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THE PACKAGING SELECTION PRACTICE
- A CASE STUDY

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ABSTRACT

Purpose of this paper

The purpose of this paper is to present a comparative case study of the procedures and guiding principles in the packaging selection practice of two international companies.

Design/methodology/approach

A qualitative case study with an inductive approach was conducted. The data was collected through semi-structured interviews, documentation, and field visits.

Findings

The study indicates conceptual similarities and dissimilarities in the two companies’ procedures, concerns and priorities with respect to the packaging domain. The packaging selection practice at the two companies appears to be highly dependent on total cost, standardization, production philosophy, and collaboration between different functions and units.

Research limitations/implications

A study of two case companies implies limitations to generalization of the findings. Nevertheless, the case companies represent two diverse industrial branches providing a good basis for conceptual similarities and dissimilarities.

Practical implications

The findings of the study have practical implications generated by increased understanding of the guiding principles and their influence on the packaging selection process with respect to different types of packaging. This in turn, has a positive financial impact, enhances efficiency and effectiveness in the supply and demand chains, and considers environmental issues.

Originality/value

No previous similar study addressing the packaging selection approach in an engineering B2B industry context has been identified. This paper attempts to contribute to the theory-building of the packaging selection practice, point out the importance of considering the packaging selection and its guiding principles in order to make a deliberate and motivated packaging selection, and can be of value to other academic researchers in the field.

Paper type - Research paper

Keywords: Packaging selection practice, Decision guiding principles, Theory-building, Case study, International companies
1. INTRODUCTION

Competitive logistics performance and efficient and effective product development processes are cornerstones for companies to stay lucrative. One matter affecting these activities is the packaging (Bowersox and Closs, 1996). Klevås (2005) addresses the need for more research in the integrated area of product, packaging, and logistics in order to enhance the performance of the entire process of a product, from idea to final delivery. Johnsson (1998) stressed the lack of integration between the areas of the logistics system and packaging and the lack of focused efforts on these issues in companies. Johnsson (1998) concluded that companies that integrate their packaging approach gain benefits in the development of cost effective packaging solutions that support protection, handling, and distribution of the product. Packaging represents an important logistics activity as the packaging impact transport, storage, and handling in the supply chain (Sagher, 2004). Klevås (2005) deals with the interactions of logistics and packaging considerations during the course of the product development process at IKEA. The study indicates that cooperation among the three functions of packaging, logistics, and product development at a product developing company enhances logistics performance. Consideration of the activities in the supply chain that are affected by the packaging is beneficial from a packaging design perspective as this may provide great cost savings (Ge, 1996). The packaging solution chosen directly impacts the total cost in terms of such factors as packaging material costs, inventory of packages, handling of packages and indirectly in terms of handling efficiency and pallet utilization (Klevås, 2005). Bramklev (2007b) has developed a procedure model for the integration of packaging and product development and argue that an integrated packaging and product development has the potential of decreasing resource utilization, including costs. Bramklev (2007a) further has analyzed a number of packaging development processes, but no emphasis are given to the aspects of the packaging selection per se nor what influences decisions in the selection procedure. The limited body of knowledge of these aspects has given rise to this study.

The purpose of this paper is to present a case study of the procedures and guiding principles in the packaging selection practice of two international business-to-business companies. The research questions guiding this study are

i. How is the packaging selection procedure designed in the two case companies?

ii. What principles guide the packaging selection procedures?

The paper is structured as follows: The frame of reference of the study is presented first. Then the methodology, including research approach, reporting criteria, and the cases are described. Next the results are presented, followed by the analysis and discussion section, and the conclusions.

2. FRAME OF REFERENCE

In this section the concepts identified in the study, as recognized by other researchers, are described and discussed. The theory described here and in the introductory section shows gaps in the knowledge of the packaging selection and guiding principles. Theory about the packaging hierarchy is also provided.
2.1. The packaging hierarchy

There are three levels of packaging in the packaging hierarchy: primary, secondary, and tertiary packaging. The three levels are generally denoted consumer packaging, transport packaging, and the assembly of several transport packages, respectively (Jönson, 2006). (An example of the assembly of several transport packages is what is placed on a load carrier wrapped with stretch film. For efficiency and effectiveness, the transport packaging ought to be adapted to fit the load carrier.) The main functions of primary packaging are to protect, make the product available to consumers, attract consumers, provide product information, and enable easy handling of the product. Secondary packaging contains a number of consumer packages and facilitates efficient and simultaneous handling of the same. The tertiary packaging, which mainly affects logistics functions (Saghir, 2004), enables transport, ease handling and stacking of the products and is highly dependent on the product to be packed and the lower levels of packaging used (Johansson et al., 1997). The interactions among the packaging levels affect the performance of the packaging system (Hellström, 2007).

