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OPPORTUNITIES AND BARRIERS IN THE DEVELOPMENT OF SUSTAINABLE PACKAGING FOR THE AUSTRALIAN FOOD INDUSTRY

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1. Introduction

For more than three decades packaging have been in the global debate considered as principal user of material resources and waste generator. Yet, the most significant environmental impacts resulting from packaging are lock-in at early stages of the development and manufacturing of packaging-products (Lewis & Gertsakis 2001). The Australian packaging industry is still in early stages of addressing environmental impacts of their activities and products, particularly there are concerns about how to address them through changes in manufacturing, design, logistics, marketing and business structures and relationships (Fitzpatrick et al., 2007) as sustainability is notably hindered by the character of current economic and business relationships (James et al., 2005).

In respond to these concerns, in 1999 the Australian National Packaging Covenant (NPC) was first introduced as a voluntary agreement between all levels of government (Federal, State and Local) and the packaging supply chain (brand owners, manufacturers, retailers and fillers). The Covenant is based on the principles of shared responsibility through product stewardship, including the effective design and operation of kerbside recycling systems. Some of the key performance indicators are related to the packaging manufactured by a company or specifically to the design, manufacture and distributions processes. A few relevant points are:

- To establish a framework to obtain national consensus on a definition of 'sustainable packaging systems'.
- To engage the packaging supply chain, consumers, environment groups and policy makers in a debate about sustainable packaging principles, goals and strategies.
- To reach consensus within key stakeholder groups about the need to integrate sustainability objectives in the design and management of packaging systems along the supply chain.

The previously mentioned initiatives have fostered improvements in the environmental performance of packaging. Nevertheless, these changes are still far from addressing all the environmental issues of the packaging sector and this is also applicable to other products too (Baumann et al., 2002). In some cases, organisational issues might interfere; in other cases the information will simply not be obtained and processed in the most critical stages. Eco-design methods, tools or documentation tend to be oriented towards environmental experts and not necessarily designers or marketers. This model in which external experts have the environmental knowledge of the product could result in the following: (Collado-Ruiz, 2007):

- Environmental issues are only addressed in very specific moments during the process.
- The need for a stronger link between different departments.

Therefore, implementing a corporate strategy that faces sustainability will not neccesarily imply that the decisions made by designers – or other decision-makers – will result in the development of more sustainable products, if the very critical parts of the process do not address this matter. The mere existence of environmental information is therefore not enough to ensure the delivery of environmentally sound products.

2. The research project

In order to contribute to the sustainability discourse in Australia and deliver appropriate recommendations to industry regarding their journey towards sustainable packaging the research project "Sustainable Packaging for the Australian Food Industry: Opportunities & Barriers" was carried out by the Centre for Design (RMIT University) in Melbourne. This study consisted of formally inviting leading food and beverage packaging companies as well as packaging experts within Australia to participate in a series of interviews to discuss the following points:

- People involved (both directly and indirectly) in the packaging development process.
- Decisions made by these people.
- Interactions (formal or informal) between those involved in the process.
- Additional types of interactions derived from considering sustainability in the process.
- People who consider sustainability in the company, and their perception of the rest of the system.
- Barriers to the development of more sustainable packaging.
- People who are perceived as potential contributors to an increase in the sustainability of the product.
- Opportunities for a more efficient implementation of sustainable packaging design.

To encourage companies to participate in the study, a report with results and strategies was offered. The content of the report depended on the level of involvement they selected from the three available, as shown in table 1.

Table 1. Three different levels of involvement for the studied companies

LEVEL OF INVOLVEMENT	POTENTIAL PARTICIPANTS	SCOPE	PROPOSED OUTCOME
Design-oriented	Designers & marketers	Initial stages of the packaging development process	A general guideline & assessment criteria for the packaging developing process
Development-oriented	Packaging technologists, environmental managers, engineers	Complete packaging development process	A report with and outline of particular strategies
Company-oriented	People from all along the company involved directly or indirectly in the packaging process, such as CEO's or business managers	Complete model of the company	A comprenhensive design of a strategy for each company's particular case.

A positive response for participating in the study was obtained from 3 brand owners, 2 packaging development-manufacturer companies, one supermarket (including its food and beverage brand), 1 independent studio and 1 government representative with a total number of 14 participants among them.

