact of purpose on other steps

5.2 Step 2 - Overview

In order to generalize the second step of the evaluation process, which is establishing an overview of relevant certificates that need to be compared in order to determine which certificate is best suited for the selected product given the purpose of certification, the web-based approach used in the case-study is used as the basic model, see Figure 40.

Figure 40 - Search process in case study

In the previous section dealing with the generalization of the purpose of certification, it was argued that the purpose of certification could be used to help define the starting point of the search process by identifying some general characteristics of the intended certificates. The starting point of the search process is then first determined according to the purpose of certification. This focus area is then searched thoroughly in order to find the first few suitable certificates. In addition to searching the focus area, any certificates known to participants in the search may be added to the list of certificates immediately, as a high number of certificates at this stage of the search process makes the following search methods more effective.

Following this, the websites of each of the found certificates are examined to generate a list of organizations mentioned or linked to on the website. This is similar to the way in which modern internet "spiders" function (Pinkerton, 1994) (Chen, et al., 1997) (Yang, et al., 2000). Spiders are advanced search-algorithms that quickly access and index a large number of websites based on relevance to the selected keyword. This is done by looking at both matches between the search term and content on a given webpage, as well as by identifying links from a given webpage to other webpages with content matching the keyword. The greater the number and proximity of matches in the given webpage and its links, the more likely it is estimated that the content is of interest to the person performing the search. Similarly, when compiling the list of websites or organizations found on the websites of the initial certificates, those that appear on multiple independent websites are marked as being especially relevant. Once a list of websites or organizations found on the websites of the initial certificates has been compiled, each item is searched in turn for additional certificates to add to the list. The websites of these new certificates are then examined in a similar fashion, until all options have been exhausted.

The websites of all the found certificates are then examined in order to establish if certain key phrases or terms are used by multiple certificates to describe aspects of the certificate. This procedure is similar to various clustering methods that have been proposed with the intention of arranging results in a search based on common phrases and terms (Zamir, et al., 1999) (Zhang, et al., 2004). The key phrases or terms gathered from the already identified certificates are then used in a wide search in order to identify any certificates not mentioned by or linked to any of the previous certificates. If such certificates are found, the websites of each certificate are then processed to identify new organizations, certificates, links or key phrases. Once no further open searches using key words are possible, the overview step is considered completed and the list of possible certificates is finalized. The entire generalized search methodology is illustrated in Figure 41.

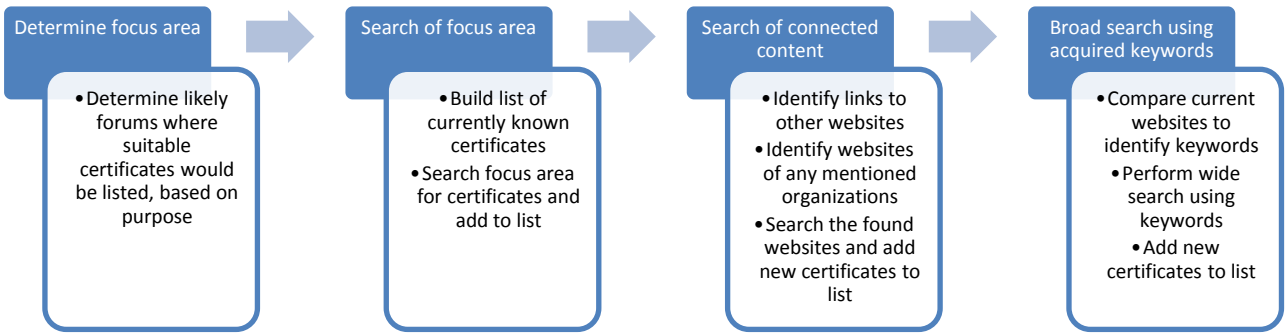


Figure 41 - Generalized search methodology

5.3 Step 3 - Requirements

The third step of the evaluation process consisted of the rating of the requirements for each of the certificates according the amount of effort if would require to bring the company's products into accordance with them. In order to generalize this step, it is necessary to build an overview of all

types of requirements that may be present in a certificate. This is done in order to ensure that all requirements can be rated using the current model. If any requirements cannot be rated using the current model, the model must then be modified accordingly.

The types of requirements uncovered in the case study through the rating of 15 environmental certificates are assumed to represent environmental certificates in general. Types of requirements include restrictions on the origins of raw materials, with some certificates only allowing ecological natural fibers for clothing (International Association of Natural Textile Industry , 2011), and others requiring at least partial use of electricity from sustainable sources (MTS, 2008). Other requirement types are related to the durability or functionality of the product, such as limitations on dimensional changes due to washing (ECNZ, 2010) and the possibility of replacing broken components in the product (Japan Environment Association, 2007).

Further requirement types found in the case study include mandatory design features such as the ability to remove non-rechargeable batteries (Miljømærkning Danmark, 2011) and restrictions on production methods, such as prohibiting plastisol based printing (Good Environmental Choice Australia Ltd., 2011). The most common requirements by far were the limitation of the use of certain substances such as chlorine based bleaching agents in the production process (Thailand Environment Institute, 2011), as well as limiting the content of substances such a phthalates in the finished product (Oeko-Tex Association, 2011). Also found in some of the certificates in the case study were requirements that dealt with the recycling of products after end of use (MBDC, 2011), as well as requirements centering around additional certification, such as requiring that certain materials be food-contact approved (Miljømærkning Danmark, 2011).

Requirements also included lower limits for production efficiency with regards to energy usage (ECNZ, 2010) as well as restrictions on emissions from production of substances such as acrylonitrate (Good Environmental Choice Australia Ltd., 2011). Finally, some certificates required that the consumer be advised of certain terms regarding the product, such the warranty period (Miljømærkning Danmark, 2011). A list of requirement types with an example of each type can be seen in Figure 42.

Requirement type	Example
Raw material and energy origins	“At least 5% of cotton used must be ecological” (MTS, 2008)
Product durability	“Dimensional change during washing must be below 3%” (International Association of Natural Textile Industry , 2011)
Product functionality	“Zippers, buttons and other accessories must be replaceable” (Japan Environment Association, 2007)
Design features	“Non-rechargeable batteries must be removable” (Miljømærkning Danmark, 2011)
Production procedures	“Plastisol based printing is not allowed” (ECNZ, 2010)
Substances used during production	“Chlorine-based bleaching agents are not allowed” (Japan Environment Association, 2007)
Substances contained in product	“Products must not contain phthalates” (MBDC, 2011)
Recycling of products after use	“Full closed loop recovery and recycling system must be in place” (MBDC, 2011)
Required certification	“Material must be approved for food-contact” (Miljømærkning Danmark, 2011)
Production efficiency	“Energy consumption must be below 70MJ per kg of textile produced” (Swedish Society for Nature Conservation, 2010)
Emissions during production	“Annual emissions to air of acrylonitrate must be below 1g per kg of fabric produced” (Good Environmental Choice Australia Ltd., 2011)
Customer information	“Packaging must list warranty period” (Miljømærkning Danmark, 2011)

Figure 42 - Requirement types from case

In order to expand the list of requirement types, a range of quality, safety and social responsibility certificates are now reviewed. In quality management certificates such as ISO:9000, a significant requirement type is the need for documentation and traceability (Internation Standard Organization, 2011). From social responsibility certificates such as Fairtrade, UTZ and Rainforest Alliance, new requirement types regarding working conditions, employment contracts (FLO-CERT, 2011) and community relations (Sustainable Agriculture Network, 2010) are added to the list of possible requirement types, as seen in Figure 43.

Requirement type	Example
Employee working conditions	“Workplaces must be made as safe as possible”
Employee contract conditions	“Employees must be free to collective bargain for better employment contracts”
Community relations	“Local labor, services and products must be prioritized in procurement processes”
Documentation and traceability	“All work processes must be documented”

Figure 43 - Additional requirement types

It is observed that for all requirement types found in the case study, as well as for the new requirement types observed in various quality, safety and social responsibility certificates, the previously used model of rating according to the estimated effort of implementation for each requirement is sufficient. As such, the only accommodation necessary in order to generalize the requirements step is to account for the effect of the purpose of certification on the way the estimated amount of effort required for the implementation of each certificate is interpreted. An additional step is added after the calculation of the respective difficulty of obtaining each certificate, where the certificates are divided into three main groups of; below current performance, close to current performance and significantly above current performance as seen in Figure 44.