2.2. Packaging practice aspects

Bramklev (2007b) observes the necessity to develop a generic packaging development process, similar to the often well-anchored generic product development process. Bramklev (2009) identified four distinct phases of the packaging development process: 1) package planning – packaging concept portfolio is considered. (The concept portfolio contains packaging concepts that are available for later needs of packaging.); 2) package conceptualization – packaging specifications, generation of packaging concepts, and selection and decision on the final packaging concept; 3) package designing – generation of packaging design, detailed design, prototype, testing of prototype, and, if approved of technical documentation of the packaging, and 4) production ramp-up – planning, development, and realization of the packaging production.

Timely and accurate handling, transport, and storage of parts and final products to the lowest cost possible rely on logistics matter, as well as on an efficient and effective development of the packaging (Bramklev, 2009). Jointly, the product and its packaging satisfy the demands and needs required to enable transport, handling, and storage (Bramklev, 2007b). “When a package is needed, considerations are seldom devoted to it during the actual development of the product.” (Bramklev, 2009, p. 172). Zacharia and Mentzer (2007) address the benefits of including logistics early in the product development process, in terms of decisions on such aspects as transport, handling, and space utilization – activities that are affected by the packaging (Lambert et al., 1998). “If logistics were involved earlier, it would be much easier to make cost trade-off decisions between the logistics implication of a particular design.” (Zacharia and Mentzer, 2007, p. 88). Nevertheless, the same authors argue that the beneficial gains of the involvement of logistics depend on timing (time of initial logistics involvement), quality (quality of involvement), and relationship (the strength of the relationship). Bramklev (2007b) experienced a strong support from industry as well as from theory to integrate the product development process and the packaging development process. Bramklev (2007b) proposes a package development process that, besides integrating well with the product development process also supports a more proactive development of new and innovative packages. Bramklev (2009) further suggests that the integration of the product developing process and the product developing process is best attained by employing a packaging development process that structurally resembles the structure of the product development process.
2.3. Packaging selection

According to Lambert et al. (1998) a good package design is governed by seven factors: standardization, cost, product and package adaptability, protective level, handling ability, product packability, reusability and recyclability. For example, the value and the sensitivity of the product to be packed motivate the shipping and storage costs of the packaging Lambert et al. (1998). “The packaging decision is truly one that requires the use of a systems approach in order to understand the true ‘total cost’ picture.” (Lambert, Stock, & Ellram, 1998, p. 333). Lambert and Stock (2001) further emphasize the need for logistics managers to understand the role of material management, which includes packaging concerns and their impact on the organization’s costs. By altering the packaging of a product where its features do not conflict with the functions of the product, companies have reduced transport, handling, and storage costs (Klevås, 2005; Lambert, Stock, & Ellram, 1998).

Mollenkopf et al. (2005) highlight the relevant costs of a cost model when determining the packaging choice with respect to expendable (one-way) packaging systems and reusable (returnable) packaging systems. The cost factors deemed applicable in the model are container cost, transportation cost, labor cost, disposal cost, and recycling cost. By the use of these cost variables in quantitative analyses, the relative cost difference between returnable and one-way packaging systems are estimated.