3. Methodology

To gain a greater understanding, both researchers attended all the interviews and audio-taped them to facilitate the transcription and coding for analysis. The interviews consisted of 7 questions about the

packaging development process. After a brief introduction of the purpose of the study, the main question was posed: *How would you describe the development process of a new packaging system: from initial idea to final product?Focusing on who is involved in the process and what decisions they make?*
After this, they were enquired about their decisions in the process, and notes were taken about all the departments and people mentioned during both questions. The rest of the interview consisted of asking interviewees to describe their relationship with each of the people they had mentioned in the first questions.
The rest of the interview included the discussion of a packaging project in which environmental criteria was considered, and another one in which it was not. Part of the interview evolves around those case studies, and around the participant's perception of other people's decisions and contributions. This provided an insight of the barriers for incorporating sustainable principles to the packaging development process.
From the transcriptions, a preliminary model or series of models were generated independently by each researcher to understand the packaging development process described and how sustainability is addressed.These models allowed to clearly identify the role of different people in the process as well as to point out the differences regarding decision-making processes between packaging manufacturers and brand owners and design consultancies. In addition to this, each researcher generated a set of recommendations derived from those models and case studies. At this stage, both interpretations were compared and common points were extracted. For example, it was important to point out the fact that design consultancies have very different relationships with others involved in the developing process compared to those within brand owners. Those dissimilarities could help to identify some obstacles when considering sustainability.
The findings presented in this paper only include those from companies that participated in the design-oriented and the development-oriented levels. Althought just preliminary results have been developed, some of the patterns can be pointed out. These initial findings serve as a guide, but final results will be obtained once the transcription and coding is finished, and when a complete model of the process is expected to be generated.

4. Initial outcomes

This section will present the initial findings from the interviews carried out at the time of presenting this paper. Althought the project has not been finalised, some patterns in the packaging decision-making processes can be pointed out already.

4.1 Definition of the models

Although the models developed for each one of the companies are different, there are some common patterns that can be considered for futher understanding of the conclusions. The development processes described fall onto two different types: step-by-step and stage-gate.
On the first one, teams respond to a functional definition. Information is passed from one team to another according to the level of definition of the project. For example, there could be a marketing team that develops a brief that the goes to a design team, and from them a series of concepts go to an engineering team. Disagreements between teams are mostly addressed with information feedback, iterations or passing information back to previous teams.
In stage-gate models, a holistic product team is formed at the beginning, with members from each of the company's functions. It remains similar along the whole process, with more or less importance of the different functions depending on the level of development of the product. In this case, disagreements are dealt in the team meetings.
However, some points are common for all the processes. The process will generally start out with a sales goal or strategy that is passed on to the marketing department. There, it is defined up to a conceptual level. Some process are flexible enough to allow other types of beginnings, such as ideas from employees or technical advances that engineering has been working on.

In all the cases studied, for completely new product designs, a purely design stage might take place. This will normally be the case when there is a considerable change in the packaging format. However, this stage will mostly take place either within the marketing or the engineering departments. Design departments existed in 4 out of the 6 companies studied, although mostly within marketing or engineering departments. Generally, decisions regarding format, shape, color or labeling will be taken by marketing, whilst materials, shape refinement and processes will be decided by engineers. For companies that do not manufacture their own packaging, technical details are discussed with the final manufacturers.

Environmental considerations tend to be assigned to particular people within the process. In most cases, an environmental expert is appointed as the person in charge of environmental considerations, and this person is provided the information and tools to assess such performance. One of the interviewees was concerned with the cost of initiating such systems. Since the most cost-effective alternative is to keep the amount of people who need additional formation to a minimum, this alternative seemed optimal. In most cases, a particular department (environmental or engineering) has the responsibility of monitoring the environmental performance of the product along the whole process. In two of the interviews, there was one person in charge of sustainability.

A final remark about the structure would point at the corporate influence in how the process is carried out, and how sustainability is addressed. In those companies where a strict process can be identified, being any of the models described before, sustainability is addressed in a much more standardized way. Environmental reports can be mandatorily generated in one of those gates or stages, thus forcing the consideration of the environment in the process. Speciffic feedback loops can also be defined for particularly positive or negative environmental results.

4.2 Motivations for different departments

Drivers for packaging industry tend to be quite similar from case to case. Most of the new product or packaging proposals (and in some companies all of them) will be oriented to a cost reduction or to a sales increase. In some isolated case studies, a project be driven by environmental concerns. Interviewees were asked about projects in which the environment had been strongly addressed, and nevertheless only 4 out of the 16 projects explicitly mentioned had started out from an environmental driver.