Below current performance	All certificates with a total rating of 0
Close to current performance	Certificates with a below average, non-zero rating
Significantly above current performance	Certificates with an above-average rating

Figure 44 - Grouping of certificates according to requirements

In this way, the group of certificates with the preferable level of requirements can be easily identified, along with the second most preferable group of certificates. This, in turn, becomes this step's input into the final evaluation in step 6.

5.4 Step 4 - Incentives

In order to generalize the fourth step, in which the incentives for certification in the case of each certificate are evaluated, it is necessary to expand the original four incentives used in the case study, in order to accommodate a wider range of certificate types. As the case study deals solely with acquisition of an environmental certificate based on the intention of increasing sales and promoting standardization among license partners and suppliers, additional incentives are sought by expanding the scope to include all the purposes for certification presented in the generalization of the first step, as well as by identifying incentives unique to other types of certificates.

First, building on the purpose of increasing sales, it was found in the theory study that the factors influencing customers with regards to environmental certificates were trust in the certificate and the certificate logo. Expanding the scope to include quality, safety and social responsibility certificates, several new incentives appear. Firstly, some social responsibility certificates such as Fairtrade actively promote products carrying their certificate, resulting in free advertisement of the product (Fairtrade, 2011). Building on the purpose of using a certificate to standardize products and components from suppliers and license partners, it was found in the case study and confirmed in the theory study that the adoption of an environmental certificate as a standard is primarily affected by the familiarity of the requirements and the available support for implementing the certificate. Expansion the scope to include certificates for quality, safety and social responsibility results in no additional incentives.

If the purpose of certification is to increase company performance in the respective area for reasons internal in the company, a new incentive that becomes important is measurability of progress. Measurability helps communicate the actual impact of certification to the internal stakeholders requesting improved performance, and also helps the company identify areas outside the certificate where performance can be improved (Boyd, 2004). When the need for certification is due to pressure from partners, then the reputation of the certificate among companies becomes an important incentive for selecting a certificate, as this reputation is likely to affect the pressuring party's acceptance of the certificate as sufficient to meet their demands. The reputation of a certificate amongst businesses may well be vastly different from the customers trust in said certificate, and as such the reputation of the certificate among businesses is included as a separate incentive (Banerjee, et al., 2003).

For the purpose of acquiring access to new markets, there is an obvious incentive in the size of such a market which indicates the desirability of the certificate. Even if the certificate is not required in order to gain access to a regional or national market, certain certificates such as Cradle-to-Cradle grant access to special online marketplaces that only allow products carrying specific certificates to be sold (eBay, 2011). Finally, the purpose of staying ahead of legislation naturally leads to the incentive of the certificate's alignment with future regulation. This can be both in the case of certification-organizations such as Bra Miljöval that try to influence legislation based on the current certificate standard (Swedish Society for Nature Conservation, 2010), and the EU Flower, where the criteria of the certificate are approved by some of the legislators in the European Union who also propose new environmental legislation (Miljømærkning Danmark, 2010). The final list of incentives, along with an example of the rating system for each incentive is shown in Figure 45.

Customer-focused incentives					
Rating	**1**	**2**	**3**	**4**	**5**
Customer trust	Low consumer trust	Below average consumer trust	Average consumer trust	Above average consumer trust	High consumer trust
Logo	No use of symbols or terms	Use of symbols	Use of terms	Use both terms and weak symbols	Use both terms and strong symbols
Free advertisement	No product promotion	Website listing of products	Consumer group product promotion	National product promotion	Worldwide product promotion
Exclusive market size	No exclusive market	Small consumer-group	Large consumer-group	State or regional market	National market
Company-focused incentives					
Rating	**1**	**2**	**3**	**4**	**5**
Familiarity of requirements	All unique to certificate or very vague	Most unique to certificate or vague	Most are either typical requirements, or are well defined	Most are typical environmental requirements and are well defined	All are typical environmental requirements and are well defined
Measurability of results	No overview of effects	Basic overview of effects	General overview of effects	Detailed overview of effects	Fully transparent overview of effects
Availability of support	Only access in a single country	Limited access in multiple countries	Good access in multiple countries	Limited access world wide	Good access world wide
Reputation in industry	Not accepted by industry	Poor reputation	Average reputation	Good reputation	Preferred certificate in industry
Legislative influence	No influence	Low influence	Moderate influence	Strong influence	Directly involved in legislation

Figure 45 - Example of incentives ratings

Following a rating of each certificate according to the list of incentives, the ratings are added together, with either company or customer incentives multiplied by a factor of two, to emphasise the incentives that are most important depending on the purpose for certification. Afterwards an average rating and the standard deviation is calculated and the certificates are divided into three groups; below average, average and above average. This is then used as the input into the final evaluation in step 6.

5.5 Step 5 - Organization

The organization step is generalized through an examination of the possible combinations of organizations that can be involved in a certificate. For this, the inherent attributes of the individual possibilities are described, along with connection based attributes. In the generalization of the purpose step of the evaluation process, it was noted that the two types of concern regarding the organizations involved in a certificate were those of credibility and efficiency.

First, the developers of the requirements or criteria that make up the certificate are examined. In general, the studies show that there were three main types of criteria developers; 8% are government bodies, 58% are non-profit organizations and 18% are specialized certification companies (Big Room Inc., 2010). In addition, there are three secondary types of criteria developers; 4% are organizations that are hybrids between for-profit and non-profit, 3% are industry associations and 1% are public private partnerships. For the purpose of determining organizational suitability hybrid organizations will be treated as for-profit due to the presence of at least some financial incentives like those of full for profit organizations. Industry associations, by their very definition, represent the interests of the companies making up the industry. As such, they are classified depending on the participants in the organization. If the participants are primarily for-profit testing institutes for instance, then the industry association will also be classified as for-profit. Finally, public private partnerships, where a government body contracts a for-profit company to perform a certain service, are treated as a government body for the purpose of defining the type of criteria creator due to the direct government influence on the performance of the service.

As was determined in the theory study, the perceived self-interest of organizations involved in a certificate impacts the credibility of the certificate. As such, non-profit organizations impart the highest credibility to a certificate, as they have the strongest incentives to focus primarily on promoting high performance in companies. Being non-profit, the organizations are less likely to be motivated by the economic prospects of certification and more by the effects of certification (Hansmann, 1980). Meanwhile, government bodies creating the criteria for a certificate, while also not benefitting directly for the use of the certificates themselves, are influenced by overall government concern with the prosperity of the country's companies and industries, as well as the effects of lobbyism (Fredriksson, et al., 2000). Finally, for-profit companies developing certificates have a vested interest in the number of certificates that are awarded. Therefore, their dedication to the core subject of the certificate, be it environment, safety, quality or otherwise, can be drawn into question.

If the focus instead is turned from credibility towards efficiency, then the issue of bureaucracy becomes a main concern. As response times for organizations are slowed as more steps or individuals become involved in the decision-making process, it is preferable from an efficiency viewpoint to limit the number of people required for creating criteria for a certificate, in order for the certificate to adapt quickly to new research, legislation or other instigators of change. Generally, the number of people involved in the decision making process increases along with the size of the

organization (Daft, 2007). For companies, this effect is usually sought countered through the use of various organizational concepts, while government bodies are typically unable to perform major organizational change, as the structure of many such bodies is determined politically rather than organizationally.

In this case, government bodies in charge of creating criteria for a certificate are likely to have longer decision making processes than both non-profit and for-profit companies. Meanwhile, for-profit organizations have added incentives to optimize their organizational efficiency, as the costs of lengthy and complex decision making processes subtract from the profitability of the company. Therefore, they are estimated as having the highest efficiency on average.

Once the criteria for a certificate have been defined, the next step is to award the certificates to the appropriate products and companies. During this certification process, it must be ensured that the products or companies fulfill the listed criteria for the certificate. As seen in the case study, this can either be done through company self-certification, where the company seeking to obtain certification submits a statement that it meets the listed criteria and is then certified based on the assumption of this statement being true. Alternatively, the product or company is measured by another organization, which through investigation of third-party documentation or direct testing and observation determines whether the product or company lives up the listed criteria.

With regards to credibility, it follows that independent investigation is valued more highly by customers than the claims of the company producing the product. When independent verification is performed, this can be done either by the same organization responsible for creating the criteria, or by a third party. If done by the same organization as the one creating the criteria, the certifying organization will be even better able to maximize profits from certification, as the certifying organization now profits directly from both the licensing of the certificate and the testing done during certification. This concern is of course dependent on the how strong the motivation is for the developers of criteria to profit from the application of certificates.