Garcia-Arca and Prado (2008) argue that in order to successfully develop a packaging design model, the four following characteristics are necessary to consider: 1) identifying design requirements and defining packaging alternatives (i.e. basic packaging decisions); 2) defining the organizational structure for the design; 3) identifying good practices in the design; and 4) establishing control mechanisms that enable packaging improvements. With reference to Johansson et al. (1997) and Henriksson (1998), Garcia-Arca and Prado (2008) highlight the need to identify design requirements based on the cooperation of the logistics, marketing, and environmental functions. Subsequent to agreed design requirements between these functions, the authors further argue that the alternatives are identified in terms of material, sizes, number of primary packaging in secondary packaging, and graphic design. The authors argue that to be able to identify these alternatives, the packaging hierarchy is to be employed. The second characteristic addresses the need to establish a suitable organizational structure and procedure. According to Garcia-Arca and Prado (2008), the organizational structure comprises three teams, the design team, the implementation team, and the support team. The product design and the packaging design departments are viewed as a collaborative team, the design team, that simultaneously designs the product and its packaging and governs all decisions made. According to Chan et al. (2006), the cost evaluation of the packaging determines the actions taken by the product and packaging design team. The implementation team operationalizes decisions made by the design team and plays the role of coordinator (e.g. testing packaging alternatives and caring for the relations with packaging suppliers). The support team, consists of representatives from packaging manufacturers and third party logistics firms, for example, and serves primarily as a technical advisory board to the design team. As for the third characteristic, Garcia-Arca and Prado (2008) list a range of good practices, of which the following are judged the most applicable to this paper: collaboration with packaging manufactures and their design units, documentation of the packaging design process, definition of maximum weight of unit loads, standardization of formats and quality of packaging, and standardization of dimensions in packaging. The fourth characteristic addresses the dynamic view of the packaging in order to have the best packaging alternative on different occasions. To achieve such a view, the authors employ Key Performance Indicators.
3. METHOD

Knowledge and theory within the area of packaging divisions’ work and the foundation upon which the packaging decisions rest are poorly documented. The author has been able to find but a few studies aiming to investigate this domain. Eisenhardt (1989) advocate the use of the case study approach for creating theory from empirical investigations. Due to the lack of a theoretical foundation of the work of packaging divisions and the selecting procedures and guiding principles used for packaging selection, the inductive case study approach was judged applicable. The exploratory nature of the research question and the focus on contemporary phenomena at the case companies bring about the use of case studies (Yin, 2003).

The author has striven to fulfill the criteria research question/purpose, case setting, data collection, and analysis and the sub-criteria of each criterion above in the framework proposed by Olander-Roese et al. (2009) to ensure and evaluate the quality, relevance and rigor as well as the reporting of the study.

The purpose of this study is to contribute to the limited body of knowledge on the packaging procedures employed and to understand the guiding principles used in these procedures. To gain this insight empirical data has been collected from two business-to-business companies. The packaging procedures in the case companies were mapped to identify procedures and guiding principles. The two case companies were selected because of their expressed focus and priorities on packaging issues. Moreover, the companies have similar business-two-business relations, which make them a suitable sample from a comparable view with respect to the posed research questions. The research was performed as a qualitative case study and the data collection was carried out by means of six semi-structured interviews at each of the two case companies’ sites, with three respondents from each packaging department. Studies of documents provided by each company, observations, and feedback sessions also served as input. The respondents’ positions in the two companies are packaging technicians/engineers, logistics developers, packaging concepts and packaging experts. The data collection took place from May to November 2009. The interviews were transcribed and the analysis was conducted using open coding analysis according to Corbin and Strauss (2008). The study was validated through the triangulation of interviews (six), observations (field visits), and documents. The analysis was complemented and reviewed through feedback meetings at each department.

The units of analysis of this study are the current procedures and decision determinants that dominate and govern the packaging selection process in the upstream flow of packages for each company and the downstream flow for one of the companies, from a manufacturer perspective.

3.1. Case descriptions

The packaging departments investigated at case companies A and B from here on are referred to as Department A (Dept. A) and Department B (Dept. B), respectively.

3.1.1. Case context Department A

Industry

Company A is an international company in the automotive industry and operates on a global market. Dept. A is a centralized packaging function for the inflow of goods only and is positioned in Scandinavia. Company A has numerous supplier relations and its assembled products are sold through a multitude of authorized sales offices. The company employs a
wide variety of components ranging from very sensitive to very solid and insensitive components. Its products are spare parts and larger systems.

Packaging flows

The packaging responsibility at Company A is divided into two separate organizations, one responsible for the inflow stream of material into the manufacturing site (Dept. A) and one for the outflow stream of materials, Fig. 3.1. The final product has no need of packaging, whereupon the department responsible for the materials outflow excludes that particular flow. Dept. A has the overarching aim to reduce the production costs (i.e. a cost oriented approach). The parallel organization working with the outflow stream of material (spare parts) is responsible for increasing the monetary inflow (i.e. a sales oriented approach). Moreover, the outflow stream of spare parts comprises an important revenue stream, which explains the need for a separate organization.

