Packaging-integrated-products:
Capturing new opportunities in the front end of product development

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Abstract

Purpose: The purpose of this paper is to examine how firms manage the front end of new product development projects where packaging forms a core part of the product itself. Within the fast moving consumer goods industry innovation provides opportunities to create packaging that forms an integrated part of the product offering. We refer to these as packaging-integrated-products. Our study conceptualises three levels of integration and investigates how they impact upon the management of the front end.

Design: The study consisted of a two phase design. This involved a preliminary study with key informants followed by a multiple case study design, which examines product development projects with differing extents of packaging integration.

Findings: Our results identify nine different new product opportunities. We also present eleven propositions that reveal the key characteristics of the front end of packaging-integrated development projects, as well as the project management requirements to capture the opportunities they present.

Research Implications: Initial insights into a number of unique front end project management characteristics required to deliver different project types form an area for further research to better understand product packaging integration. The propositions presented guide the way forward for future studies.

Practical Implications: The findings provide marketers with new understanding of three types of new product opportunities presented by packaging integration and demonstrate what is required to capture the opportunities they present in the front end of product development.

Value: The paper contributes to extant studies of packaging development in the marketing literature, which have previously failed to capture the high levels of integration between packaging and the product. We present a new conceptual approach to understanding integration and subsequently uncover how the opportunities it presents can be captured.

Keywords: New product development, Frond end innovation, Packaged Foods Sector, Packaging innovation, Packaging.

Introduction

Packaging development plays a central role in the creation of new products in across each sector of the FMCG industry (e.g. food, drink and household goods) (Ahmed et al., 2005; Simms and Trott, 2014). Organisations are increasingly looking to packaging to revitalise mature products, differentiate them, and achieve higher price premiums (e.g. Wansink and Huffman, 2001; Wells *et al.*, 2007). Thus, scholars have argued that packaging is a priority issue within new product development (NPD) (e.g. Orth and Malkewitz, 2008; D'Attoma and Ieva, 2020), that should be managed simultaneously with the product in NPD projects (Ahmed et al., 2005; Simms and Trott, 2010). A number of factors have led to an increased importance of packaging, these include the following: growing competition from retailers own label brands, increased logistics costs, concerns over sustainability and food waste, and older consumers' abilities to live independent lives (e.g. Ford *et al.*, 2016; Keranen et al., 2021; Rundh, 2005; Vazquez *et al.*, 2003).

Our paper argues that the high levels of integration between packaging and the product, beyond its marketing communications and branding functions, have not been captured by either existing studies of packaging or new product development. We argue that packaging can form an integrated part of the product itself. Thus, it provides marketing and product development managers in the fast moving consumer goods industry (FMCG) with opportunities for innovative new products. This industry is characterised by relatively low levels of innovation, which hinders the performance of firms (Rudder et al., 2001). Research shows that packaging is key to the success of product innovations (D'Attoma and Ieva, 2020). It is surprising therefore that it is also frequently overlooked within NPD in favour of decisions around cost reduction (e.g. Ahmed et al., 2005; Francis et al., 2008; Simms and Trott, 2014). There are a few high profile products from across the FMCG industry which highlight that opportunities exist for clever packaging-integrated-products. For example, in the drinks sector, the development of the in-can system enabled Guinness to compete in the market for at-home consumption, likewise coffee brands such as Nespresso are using pod-based systems to deliver fresh convenient coffee. Further, within foods, microwavable rice, and ready-meals rely on their packaging for heating. We refer to these as 'packaging-integrated-products'. These examples of successful innovations have not only disrupted their respective product categories, they have also frequently become synonymous with a particular brand.