If certification is performed by a third party, this may in turn be a government institute, a non-profit organization or a for-profit organization. As payment for certification is typically rendered regardless of whether the product or company is actually awarded the certificate, the credibility of the certifying organization is not likely to be influenced by concerns over profit maximization. Instead, it is worth noting that the certifying organization normally has to be granted the right to perform certification by the developers of the criteria for the certificate. In this regard, the developers of the criteria may, if aiming to maximize profits by awarding a high number of certificates, select certification organizations that are less strict in evaluating companies or products. If a certain certificate is the largest customer of a certification organization, the developers of criteria may also be able to put pressure on the organization to be less strict in awarding the certificate. As such, credibility is likely to be higher when certification is performed by non-profit organizations, as they receive little benefit from awarding more certificates either way. Similarly, government

institutes are likely to be able to withstand pressure from the developers of criteria for a certificate, due to having a function within the government that is the main source of income for the institute.

With regards to efficiency, the most efficient certification process is estimated as being allowing the company seeking certification to evaluate current performance against the certificate criteria, relying on the validity of the statement from the company seeking certification. If a third-party certification process is to be performed it is preferable that the developers of the criteria for the certificate handle certification as well, due to their familiarity with the criteria, as well as ready access to interpretation in cases where the applications of criteria are unclear. With regards to independent certification organizations it is estimated that higher efficiency is achieved with companies, followed by government institutes and finally non-profit organizations, based on similar reasoning as for criteria developers; companies have the highest motivation to increase their efficiency due to the direct benefit of decreased costs. This is less true for government institutes, which see little direct benefit of decreased costs, but which are often forced to operate under strict budgets. Lastly, non-profit organizations gain little benefit at all from reducing costs, as the pricing of certification is directly tied to cost.

The final function regarding certification is the auditing of certified products or companies. As was noted in the case study, this can either be performed by the same organization that performs the initial certification, a different third party organization or not at all. A further possibility is that the auditing organization could be the same as the developers of the criteria, without being the same as the certifying organization.

With regards to credibility, it is certainly preferable that auditing be performed in some respect. In the case of the auditing and certifying organization being the same, this provides additional incentive for the certifying organization to award the certificate in the first place, as auditing is only performed for products or organizations which have been certified in the first place. The credibility of having the same organization perform certification and auditing is therefore dependent of the credibility of the certifying organization, as described earlier. Similarly, the credibility of auditing by the developers of criteria for certification may be compromised by concerns regarding that the organization in question would benefit doubly from the number of companies carrying the certificate. This is concern is further increased in a situation where the same organization creates the criteria, performs the necessary certification and performs audits.

If auditing is performed by a completely separate organization, the concerns regarding profit maximization related to certification apply. As a failed audit can prohibit the performance of future audits due to the certificate no longer being awarded to the given product or company, a for-profit auditing organization has an interest in having only successful audits. The same applies, though with reduced effect to government bodies, while non-profit organizations have no interest in performing more or fewer audits, as there is no profit either way.

With regards to efficiency, the ideal would, like with certification, be no auditing at all. Alternately, efficiency benefits from having the same organization perform both creation of criteria, certification and auditing. Efficiency is also improved if the same organization both certifies and audits, as these procedures require many of the same processes. There are also minor efficiency improvements associated with the same organization managing both creation of criteria and auditing, as thorough knowledge of criteria helps resolve unusual circumstances encountered during auditing, if these were not addressed during certification.

Based on the same arguments as with the certification function, it is estimated that higher efficiency is achieved with companies, followed by government institutes and finally non-profit organizations, due to companies having the highest motivation to increase their efficiency due to the direct benefit of decreased costs.

Finally, the issue of the number of certifying organizations was raised in the case study and further treated in the theory study. Here it was determined that a low number of certifiers or auditors would result in lower prices due to economics of scale (Larson, et al., 1998). Meanwhile, a high number of certifiers or auditors would result in better service due to competition between the different organizations (Richardson, et al., 1995). For efficiency, this means that a low number of service providers is preferable, as this maximizes economics of scale. At the same time, there must be more than a single provider of a given service, in order to prevent inflation of prices due to a monopoly. A monopoly is even more undesirable than large numbers of service providers where the cost of a service is raised due to a lack of economics of scale, as the large number of providers will at least ensure competition on prices. For credibility, the number of service providers is a minor issue, though a low number of providers may lead to a low level of service and thus decreased thoroughness in certification and auditing. It then follows that larger numbers of providers are generally more favorable.

Based on these estimations, two new rating models are built for the organization step. The first is based on a purpose requiring credibility, see Figure 46. The second is based on a purpose requiring efficiency, see Figure 47.

Rating	Criteria creation	Certification	Auditing	Connections	Number of certifiers	Number of auditors
0		None performed	None performed	All three functions handled by same		
1	Company	Company	Company	Certification and auditing handled by same	Limited to 1	Limited to 1
2	Government	Government	Government	Criteria creation and auditing handled by same	2-3	2-3
3	Non-profit organization	Non-profit organization	Non-profit organization	Criteria creation and certification handled by same	More than 3	More than3
4				All three functions separate		

Figure 46 - Organization rating model for credibility

Rating	Criteria creation	Certification	Auditing	Connections	Number of certifiers	Number of auditors
0				All three functions separate		
1	Government	Non-profit organization	Non-profit organization	Criteria creation and auditing handled by same	Limited to 1	Limited to 1
2	Non-profit organization	Government	Government	Criteria creation and certification handled by same	More than 3	More than 3
3	Company	Company	Company	Certification and auditing handled by same	2-3	2-3
4		None performed	None performed	All three functions handled by same		

Figure 47 - Organization rating model for efficiency

Regardless of which rating model is used, an average score is calculated for the evaluated certificates, which are then divided into three groups; below average, average and above average. This is used as input in the final step, where the overall evaluation of certificates is performed.

5.6 Step 6 - Selection

In order to generalize the selection step, the model from the case study, see Figure 48, needs to be modified to accommodate the additional parameter, founds through the generalization of the rest of the evaluation process. Not only must the new selection model be able to account for each new parameter, it is also necessary to re-evaluate how each of the previous steps are integrated into the model based on the different purposes for certification.

	Nordic Swan	Cradle-to-Cradle	Good Environmental Choice Australia
Requirements	1	1	1
Incentives	2	2	2
Organization	2	1	3
Total	5	4	6

Figure 48 - Selection model from case study

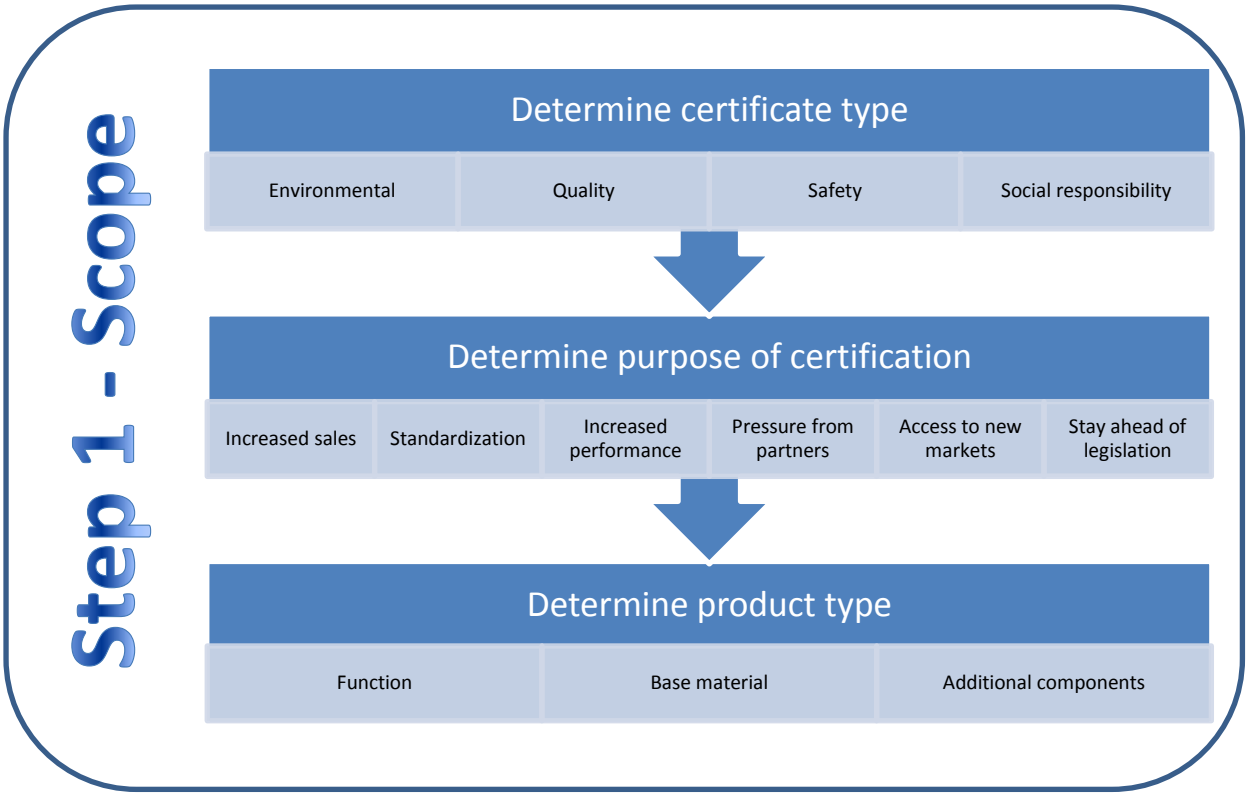
In this model, the certificates are in each step divided into three groups; below average, average and above average. These groups are then assigned a value of 1, 2 and 3 respectively. As the effects of the purpose of certification has on the evaluation of the different parameters in the incentives and organization steps has been accounted for in those steps, only the three groupings of certificates in the requirements step need to be assigned a separate value depending on the purpose of certification.