Figure 3.1 Focus of Department A. The dashed boundaries represent its areas of packaging responsibility.

3.1.2. Case context Department B

Industry

Company B is an international company in the electronics engineering industry and operates on a global market. Dept. B in Company B is a centralized packaging function and operates from Scandinavia. Company B has numerous suppliers and the products, spare parts and final complex systems are sold to customers globally. The number of relations up-streams (towards the suppliers) exceeds the total number of relations down-stream (towards the customers). The majority of the products in Company B’s repertoire of components are more or less fragile.

Packaging flows

Company B has gathered the inbound (inflow), the outbound (outflow), and the reverse streams of material in the same organization, Dept. B. Dept. B is positioned as a sub-organization to Research & Development at the company. Until now, individual packaging solutions have been implemented independently of each other – with no centralized packaging responsibility. Dept. B has been assigned the overall responsibility for all packaging for all products in all flows, by serving the needs with as few types of packaging as possible (Fig. 3.2). By centralizing the packaging responsibility this is deemed possible.
4. RESULTS

The first research question posed was, ‘How is the packaging selection procedure designed in the two case companies?’ The answer is framed by describing the packaging procedures found at Dept. A and Dept. B. Research question number two, ‘What principles guide the packaging selection procedures?’ is dealt with in section 4.2.

To enable comparisons between the two procedures, comparable structures have been achieved by omitting detailed and specific information. The crossroads in the procedure maps represent decision points and are given more attention in section 4.2. Each procedure was initiated by an observed need for packaging. The activities following the need differ in sequence as well as in content between the two departments.

Judging by the use of packaging in the two business-to-business departments, the conventional packaging hierarchy is not used. Department A primarily strives to use as large types of packaging possible. The preferably order of packaging types at Dept. A is at first hand load carriers followed by transport packaging. Dept. B considers packaging as complementary units and does not categorize them.

4.1. The packaging procedure

4.1.1. Department A

The packaging procedure followed by Dept. A complies with Company A’s overall manufacturing scheme. In this scheme, there are defined tollgates and deliverables for Dept. A. Hence, failures in Dept. A’s deliveries end up with standstills in production.

The packaging procedure depicted in Fig. 4.1 is applicable for inner as well as outer packaging. All packaging Dept. A purchases and possesses belong to the dedicated packaging category. All types of standard packaging are rented out by Dept. A’s logistical provider.
A packaging selection guide (see section 4.2 for a thorough description) assists the component suppliers to suggest suitable packaging, based on the frame stipulated by Dept. A. The frame is based on its logistical provider’s zone price setting and the LEAN production philosophy permeating company A. In the first decision point, the packaging selection guide is employed for determining whether to choose a standard packaging or a dedicated packaging. Selection of the standard packaging is usually the first choice. Upon selection of standard packaging, the second decision point determines whether to select one-way packaging or returnable packaging. The one-way packaging is the responsibility of the supplier in terms of design and applicability with the supplied component, and is included in the product price. Selection of one-way packaging is primarily chosen if there are no established forward and reverse material flows. In case of established flows, a dedicated packaging is selected and the procedure follows the path. The selection of standard returnable packaging is followed by the next option found in the packaging selection guide, whether to proceed with letting the supplier suggest a generic alternative, or if the rules set in the guide do not comply with a generic alternative, choose dedicated packaging (decision point three). Next, requirement specifications of the packaging, the product, and from the supplier are set. These specifications differ widely between different products. A project budget is drawn up and sent for financial approval. After budget approval the fourth decision point is reached. The two plausible alternatives are existing packaging solutions or new/modified packaging. The first option is topical in cases where there already is an existing compatible packaging concept, and the second option in all other cases. Selection of a new packaging solution or the modification of an existing one is followed by a release of its identification number. Subsequently, the fifth decision point is arrived at providing the option of in-house packaging design or outsourcing of the packaging design. In most cases, the packaging design is
delegated to an outsourcing third party design unit. The outsourcing decision does not, however, exclude Dept. A from taking part in the design work. Upon the decision to outsource, complementary information is provided in terms of technical specifications. Dept. A never provides the third party design unit with drawings or other “do-this” directives; these are, instead, created in collaboration. Upon reaching an agreed packaging solution, a packaging prototype is produced by the third party design unit and sent to Dept. A for verification. An approved verification is followed by a three dimensional model and drawings, followed by the purchase phase. An unsatisfactory prototype directs the project to a re-evaluation of the fifth decision point.