Despite this, few studies have examined product packaging development. Our empirical study of packaging is positioned within the front end stages of NPD (e.g. Floren and Frishammar, 2012; Floren et al., 2018; Stevens, 2014). The front end begins with the

conceptualization of basic ideas and reaches an end when these are formed into a product definition (e.g. Eling and Herstatt, 2017; Gama et al., 2021). Whilst these early project stages are of critical importance, theory on the front end is weak (Floren et al., 2018; Suddaby, 2010). Our emphasis enables us to examine the characteristics of the front end of packaging-integrated NPD projects, as well as the requirements to capture the opportunities they present. A criticism of previous studies of NPD is their failure to capture packaging activities, beyond the development of label reprographics (see Anselmsson and Johansson, 2009; Francis *et al.*, 2008; Simms and Trott, 2014). Empirical studies examining packaging innovation are scarce (e.g. Keranen et al., 2021; Lorenzini et al., 2018) and even fewer have focused on development processes. Simms and Trott's (2014) study of packaging management provided exploratory insights into FMCG firms management of packaging development. They revealed the significance of new packaging activities, leading the authors to call for in-depth comparative studies in practice, to examine the management of packaging within NPD projects. In response to this call, our study aims to provide a first step towards empirically understanding the management of the front end for NPD projects involving the development of packaging-integrated-products. Specifically, we address the following research questions: (i) How is the front end for the development of packaging-integrated-products characterised? (ii) What are the project management requirements necessary within the front end for the development of packaging-integrated-products?

Prior studies of NPD fail to account for the different management requirements for different projects (e.g. Sauser *et al.*, 2009; Salerno *et al.*, 2015). Specifically, when it comes to the front end, there is a need to understand the different requirements for different project types and different contexts (Floren et al., 2018; Nobelius and Trygg, 2002). By contrast, our research focuses specifically on understanding the front end of packaging-integrated-products. We combine insights from prior studies on food consumption and packaging to develop a new conceptual framework that reveals three different types of packaging-integrated-products: i) convenience, ii) inseparable, and iii) dependent. The existing marketing literature fails to capture the product opportunities that these types provide to firms.

We provide three contributions to the literature. Firstly, we contribute to the research undertaken by Underwood (2003) who identified the opportunities of consumers 'lived experiences' in their homes. We generate a matrix that identifies nine unique packaging-integrated-product types. Secondly, we contribute to Simms and Trott (2010) who developed a conceptual framework for the generation of new product ideas in the front end. We have provided an empirical study that reveals the distinct characteristics of the front end for

packaging-integrated-products. Finally, we reveal the front end project management requirements necessary for packaging-integrated-products. In doing so, our study contributes to the limited research on the differing requirements of different project types (e.g. Floren et al., 2018; Nobelius and Trygg, 2002). Our analysis leads to the generation of propositions that guide the way forward for future studies.

The paper proceeds as follows. We begin with a literature review, followed by an overview of the conceptual framework of packaging-integrated-products. Next, we describe the research design and data collection. We then provide an overview of the findings and cross case analysis. Finally, we present conclusions, implications, and research recommendations.

Literature review

Front End of New Product Development in Packaged Foods

The front end of NPD is the initial period in a project that involves the generation of new product ideas and the decision whether to commence formal development (Floren et al., 2018; Kim and Wilemon, 2002). Within these early stages opportunities are recognised, refined, and their legitimacy is established (Floren and Frishammar, 2012). Reflecting this, a recent systematic review identified a robust product definition as one of the most critical of success factors (Floren et al., 2017). Despite the recognised importance of the front end, the literature needs further conceptual development. Notably, differences in the front end and its management requirements across different contexts and project types has not been captured (Floren et al., 2017; Nobelius and Trygg, 2002). Studies have not examined the packaged foods sector.

Within the mainstream marketing literature, the limited studies on packaging development have either been conceptual in nature (e.g. Simms and Trott, 2010; Ahmed *et al.*, 2005) or investigated particular phenomena, such as logistics or sustainability (e.g. Keranen et al., 2021; Rundh, 2005; Vernuccio *et al.* 2010). Scholars have argued the potential advantages of concurrently managing product and packaging development (Ahmed *et al.*, 2005; Simms and Trott, 2010). Yet it appears firms fail to create a pipeline of new concepts (Ahmed *et al.*, 2005; Simms and Trott, 2014) with low levels of innovative products (see Rudolph, 1995; Trott and Simms, 2017). This has detrimental effects on firm performance (Fuller, 2004; Richmond, 2004).