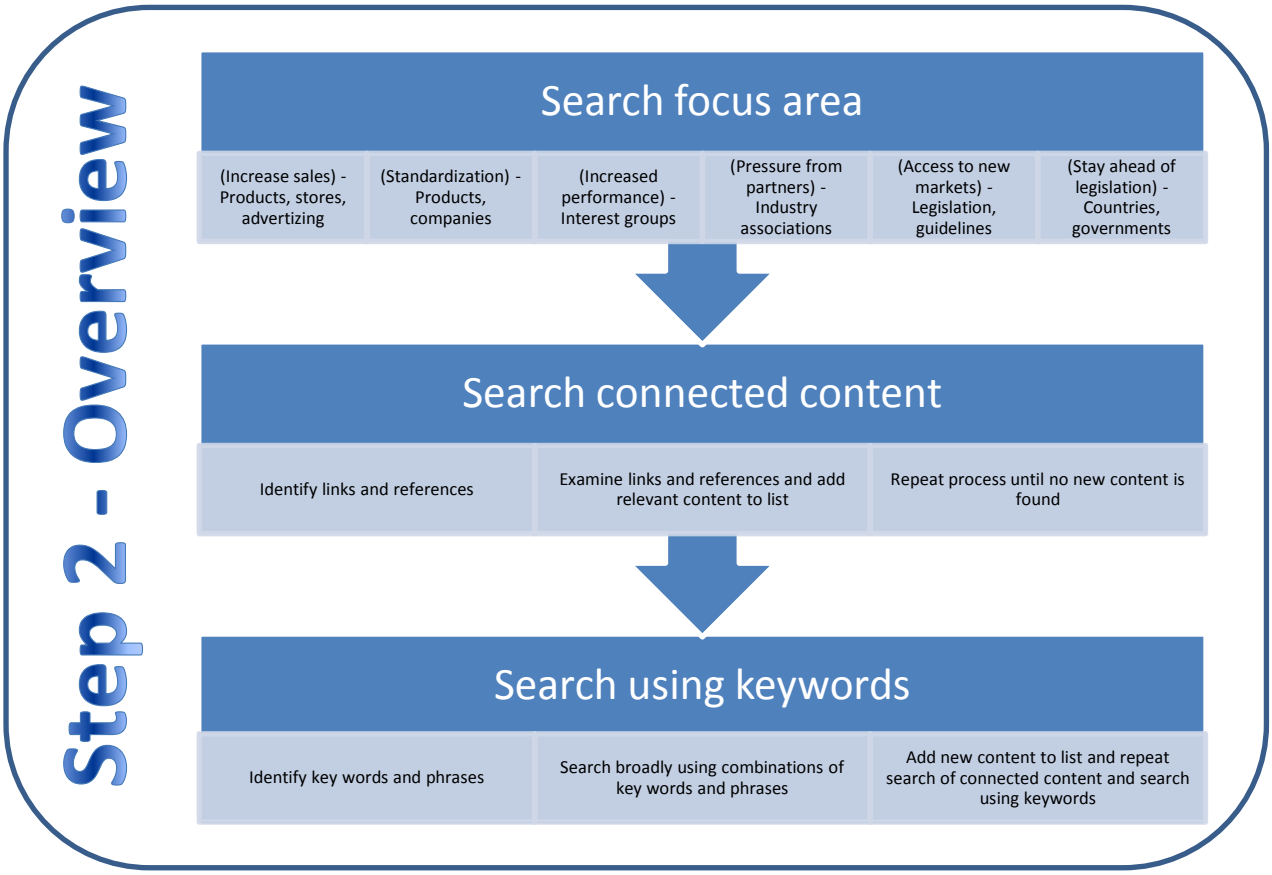
In the requirements step, the certificates were divided into three main groups; those with no failed requirements, those with few failed requirements and those with many failed requirements. As was determined in the theory study, the measurement of failed requirements did not provide an accurate view of the effort required for certification. Instead, requirements were assigned an effort value, depending on how resource intensive they were to fulfill. As such, the generalized selection process would have to assign values ranging from 1 to 3 based on the purpose of certification to certificates assigned to three groups; no effort required, low level of effort required and high level of effort required, as seen in Figure 49.

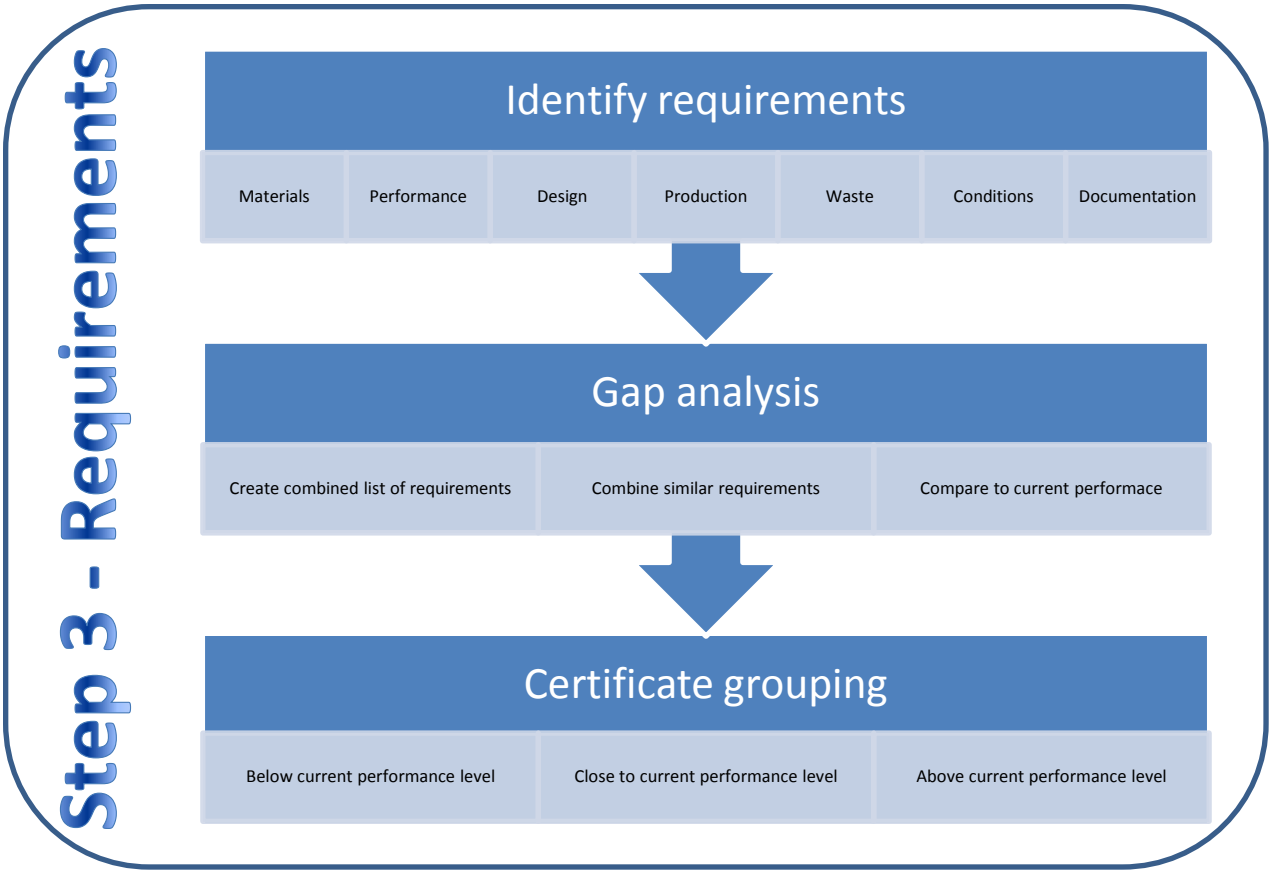
Purpose	None	Low	High
Increased sales	3	2	1
Standardization	2	3	1
Increased performance	1	2	3
Pressure from partners	1	3	2
Access to new markets	3	2	1
Stay ahead of legislation	1	2	3