4.1.2. Department B

The packaging procedure in Fig. 4.2 applies only to inner packaging. Outer packaging is standard packaging for the most part and there is no stated procedure for that selection. The packaging procedure is applicable for “white box suppliers” only (suppliers with which the department has a transparent relationship). For the “black box suppliers” (suppliers that are assigned to develop packaging with few requirements placed from Dept. B.) there is no established procedure of how to select packaging due to lack of know-how of how to work with them.

The choice of standard or dedicated packaging is not considered in the procedure in Fig. 4.2, which is for dedicated packaging only. There is no active option for standard packages. Dept. B strives to have the same view of packaging as of any other of Company B’s products and hence employ the same processes. In practice, this means applying the same processes and procedures to packaging as to other products. Traditionally, packaging matters at Company B have until recently been considered separately from other products. The organizational positioning at the R&D department is expected to promote the collaboration between the product design department and Dept. B.

Figure 4.2 Packaging procedure at Department B. The two decision points are circled.

The need for packaging is immediately followed by the first decision point. The choice of action is based on the particular packaging need. A modification of existing packaging is
chosen if a given packaging has proven to be insufficient in any way. If the need does not originate from dissatisfaction, but has evolved as a need from a new component, new packaging is developed. Regardless of the initiating reason, the same outlined procedure is followed. The next activity, collection of technical data of packaging and product comprises basic information of the project, basics of the packaging set-up and packaging drawings and basics of the product fragility. Next, the third party design unit is chosen and the packaging suggestions are developed in collaboration with Dept. B. Subsequently the choice of packaging type is decided upon based on a lowest total cost estimate of material cost, handling cost, transport cost, and storage cost. The chosen packaging suggestion arises from compromises of the aforementioned factors. Despite the trade-offs among these factors, the packaging must be compatible with foreseeable situations throughout the material flow. Next, fragility tests of the product follow to simulate its handling environment. Subsequently, if applicable, the dimensioning of the returnable packaging fleet is calculated based on storage and set-up configuration. The costs are considered and approved by the purchasing department followed by review and decision on packaging suggestions. The suggestion decided on is given a packaging identity number. Having decided on a design suggestion, the prototype and its documents are verified and tested. If the second decision made at an earlier point resulted in returnable packaging its set-up is arranged at this stage. Next, packing instructions on the functionality of the packaging are provided to the external test unit. The packaging and the product in question are verified for functionality and compatibility followed by evaluation and approval. A positive outcome of the verification leads to the purchasing phase. In case difficulties are encountered with the selected packaging, the procedure starts from the beginning.

4.2. Guiding principles

At each decision point briefly described in section 4.1., there are two available options, each of which terminates in equal output (i.e. the selected packaging is integrated with its product). This study has identified the guiding principles governing the decision making at each of these points. In the packaging procedure of Dept. A, five decision points were identified and in the packaging procedure of Dept. B, two decision points were identified. The decision points at Dept. A are illustrated in Fig. 4.1 and the ones at Dept. B in Fig. 4.2. Next, each decision point is identified and its guiding principles are elaborated on.

4.2.1. Department A

The packaging selection guide, developed by Dept. A, plays a major role at decision points one, two, and three. The purpose of the guide is to standardize procedures and to clarify Dept. A’s expectations for the suppliers. Working according to the guide, the suppliers provide Dept. A with packaging suggestions to consider. The supplier’s knowledge and first encounter with the component per se are considered valuable at these decision points.