Nevertheless, in four of the companies, the environment is considered a stop/go criterion: when the product has an additional environmental impact when compared to previous options or to reference products, the people responsible for the project will have to justify the advantages of the proposal from a customer level. In one of the companies, in case of great increases on impact, person in charge of the environment must report to corporate level, which encourages the consideration of sustainability along the whole process. "*The power of having an elevation process is of absolute importance in order to ensure that putting any sustainbility system in place is used when it should be used*".

These economic and sales goals will generally be the information given to the marketing department to prepare a brief. This department, according to many of the interviews held, tends to concentrate on the consumer's perception, and therefore is mostly oriented to sales increase. Sustainability at this level is considered only from the point of view of the consumer, and therefore only those issues that the user is aware of, or concerned with, will be included. In general terms, these have been relatively unimportant, but increasing awareness in the Australian market has increased this factor. Nevertheless, very little information on sustainability can be found which is oriented to marketers. In most interviews held with the people in charge of the environment, marketing is perceived as a driver opposite to sustainability. For all 5 interviewees in charge of environmental considerations, most arguments related to sustainability come from this conflict.

From the point of view of most of the other people involved in the development process, the main driver is still cost. Two of the interviewees stated, most probably out of environmental concern, that "there is still too much focus on cost", and find it as a barrier towards more sustainable packaging. Nevertheless, there were also three interviewees from different companies who exposed that cost had been found to be relatively correlated to environmental impact, and therefore a fairly appropriate driver also in sustainability matters. *"... unless there is a big technology break, you typically find that*

the comercial reality, in dollars, lines up very very closely with the environmental impact, because the amount of dollars covers off the amount of energy needed to make the [product]…". One of the most influent parameters in packaging sustainability is considered to be, in general, weight, and "*[downgaging for cost reasons] aligns closely with also environmental [drivers]: the less packaging there is, the cheaper it is*". However, most engineers mentioned the barrier of the current cost of recycled content in comparison to the price of virgin material, as well as the excessive price of materials derived from renewable resources.

In the particular case of designers – both those in the engineering or technologist's department in charge of the design of the product, or those in which there was a purely dedicated design function – in 3 cases a very important duality was perceived. On one hand, it is common in industry to include reference products – normally the market leader – that the designer should imitate, thus giving them a merely mechanic task of copying facets and style. The level of compromise in regards to the environment in that sense is very low. On the other hand, there is an increasing trend in design and marketing to face the designer with the global picture. In this second model, the designer does not only have to define the characteristics of the product, or copy the style of a reference, but has to understand the complete behavior of this packaing along its life cycle. They have to go beyond that initial state of defining the color or the decoration aspects, and include additional functionalities such as an extended life or secondary uses. Furthermore, a potential point attributed to designers in this sense is the possibility of seeing how the consumer will interact with the packaging, making it part of their lifestyle. This implies not only considering the environmental side, but also the social and economical implications of this life cycle (Avendano, 2007). From the designer's point of view, this duality is particularly strong, since it is perceived as a struggle between what they should be doing for sustainability and what they are asked to do most of the time. Management and engineering are also starting to face this aspect.

4.3 How sustainability has been addressed so far

Several different strategies have been adopted, mostly depending on the packaging development process previously in place. In general, some person or department is appointed to be in charge of the environment, and several environmental checks are carried out for packaging changes. The only interviewee that refered to this declared that this environmental assessment was only done when there was a change in format, since the rest of the times previous information could be reused.

4 out of the 6 companies spoke about the use they made of the PIQET© software as an environmental analysis tool (SPA, 2007). This tool uses Life Cycle Assessment (LCA) with a simple interface. A pre-selection of environmental impacts and scope assumptions are embedded in the tool, so that the user does not require extensive knowledge on LCA to perform a proper analysis.

This tool is specially tailored for packaging companies, since it addresses their specific needs. It is also a context-oriented tool, providing with relevant information for Australia: it assists them in the generation of the NPC reports and it contemplates those environmental impacts that are relevant in the Australian contex.

PIQET© adds a numerical input to the process in regards to the environmental impact, allowing the evaluation and assessment of those projects that represent a considerable environmental concern or that are going to entail a higher future impact.

As has been mentioned, most of the interviewed companies had filtering processes, by which all projects that potentially represented a higher impact would be scanned and, if they did not comply with environmental criteria, they would be pushed backwards for readdressing or justification. There is even a case in which if the environmental impact was of a particular magnitude, the project could reach corporate level. This measure obtained very positive results, even though for the moment there has been no report that has reached such level.