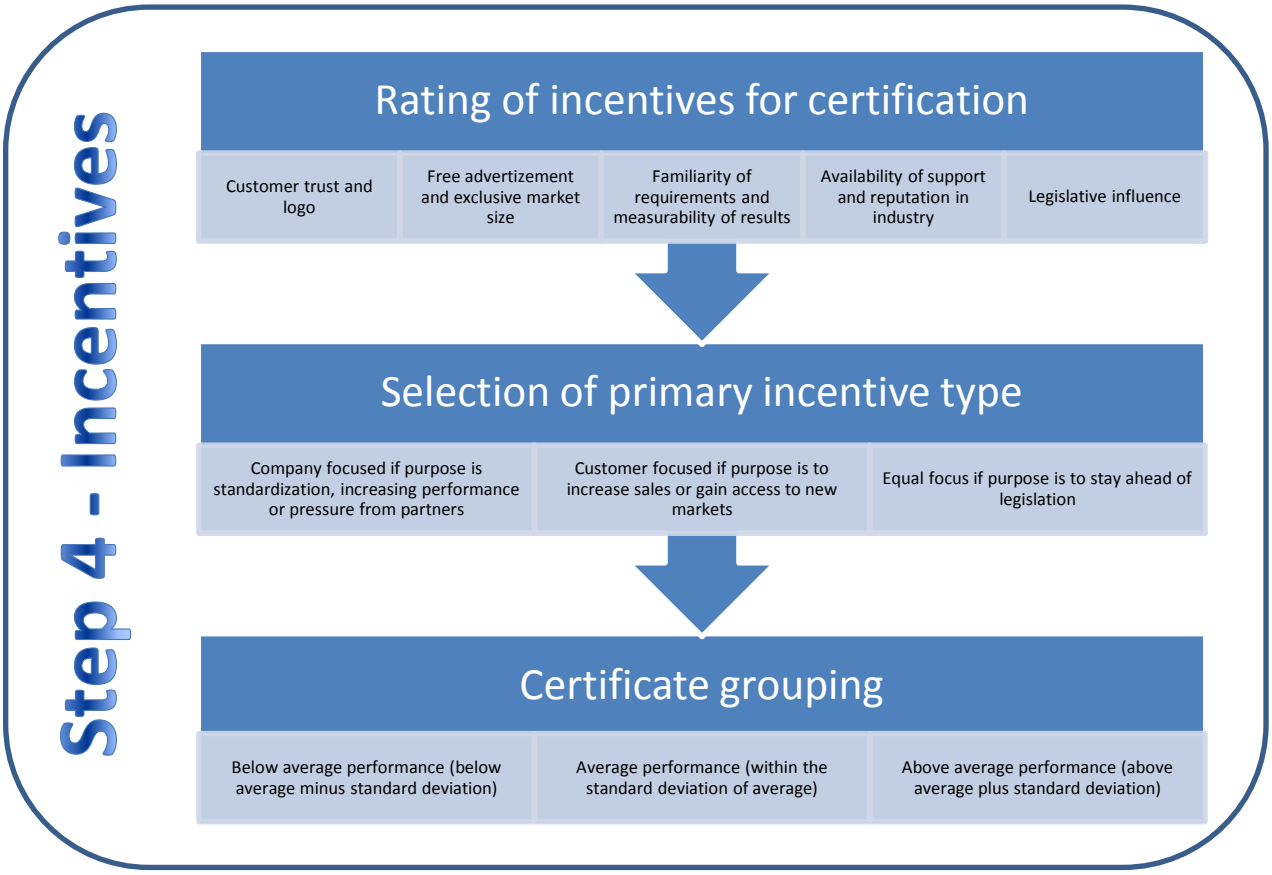
Figure 49 - Value of requirement groupings