The frame of decision is based on a zonal price setting rationale. The location of terminals from where empty standard packaging is shipped to the suppliers (i.e. the infrastructure) determines the transaction cost (packaging rental charge) per standard packaging item. This cost per item escalates the further away a supplier is from its terminal (i.e. source of packaging). The distances between suppliers and their closest packaging terminal are classified into three zones. The transaction cost is highest for the zone furthest away and is reduced closer the packaging terminal. Hence, to cut packaging and transportation costs, there is a decrease in the spectrum of available standard packaging with respect to one-way, dedicated packaging, or different sizes of returnable packaging, with increasing distance between packaging terminal and the supplier.
Decision point I:
The packaging procedure map is initiated by the decision whether to employ standard or dedicated packaging. The governing guiding principles are the geometrical shape of the component in question (i.e. if the shape is suitable for the available standard packaging options or not) and the fulfillment of specified requirements such as sensitivity to superficial damage if the part in question is visible on the final product. Generic standard packaging is selected if these conditions are met by the available options; if not, dedicated packaging is decided on. Dept. A strives to use standard packaging to the greatest possible extent whenever applicable.

Decision point II:
At this decision point the packaging selection supplier guide again plays a key role in terms of the characteristics of geometry, weight and desired workload. Besides these constraints, the geographical distance between the supplier and its most adjacent packaging terminal and hence, the total cost of packaging and transport determines the range of standard packaging alternatives available for each supplier. One-way packaging is used when no transport infrastructure exists at the distance in question or when the components are too bulky for standard packaging.

Decision point III:
At this point, with the help of the guide, the supplier suggests a standard returnable packaging that already exists in the standard packaging range, or has decided that the product requires standard dedicated packaging. More specifically, standard dedicated packaging applies when the geometry of the product is incompatible, the quantity of product packaged in the returnable packaging is not sufficient for the set time of labor and/or exceeds the set weight limits, the returnable packaging choice is ruled out, and the outlined dedicated packaging procedure is followed.

Decision point IV:
Either a volume purchase of an already existing packaging concept is placed or a new or modified packaging is generated. The prerequisite enabling a volume purchase is a fruitful collaboration between Dept. A and the product design department. To keep the types and number of packaging at a minimum level, Dept. A tries to influence the product development department to design products in the same categories with equal features, without compromising the functionality. In doing so, the need for new and diverse packaging is decreased and the efficiency of the combined product-packaging system is increased. Dept. A can also adjust the packaging to products of the same category, though with slightly different features, by developing several unique fits in the same packaging. In other words, the existing packaging fulfills multiple needs and simultaneously reduces packaging costs. The suggestions from Dept. A to the product development department often go hand in hand with the desires of manufacturing (i.e. improvement of the packaging enables a more effective and efficient manufacturing site). Advances made in co-operation decrease the packaging costs. In case a slight modification of an already existing packaging concept is necessary or a brand new packaging is required, the outlined procedure is implemented.

Decision point V:
The decision on whether to outsource or not is highly dependent on resource utilization, not in monetary terms but in terms of personnel resources and core competence. The predominant choice is, however, the employment of a third party design unit. Nevertheless, the design is developed in a collaborative manner.
4.2.2. Department B

Decision point I:
The packaging procedure starts with a decision on the action necessary to meet the packaging need. The rationale for modifying an existing packaging is the observation that it does not meet its requirements. In contrast, the development of new packaging stems from the need of a new component.

Decision point II:
Cost calculations are essential for the selection of packaging at this point. The decision on returnable packaging versus one-way packaging is determined by the overall lowest total cost of packaging with regards to material, handling, transport, and storage.

5. ANALYSIS AND DISCUSSION

The study reveals that the two departments have similar procedures and guiding principles in certain matters and different one in others. Below the packaging procedures and guiding principles at the decision points will be discussed.

5.1. The packaging procedures

The two packaging procedures presented differ in the order of activities as well as in how they correspond to theory. The package planning phase suggested by Bramklev (2009) is not included in Dept. A’s packaging procedure (Fig 4.1), however, the department claimed to have a database of former packaging selection procedures where inspiration is taken for coming activities in the procedure. The activities following the third decision point in the packaging procedure (Fig. 4.1) are comparable to Bramklev’s (2009) second and third phase of the packaging development process, except that financial considerations are not included in her phases. However, in Fig. 4.1 there is no clear distinction of what activities that belong to the second or third phase; they are instead intertwined. The fourth phase of the packaging development process, production ramp-up, is included in the sub-activities of the purchase phase in Fig 4.1. The package planning included in Bramklev’s (2009) first phase is not included in Dept. B’s packaging procedure. However, the department addresses the need for such a forum. Such a forum might reduce the number of dedicated packaging developed and assist in the desire to serve the need with as few packaging types as possible. The activities following the involvement of the third party unit and ending with the packaging number identity (Fig. 4.2) are comparable to Bramklev’s (2009) package conceptualization phase. The subsequent five activities are included in Bramklev’s (2009) package designing phase. The purchase phase in Fig 4.2 incorporates the activities included in Bramklev’s (2009) third phase, package designing.