4.4 Roles of different people towards sustainability

One of the most remarked roles in this sense has been that of the marketing function or department. Both from within and from outside, 5 of the interviewees perceived that decisions taken at this point will have a great consequence in the final outcome. Moreover, for all these interviewees, decisions

regarding the directions in which to drive the product are set as the origin of the impacts. Nevertheless, the general perception is that this department has to ensure other much different needs, and that this problems come from a lack of correlation between the market drivers and the environmental drivers.
Those who didn't associate the critical decisions to marketing did so to the customer or the consumer. It is important to mention that many of the mentioned companies develop packaging for brand owners of the food industry. These include both big and small food companies, but in all cases they have the last word as to what has to be designed. Some of the interviewees associated the first lock-in of the impacts to the customer, and some of them extended this responsibility to the final consumer, in attention to which those specifications are set. "*... some of the customers tend to be more switched on because of this tripple bottom line thing. […] Others, they just want to take the market and stay away from the bigger guys*".
However, environmental concern is increasing every day, and some interviewees from marketing seem to be aware of including these considerations. Even in these cases, marketers tend to have little information or knowledge about environmental criteria or about the environmental impact of their decisions. The marketers approached in this study demanded more information oriented to them, that could be used without the need of detailed data.
There were also remarks as to the options marketers have to select. A complaint was arisen as to the level of information given by packaging manufacturers or materials suppiers about their environmental performance. Even in the case of there being environmental information, there is no consensus as to what is better or worse for the environment for a particular case. This type of clarification, would be highly relevant in the obtention of more sustainable practice in the packaging sector.
Another group that has a decisive role in the achievement of sustainable packaging is general management. In the most initial stages, they set the goal for the project team, so commitment with this cause requires of sustainability criteria to be included from this point onwards. Furthermore, it has been shown that companies with a strongly organized system, in which measurement processes can be established, provide results that are perceived as much better for including sustainability criteria.
In general, this corporate commitment should be influenced to every one in the process. Therefore, each person will have a different role. However, the rest of the roles are perceived as already considering these criteria in a significant level.

5. Conclusions and further development

From the findings presented, several initial recommendations can be given. Most of them fall under the consideration of one of the previously mentioned issues, although some of them come from a global picture of the packaging development process.
Firstly, more emphasis should be given to sustainability in the **initial stages**. In general products, it has been attributed in literature to design teams, although in the case of packaging the main department involved in this initial definition, as to the extent of this recommendation, would be marketing. Therefore, an increase in the environmental knowledge of this group needs to be addressed.
The knowledge need is twofold: on one hand more information as to **what is more or less sustainable** is required, as well as what strategies marketers should use when defining information about the product. The magnitude of these decisions should be considered, and compared to the rest of the market information. The other type of information need refers to **options** (material, format,…) available for selection at this stage. In some cases, information might be sought from manufacturers or suppliers, but most commonly they do not have environmental information ready to be provided.
Following this point of view, there is a need to understand different market drivers that can motivate a company to deliver more sustainable products, and therefore provide information for marketers to base their decisions also on these factors. Some research exists, but this area has not yet been transferred to industrial knowledge. Customer pressure needs to be addressed, and for that the customer must know about the environmental performance of packaging. Therefore, a strong point must be made arount the concept of **consumer education**. Packaging includes, by law, a large amount of information about the packaging and the product. Environmental information is thus very difficult to transmit to the final consumer. This field is challenging, and at the same time inexplored.

Another key point is the influence of **corporate involvement**. Ranging from putting the services into place to setting up a sustainability strategy, the role of the business in the everyday running is very important. Nevertheless, it cannot be expected to deliver sustainable products by just setting the mechanisms: they must also be checked and constantly readdressed. Studies such as this one provide the background to update organisational models and to adapt them to a constanly changing context of environmental concern. The company has to make sure that the people taking the most sensitive decisions are also considering environmental criteria.

There is a common pattern in several companies as to overseas influence. In bigger companies, the environmental and sustainability decisions from the corporate level tend to reach the Australian context in a very structured way. On the other hand, in environmental matters, many companies are looking at what is happening in other places such as Europe or the U.S., since the future context is bound to be similar to this.

It is thus critical to take into consideration this context. This is the reason why tools such as PIQET have had a considerable acceptance in the packaging sector.

At this stage, the remaining of the transcriptions as well as coding and analysis of the interviews is being carried out. This will allow a further definition of the ideas mentioned in this paper, as well as a rigorous analysis of the vocabulary and concepts used by the interviewees. The magnitude of the similarities and common grounds of the different companies studies, as well as the differences between them, will be assessed.

A point onwards from this study is the development of recommendations not only for packaging developing companies, but also for other stakeholders involved in this process such as governmental agencies, consumer associations or NGOs.

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