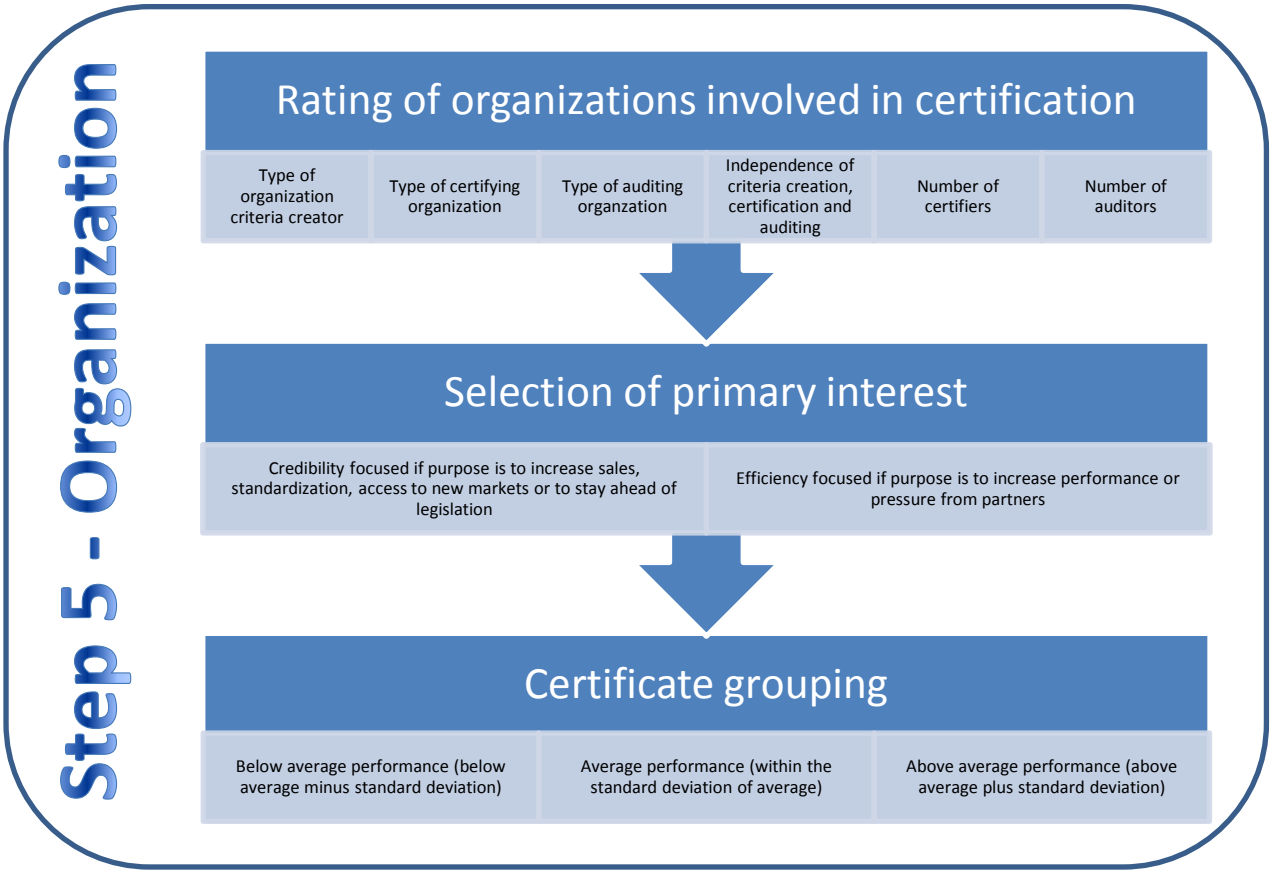
6 Visual presentation of final model

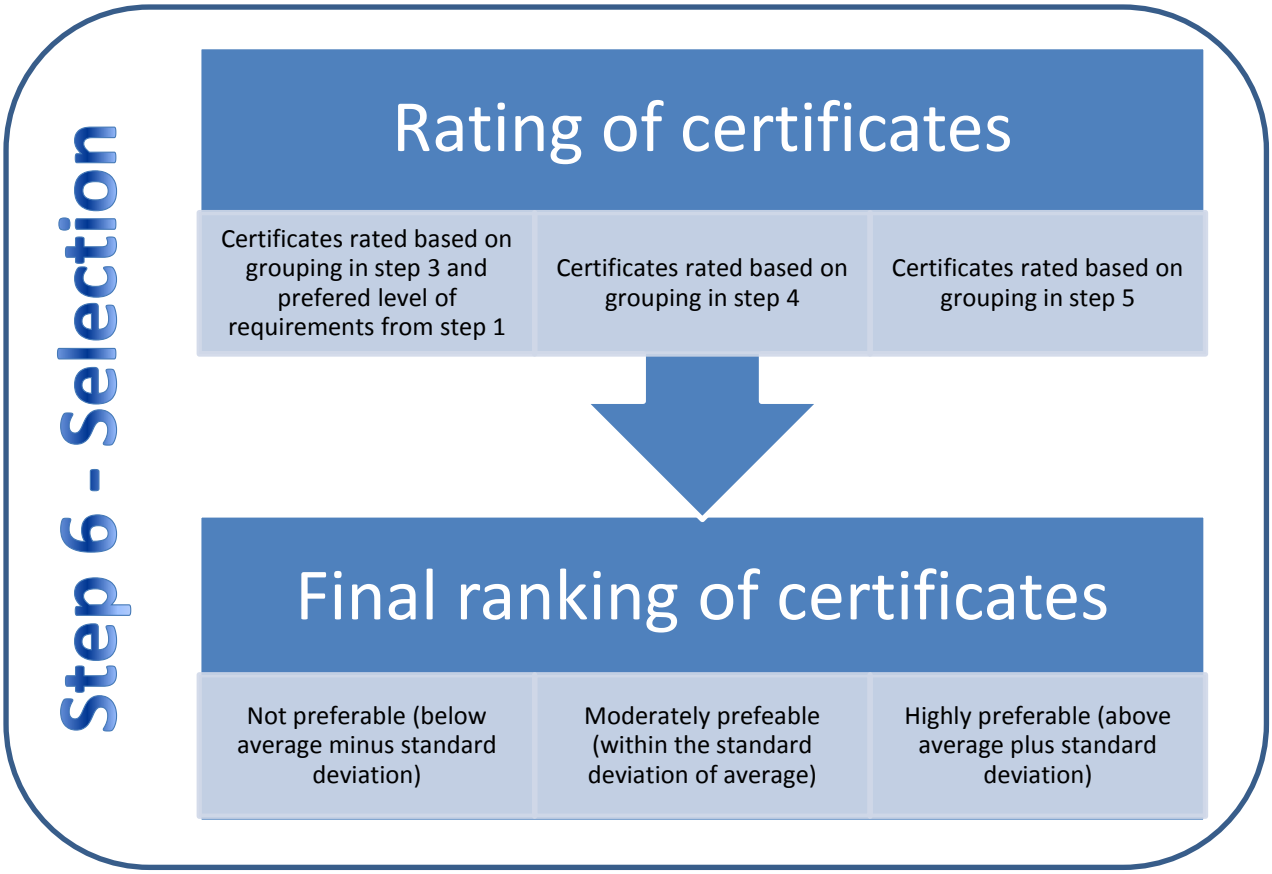





Step 3 - Requirements
Identify requirements
Materials
Performance
Design
Production
Waste
Conditions
Documentation
Gap analysis
Create combined list of requirements
Combine similar requirements
Compare to current performace
Certificate grouping
Below current performance level
Close to current performance level
Above current performance level


Step 4 - Incentives
Rating of incentives for certification
Customer trust and logo
Free advertizement and exclusive market size
Familiarity of requirements and measurability of results
Availability of support and reputation in industry
Legislative influence
Selection of primary incentive type
Company focused if purpose is standardization, increasing performance or pressure from partners
Customer focused if purpose is to increase sales or gain access to new markets
Equal focus if purpose is to stay ahead of legislation
Certificate grouping
Below average performance (below average minus standard deviation)
Average performance (within the standard deviation of average)
Above average performance (above average plus standard deviation)


Step 5 - Organization
Rating of organizations involved in certification
Type of organization criteria creator
Type of certifying organization
Type of auditing organzation
Independence of criteria creation, certification and auditing
Number of certifiers
Number of auditors
Selection of primary interest
Credibility focused if purpose is to increase sales, standardization, access to new markets or to stay ahead of legislation
Efficiency focused if purpose is to increase performance or pressure from partners
Certificate grouping
Below average performance (below average minus standard deviation)
Average performance (within the standard deviation of average)
Above average performance (above average plus standard deviation)


Step 6 - Selection
Rating of certificates
Certificates rated based on grouping in step 3 and prefered level of requirements from step 1
Certificates rated based on grouping in step 4
Certificates rated based on grouping in step 5
Final ranking of certificates
Not preferable (below average minus standard deviation)
Moderately prefeable (within the standard deviation of average)
Highly preferable (above average plus standard deviation)

7 Conclusion

In this thesis, a general method for the evaluation and selection of certificates and labels was developed through a process based on the Grounded Theory framework. As there are few studies presently that deal with the evaluation and selection of a certificate or label from the growing number of these that are available, with those few studies making an effort to perform such an evaluation being simple affairs with a limited scope and only a handful of parameters taken into account. As such, it was chosen to base the development of an extensive method for performing such evaluations on current industry practice, in order to accurately capture the knowledge and concerns found in a company with regards to certificates and labels.

This was studied through a participative case study at the LEGO Group, where it was sought to evaluate environmental certificates to find the certificate preferable for each of the two types of products. The first product type was plastic toys with textile and electronic components that are the core products of the LEGO Group, while the second product type was children's clothing, which were produced by a separate company under license from the LEGO Group. The stated reason for certification was to highlight the company's already strong environmental focus through a certificate matching the environmental performance level of the first product type. For the second product type, the aspiration was to use an environmental certificate as a standard for ensuring that the license partner maintained an acceptable environmental performance in order to ensure that the LEGO brand as whole was environmentally friendly.

The initial evaluation method focused on three main areas of evaluation; requirements, incentives and organization. Requirements covered the overall difficulty of obtaining a given certificate, which was determined based on the criteria that had to be fulfilled in order for the company to be awarded the certificate. Meanwhile, incentives covered the benefits of using a given certificate, based on four parameters derived from the original reasons for seeking certification; how well-known the certificate was by customers, how well the logo communicated environmental responsibility, how likely it was that the criteria for certification would be familiar to license partners and suppliers, along with how much support was available for companies choosing to use the certificate.

In addition, the initial evaluation method included a strategy for searching for relevant certificates on the internet in order to create an overview to be used in the evaluation process. The search process began with identifying applicable certificates where they were most expected to be found; on products similar to those that were to be certified. Following this, the certification industry as a whole would be searched using the already found certificates to find relevant connections to other environmental certificates that could be used on the products of the LEGO Group. Finally, a broad search was performed using keywords obtained from the previously found certificates and certification industry websites.

Once the applicable environmental certificates had been identified and evaluated, a recommendation was made to the LEGO Group based on the results of the evaluation process for use in their further work regarding the possibility of certification. Meanwhile, the finalized evaluation method for the case study was reviewed with regards to the assumptions it was based on. For each assumption, a review of relevant studies and literature was performed in order to either confirm or deny the validity of these assumptions. Following this, the original evaluation method was modified with the intention of ensuring full compliance with existing studies and literature, as well as to accommodate additional relevant parameters not identified during the case study. This resulted in a refined evaluation process specifically tailored to environmental certificates for use as marketing tools or as standards for suppliers and license partners.