Moreover, the procedures employed by Dept. A are fundamentally equal to the procedures in the overall manufacturing system at Company A. Dept. B aims to apply the product design department’s processes to the development and selection procedures for packaging. In other words, Dept. B’s current packaging procedure will change in the future. The set-up of using a packaging process that is structurally similar to the already well-established product development processes is supported by Bramklev (2009).

The two departments differ in their degree of requirement specification of what packaging type is to be delivered by the supplier to the company in question. Dept. A has set requirements based on the packaging selection guide, the prevailing production philosophy,
and the factors affecting the decision points. Packaging selection problems are overcome by creating an understanding among the suppliers of the input components in the processes at Company A. Dept. B, on the other hand, claims to have issues in the cases of black box suppliers in defining what type of packaging is to be delivered by the supplier to the company. These differences imply that the two departments view suppliers in different ways.

The total cost estimation plays a salient role in the selection of packaging at both departments. At Dept. A, the second decision point is affected by the total cost of transport and packaging. These cost considerations are in line with two of the five costs considered by Mollenkopf et al. (2005). Dept. B’s second decision point is dominated by the total cost of one-way packaging and returnable packaging with regards to material, transport, handling, and storage. According to Mollenkopf et al. (2005), a cost model used for the selection of packaging type should include the container cost, transportation cost, labor cost, disposal cost, and recycling cost. In the case of Dept. B the material cost, transportation cost, and handling cost correspond to the costs considered necessary in theory. The costs of disposal and recycling mentioned in the literature are not included in the cost calculations for the second decision at Dept. B. Chan et al. (2006) state that the actions taken by the packaging and product design departments are determined by the cost evaluation of the packaging system.

Both departments aim for standardized procedures. Dept. A has already implemented them, whereas Dept. B is in the process of doing so. According to Garcia-Arca and Prado (2008), successful development of a packaging design model is facilitated by standardization of formats, dimensions, and quality of packaging.

Dept. A’s early engagement in product design development is supported by Bramklev (2009) and Zacharia and Mentzer (2007). Additionally, collaboration between the product design function and the packaging function is considered necessary to develop a successful packaging design model (Garcia-Arca and Prado, 2008). The cooperating activities between the product and packaging design units correspond well to the opinions of Klevås (2005) and Zacharia and Mentzer (2007) for achieving cost reductions and higher effectiveness. Dept. B is in the process of establishing collaboration with the product design department. Collaboration between the supplying actors and the packaging department is more prevalent at Dept. A than Dept. B.

Garcia-Arca and Prado (2008) discuss the set-up for implementation of a successful packaging design model on a more strategical level, whereas the case study packaging departments deal with packaging activities on a tactical level. The case study reported on in this paper addresses the phenomena on the tactical level. The four basic decisions made in the packaging design model presented by Garcia-Arca and Prado (2008) do not deal with the choice of different packaging types or the influences of the selection, but on the external features and functions of an already selected packaging. Garcia-Arca and Prado (2008) also address the necessity of relying on the packaging hierarchy to identify packaging alternatives. The findings of this study do not support this belief, since the packing hierarchy is not considered in either of the two companies in packaging selection. The correlation made to the packaging hierarchy at Dept. A was rather to adapt the packaging to the load carrier to facilitate transport.