It was then sought to develop a fully generalized method for evaluating and selecting certificates and labels from the refined evaluation process. This was done by going through each of the four steps of the evaluation process and adapting them to accommodate any number of different products, companies and certificate types. Initially, this meant creating an overview of all the possible reasons for wanting a certificate or label and then mapping how each approach affected the rest of the evaluation process. This was followed by the development of a more general and robust search process to be used in creating the initial overview of certificates or labels to be evaluated. For the requirements and incentives step, various certificate types were examined with the aim of expanding each step to accommodate any new parameters relevant to these certificate types. Finally, the organization and selection steps were re-evaluated based on each reason for certification found, in order for the steps to correctly value certain aspects of certificates based on what the intended function was.

As a conclusion to the development of a generalized method, the method was presented in an illustrative format meant to facilitate the use of the method by companies with no prior experience with such selection processes.

As such, the end product of the thesis was an evaluation method that can be used to help select an appropriate certificate or label for a product or service based on the reasons for seeking certification. The main weakness of the method lies primarily in the lack of directly supportive studies of the impacts of the measured parameters. As the method sees use and the various concerns regarding certification addressed in the method are further studied, it is conceivable that parameters will be added or removed from the method. In this sense, the method is to be seen as a synthesis of the research that currently exists on the subject of evaluating certificates or labels, coupled with more general theories regarding a wide range of topics where no specific studies or literature exists.

8 Perspectives

In order to provide a context for the evaluation method presented in this thesis, as well as to provide some suggestions regarding relevant topics in this area of study that are in need of further investigation, some avenues for further development of the method are presented and discussed.

8.1 Thorough testing of the presented hypotheses

Due to the general lack of studies into many of the parameters that are relevant with regard to evaluation of certificates and labels, some parts of the method presented in this thesis rely on comparison with similar issues in other avenues of research. As such, issues such as determining the relative impact of one incentive or organization type over another is outside the capabilities of this method. If sufficient studies could be done in the effects of each incentive and organization type with regards to certificates and labels, it would be possible to provide a much more detailed model of the importance of each parameter in comparison to other parameters.

To this end, it would be relevant to map the effects of free advertisement provided by certifying organizations compared to advertisement done by the company that produces the certified product. Also of relevance is the influence of prior knowledge of requirement-types on the willingness of suppliers and license partners to adopt a certificate at the request of the company seeking certification. Furthermore, the impact of support on the implementation of a certificate should be studied based on the amount of support that is available and whether it is local or centralized. Finally, it would be useful to fully document the connection between requirements in certificates and labels compared to requirements in later legislation, in order to determine to which degree certificates and labels influence or predict legislation and vice versa.

8.2 Improved search process

As the search process developed for the generalized method is based on the basic principles used in modern web-spiders, it is an obvious extension of this concept to further refine the search process by building and actual web-spider to automate parts of the search. Initially, a simple search script able to quickly map mentions of and links to other certificates on a website would ease the process of building a list of possible certificates once a small number of initial certificates have been defined. Likewise, a simple script could be made that could identify common key words or phrases used by already known certificates to describe their services or contents. These key words or phrases could then be fed into a Boolean search which in turn would provide new possible certificates that the script could use to identify new key words and phrases.

A key concern with this approach is how to evaluate the relevance of information at each step of the search process in order to ensure that only mentions and links to certificates are used, and not links to irrelevant sources such as advertisers and the like. Likewise, the most common words and phrases used by relevant certificates might not be specific for certification or the subject of the

certificate, instead being common word constellations used by many websites without connection to certification.

8.3 Elimination-based selection process

A possible restructuring of the proposed evaluation and selection process would be to change the way certificates are selected in the process. Instead of evaluating all certificates on all parameters which culminates in a selection between all available certificates, it would be possible to arrange the evaluation process in such a way that the most important evaluation steps for a given purpose were performed first, with certificates that perform poorly in these steps eliminated from consideration immediately. This would reduce the number of certificates to be evaluated for each step, which in turn would speed up the evaluation process considerably.

Apart from the fact that the entire evaluation process would have to be adapted to this much more flexible format, there is also the issue of the possible elimination of certificates that perform below the elimination threshold in the first evaluation step, but would have performed extraordinarily well in the following evaluation steps. In the same way, certificates that performed just over the elimination threshold in all steps would be allowed to continue in the evaluation process, even though their collective value might be less than some certificates eliminated due to a single low score.

Literature

Good Environmental Choice Australia Ltd. 2011. Home. *GECA.org.* [Online] March 22, 2011. [Cited: March 30, 2011.] http://www.geca.org.au/index.html.

Banerjee, Abhijit and Solomon, Barry D. 2003. *Eco-labeling for energy efficiency and sustainability: a meta-evaluation of US programs.* s.l. : Elsevier, 2003.

Bansal, Pratima and Roth, Kendall. 2000. Why Companies Go Green: A Model of Ecological Responsiveness. *The Academy of Management Journal.* 2000, Vol. IV, 43.

Bennington, Lynne, Cummane, James and Conn, Paul. 2000. Customer satisfaction and call centers: an Australian study. *International Journal of Service Industry Management.* 2000, Vol. II, 11.

Besanko, David and Braeutigam, Ronald. 2004. *Microeconomics.* s.l. : Wiley, 2004.

Big Room Inc. 2010. *Global Ecolabel Monitor 2010.* s.l. : World Resources Institute, 2010.

Boyd, Jessica. 2004. *Measuring social impact: the foundation of social return on investment (SROI).* London : London Business School, 2004.

Braungart, Michael and McDonough, William. 2009. *Cradle to Cradle: Remanking the Way We Make Things.* London : Vintage, 2009. 9780099535478.

Brunsson, Nils. 1982. The Irrationality of Action and Action Rationality: Decisions, Ideologies and Organizational Actions. *Journal of Management Studies.* 1982, Vol. I, 19.

Buckley, Ralf and Font, Xavier. 2001. *Tourism ecolabelling: certification and promotion of sustainable management.* s.l. : CABI, 2001.

Campbell, Anita. 2009. Over 70% of the Largest Small Businesses Have a Website. *Selling to Small Businesses.* [Online] February 24, 2009. [Cited: April 27, 2011.] http://www.sellingtosmallbusinesses.com.

Central Pollution Control Board. 2007. Eco-mark scheme. *Central Pollution Control Board.* [Online] July 14, 2007. [Cited: March 31, 2011.] http://cpcb.nic.in/.

Chen, Hsinchun, Chung, Yi-Ming and Ramsey, Marshall. 1997. *Intelligent Spider for Internet Searching .* Maui : Hawaii International Conference on System Sciences, 1997.

Chow, Clement S. F. 2002. *Eco-label design: the influence of visual and verbal cues on purchase intentions.* Hong Kong : Hong Kong Polytechnic University, 2002.

Cox, Roger and Lejeune, Bert. 2009. Cradle to Cradle urgently needs a Dutch public private partnership. *Duurzaamgebouwd.nl.* [Online] February 23, 2009. [Cited: March 14, 2011.] http://www.duurzaamgebouwd.nl/.

Daft, Richard L. 2007. *Understanding the Theory and Design of Organizations.* s.l. : CENGAGE Learning, 2007.

Deaton, James B. 2004. A theoretical framework for examining the role of third-party certifiers. *Food Control.* 2004, Vol. VIII, 15.

Deci, Edward L. and Ryan, Richard M. 1985. *Intrinsic Motivation and Self-Determination in Human Behavior.* New York : Plenum Press, 1985.

eBay. 2011. Trust Provider Directory. *WorldOfGood.com.* [Online] May 20, 2011. [Cited: May 20, 2011.] http://community.worldofgood.com/.

ECNZ. 2010. About ECNZ. *ECNZ homepage.* [Online] April 20, 2010. [Cited: March 24, 2011.] http://www.enviro-choice.org.nz/about.html.

European Commission. 2011. European Commission - Environment - Ecolabel. [Online] January 25, 2011. [Cited: March 27, 2011.] http://ec.europa.eu/environment/ecolabel/.

Fairtrade. 2011. Fairtrade Mærket opruster sit PR-arbejde. *Danish Fairtrade homepage.* [Online] May 9, 2011. [Cited: May 20, 2011.] http://www.fairtrade-maerket.dk/.

FLO-CERT. 2011. Certification - Requirements. *FLO-CERT Certification.* [Online] January 20, 2011. [Cited: May 22, 2011.] http://www.flo-cert.net/.

Font, Xavier. 2001. *Environmental certification in tourism and hospitality: progress, process and prospects.* s.l. : Centre for the Study of Small Tourism and Hospitality Firms at Leeds Metropolitan University, 2001.

Fredriksson, P.G. and Gaston, N. 2000. Environmental governance in federal systems: the effects of capital competition and lobby groups. *Economic Inquiry.* 2000, Vol. III, 38.

GreenTick Certification Ltd. 2008. What is GreenTick. *GreenTick.com.* [Online] December 29, 2008. [Cited: March 27, 2011.] http://www.greentick.com/Html/whatisF.html.

Guvå, Gunilla and Hylander, Ingrid. 2005. *Grounded Theory - et theorigenererende forskningsperspektiv.* Copenhagen : Hanz Reitzels Forlag, 2005. 87-412-2372-1.

Hammond, Peter J. 2001. *Rationality in Economics.* s.l. : Stanford University, 2001.

Hanas, Jim. 2007. A World Gone Green. *Advertizing Age.* 2007.

Hansmann, Henry B. 1980. The role of Nonprofit Enterprise. *Yale Law Journal.* 1980, 89.

Hersey, Paul, Blanchard, Kenneth H. and Johnson, Dewey E. 2000. *Management of Organizational Behavior.* s.l. : Prentice Hall, 2000.

Houe, Raymond and Grabota, Bernard. 2007. *Assessing the compliance of a product with an eco-label: From standards to constraints.* Tarbes : Laboratoire Génie de Production-EN, 2007.

Howard, Philip H and Allen, Patricia. 2010. Beyond Organic and Fair Trade? An Analysis of Ecolabel Preferences in the United States. *Rural Sociology.* 2010, Vol. II, 75.

Huy, Quy Nguyen. 1999. Emotional Capability, Emotional Intelligence, and Radical Change. *The Academy of Management Review.* 1999, Vol. II, 24.

Internation Standard Organization. 2011. ISO 9000 essentials. *ISO hompage.* [Online] May 16, 2011. [Cited: May 2011, 22.] http://www.iso.org.

International Association of Natural Textile Industry . 2011. Goals, concepts, history and structure. *IVN homepage.* [Online] March 11, 2011. [Cited: March 31, 2011.] http://www.naturtextil.com/profile/association.html.

International Working Group on Global Organic Textile Standard. 2010. GOTS - About Us. *GOTS homepage.* [Online] December 20, 2010. [Cited: March 30, 2011.] http://www.global-standard.org/about-us.html.

Jahn, Gabriele, Schramm, Matthias and Spillee, Achim. 2005. The Reliability of Certification: Quality Labels as a Consumer Policy Tool . *Journal of Consumer Policy.* 2005, Vol. I, 28.

Janns, Casper and Dybdal, Frank. 2002. *Stakehold.* Copenhagen : Lindhardt og Ringhof, 2002.

Japan Environment Association. 2007. The Eco Mark program. *Ecomark english homepage.* [Online] November 19, 2007. [Cited: March 25, 2011.] http://www.ecomark.jp/english/.

Larson, Paul D and Kulchitsky, Jack D. 1998. Single Sourcing and Supplier Certification: Performance and Relationship Implications . *Industrial Marketing Management.* 1998, Vol. I, 27.

Lockwood, Charles. 2006. *Building The Green Way.* s.l. : Harward Business Review, 2006.

MBDC. 2011. *MBDC hompage.* [Online] March 16, 2011. [Cited: March 28, 2011.] http://www.mbdc.com/.

McIntire, Jeff. 2008. Sustainablog. *Robbing the Cradle to Cradle? William McDonough a Saint… and a Sinner.* [Online] November 10, 2008. [Cited: February 23, 2011.] http://blog.sustainablog.org/.

Mehta, Pradeep S. 2006. *Why was India's Ecomark Scheme Unsuccessful?* Delhi : Ministry of Environment and Forests, 2006.

Mera, Antonio Chamorro and Palacios, Tomás M. Bañegil. 2004. *Factors that determine the adoption of an eco-label as a marketing tool.* s.l. : Esic Market, 2004.

Miljømærkning Danmark. 2010. Ecolabel.dk - Om Blomsten og Svanen. *Ecolabel.dk.* [Online] June 1, 2010. [Cited: March 28, 2011.] http://www.ecolabel.dk/.

—. 2011. Sådan får du licens. [Online] April 4, 2011. [Cited: April 6, 2011.] http://www.ecolabel.dk/.

MTS. 2008. SMaRT product standard. *MTS homepage.* [Online] Oktober 8, 2008. [Cited: March 30, 2011.] http://mts.sustainableproducts.com/SMaRT_product_standard.html.

Nadaï, Alain. 2007. *Conditions of Development of a Product Ecolabel.* Pittsburgh : Carnegie Mellon University, 2007.

Nakamura, Masao, Takahashi, Takuya and Vertinsky, Ilan. 2001. *Why Japanese Firms Choose to Certify: A Study of Managerial Responses to Environmental Issues.* s.l. : Journal of Environmental Economics and Management, 2001.

Nguyen, Lien Quynh and Du, Qian. 2010. *Effectiveness of Eco-label; A study of Swedish University Students' Choice on Ecological.* Umeå : Umeå School of Business, 2010.

Oeko-Tex Association. 2011. Oeko-Tex Association. *Oeko-Tex.com.* [Online] March 15, 2011. [Cited: March 29, 2011.] http://www.oeko-tex.com.

Office for National Statistics. 2005. *e-Commerce Surve.* 2005.

Page, Benjamin I. and Shapiro, Robert Y. 1983. Effects of Public Opinion on Policy. *The American Political Science Review.* 1983, Vol. I, 77.

Pinkerton, Brian. 1994. *Finding What People Want: Experiences with the WebCrawler.* Washington : University of Washington, 1994.

Richardson, James and Roumasset, James. 1995. Sole sourcing, competitive sourcing, parallel sourcing: Mechanisms for supplier performance. *Managerial and Decision Economics.* 1995, Vol. I, 16.

Sacks, Danielle. 2008. FastCompany. *Green Guru Gone Wrong: William McDonough.* [Online] November 1, 2008. [Cited: February 23, 2011.] http://www.fastcompany.com/.

Scientific Certification Systems. 2011. About Scientific Certification Systems. *SCScertified.com.* [Online] March 30, 2011. [Cited: March 31, 2011.] http://www.scscertified.com/about_scs.php.

Strausz, Roland. 2005. Honest certification and the threat of capture. *International Journal of Industrial Organization.* 2005, Vol. I, 23.

Sustainable Agriculture Network. 2010. Our standards - Farm standards. *SAN hompage.* [Online] July 1, 2010. [Cited: May 22, 2011.] http://sanstandards.org/.

Swedish Society for Nature Conservation. 2010. About Bra Miljöval. [Online] May 24, 2010. [Cited: March 29, 2011.] http://www.naturskyddsforeningen.se/bra-miljoval/in-english/about-bra-miljoval/.

Tang, Esther, Fryxell, Gerald E. and Chow, Clement S. F. 2004. Visual and Verbal Communication in the Design of Eco-Label for Green Consumer Products. *Journal of International Consumer Marketing.* 2004, Vol. IV, 16.

Thailand Environment Institute. 2011. About the Thail Green Label scheme. *TEI homepage.* [Online] March 9, 2011. [Cited: March 31, 2011.] http://www.tei.or.th/greenlabel/about.html.

Thøgersen, John, Haugaard, Pernille and Olesen, Anja. 2010. Consumer responses to ecolabels. *European Journal of Marketing.* 2010, Vol. XI, 44.

Vistaprint and Hawk Partners. 2009. *Vistaprint Small Business Survey.* 2009.

Voloudakis, John. 2010. *IT Organizations: Balancing Centralized Efficiencies with Localized Needs.* Boulder : EDUCAUSE Center for Applied Research, 2010.

Wiener, Joshua L. and Mowen, John C. 1986. Sourcee Credebility: on the Independent Effects of Trust and Expertise. *Advances in Consumer Research.* 1986, 13.

Yang, Christopher C, Yen, Jerome and Chen, Hsinchun. 2000. Intelligent internet searching agent based on hybrid simulated annealing. *Decision Support Systems.* 2000, Vol. III, 28.

Zamir, Oren and Etzioni, Oren. 1999. Grouper: a dynamic clustering interface to Web search results. *Computer Networks.* 1999, Vol. XI, 31.

Zhang, Dell and Dong, Yisheng. 2004. *Semantic, Hierarchical, Online Clustering of Web Search Results.* Singapore : National University of Singapore, 2004.