### 5.2. The decision points

The lack of theory with regards to the factors influencing the decision points calls for comparisons between the two packaging departments studied. The first decision point at Dept. A does not have a corresponding decision point at Dept. B. Adding this type of decision point to Dept. B’s working procedure might call for a procedure not exclusively ending up in...
dedicated packaging. In the current state, all packaging developed at Dept. B is dedicated. This further implies that the cost and effort of the entire packaging procedure at Dept. B could be reduced by initially considering standard packaging. The second decision point at Dept. A corresponds to the second decision point at Dept. B. At Dept. A, this decision resulted in an implemented packaging solution at an early stage, or to proceed with the returnable packaging path outlined. The third decision point at Dept. A has no analogous decision point at Dept. B. Nevertheless, the engagement of Dept. B’s component suppliers in the selection of packaging could strengthen the supplier relationships and thus remedy the lack of knowledge of how to deal with black box suppliers. Dept. A’s fourth decision point is akin to Dept. B’s first, except that Dept. A also considers the suitability of already existing packaging solutions. A regular collaboration between Dept. B and the product design department as well as the aforementioned forum could give rise to consideration of already existing packaging solutions. The reasons for modifying a packaging, however, are different between the departments. In Dept. A, a modification is carried out to add necessary features to an existing packaging. At Dept. B modifications are carried out to remedy dysfunctional packaging. The fifth decision point at Dept. A does not have a stated equivalent decision point at Dept. B. However, despite the lack of this point at Dept. B, both departments have a close collaboration with the outsourcing unit. Table 5.1 depicts the decision points and their guiding principles.

Table 5.1 Each decision point and associated guiding principles.

<table>
<thead>
<tr>
<th>Decision point</th>
<th>Guiding principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>• Geometrical shape</td>
</tr>
<tr>
<td></td>
<td>• Fulfillment of specific requirement</td>
</tr>
<tr>
<td>A2</td>
<td>• Total cost</td>
</tr>
<tr>
<td></td>
<td>o Packaging and transport</td>
</tr>
<tr>
<td>A3</td>
<td>• Set time for labor</td>
</tr>
<tr>
<td></td>
<td>• Weight limit</td>
</tr>
<tr>
<td></td>
<td>• Geometrical shape</td>
</tr>
<tr>
<td>A4</td>
<td>• Multifunctional purpose</td>
</tr>
<tr>
<td></td>
<td>o Outcome of collaboration</td>
</tr>
<tr>
<td></td>
<td>• Cost</td>
</tr>
<tr>
<td>A5</td>
<td>• Resources</td>
</tr>
<tr>
<td></td>
<td>• Collaboration across functions</td>
</tr>
<tr>
<td>B1</td>
<td>• The origin of the need</td>
</tr>
<tr>
<td>B2</td>
<td>• Total cost</td>
</tr>
<tr>
<td></td>
<td>o Material, handling, storage, and transport</td>
</tr>
</tbody>
</table>

Neither of the departments focuses exclusively on environmental benefits as guiding principles. Dept. A states that the use of stackable and/or foldable returnable packaging gives rise to less voluminous transport of empty packaging and hence is environmentally beneficial.
The environmental considerations at Dept. B deals with reduction of the amount packaging material and use of returnable packaging.

6. CONCLUSION AND FURTHER RESEARCH

Parts of the activities in the two packaging departments are comparable to the packaging development phases suggested by Bramklev (2009). Nevertheless, the relevant theory does not in depth consider the guiding principles that govern the packaging practice and ultimately the selection of packaging. The theory as well as the case study described in this paper indicate that the selection of packaging is influenced by several factors. The case study presented in this paper shows that the predominant guiding principles influencing the selection of packaging are total cost, standardization, production philosophy, and collaboration between functions. The factor that is most salient as well as common is the total cost of packaging related activities. The factors that separate the departments the most are the degree of established working methods and the attitude towards collaboration between different interested parties. Unlike Dept. B, Dept. A involves its component suppliers in the selection of packaging. This involvement is enabled by clearly stated regulations on the type of packaging to be used and the conditions that should prevail to employ a certain type of packaging. Similar relationships are lacking at Dept. B.

This paper contributes knowledge of the packaging selection procedures and guiding principles employed in two different businesses. The author intends to perform a corresponding case study at packaging manufacturers. Further research of the common denominators and the differences found is needed to complement and expand the findings, preferably in other businesses in order to broaden the perspective and enhance the body of knowledge in the area.

The practical implications of the study include an increased understanding of the guiding principles and their influence on the packaging selection process. This can have a positive financial impact, enhance the performance of the supply and demand chains, and decrease environmental impact.

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