These weaknesses have led to calls for further research (Ahmed *et al.*, 2005; Rundh, 2005; Simms and Trott, 2014; Trott and Simms, 2017). We argue that a lack of studies specific to the packaged foods sector[1], combined with the one-size-fits-all approach (e.g. Salerno,

2015) adopted within existing process models in the food industry, has resulted in a failure to account for the significance of packaging development. The section that follows presents a new theoretical approach to understanding packaging's integration within the product offering and forms the basis for our investigation of the management of product packaging at the project level.

Conceptualising Packaging's Role in New Product Development: Packaging-integrated-products

Prior research on packaging's contributions to the product can largely be classified into three streams, each of which we classify as a low level of integration. Table I forms the rationale for Figure 1 and underpins the following discussion. It provides the support for our distinction between the different streams of prior studies and captures these streams supported by selected examples of key studies. Notably Table I reveals that whilst opportunities exist to increase the contribution of packaging to the product, enabling it to add value and become a critical part of the offering that is integrated to its consumption, this has largely been largely overlooked. We identify the three main streams of studies that have examined:

(i) packaging's basic functions, namely protection, containment, and identification; e.g. Lee and Lye, 2005; Stewart, 1996; Vidales Giovannetti, 1995.

(ii) its role as a marketing communications tool; e.g. Ampuero and Vila, 2006; Davies and Wright, 1994; Han and Pandelaere, 2021; Marckhgott and Kamleitner, 2019; Nancarrow et al., 1998; Prendergrast and Pitt, 1996; Swahn et al., 2012; Underwood and Klein, 2002.

(iii) the ability of packaging designs to become an integrated part of consumers perceptions of the product; e.g. Becker et al., 2011; Berg-Weitsel and van de Laar, 2001; Celhay and Tringuecoste, 2014; Jinkarn, and Suwannaporn, 2015; Little and Orth, 2013; Orth and Malkewitz, 2008; Reimann et al., 2010; Silayoi and Speece, 2007; Underwood, 2003.

Each stream has tended to emphasise the functions packaging can perform *for* the core product. Our paper argues the need for a new perspective that recognises the potential for packaging to become a core part *of* the product and the subsequent new product opportunities this presents. We refer to these as 'packaging-integrated-products', which are defined as: Products for which the packaging plays an important role in the use,

[1] The packaged foods sector forms a significant sector of the Fast Moving Consumer Goods Industry (see Trott and Simms, 2017), which reached a value of £62 billion (c. $84 billion) in the UK and a total of $571 billion (c. £421 billion) in Western Europe in 2018, with households consuming almost four times more packaged foods than fresh products (Euromonitor, 2018).

consumption or quality of the product at one or more phases of the consumption process. We argue that not only is it necessary to distinguish between products in which packaging is integrated, as opposed to those for which it is not, but also that our understanding can be improved through the identification of differing extents of integration. Expanding on the above definition, this is dependent on two variables:

Functional Product Integration: The first variable (horizontal axis Figure 1), by which we establish integration, is broken down into six levels, based on the extent to which the packaging contributes to the product's utility or function. Table I links each level to the three existing streams of studies, revealing that packaging which is integrated with the product has largely been overlooked. Underwood's (2003) study provided initial insight into two different types of product-packaging relationships. Firstly, at the point of sale, the structural and visual elements of the packaging generate symbolism for the product and communicate its attributes. Secondly, within the consumers home, the packaging's functionality and its ability to communicate a product experience play a key role in determining the consumers relationship with the product through 'lived experiences'. Our research specifically focuses on the latter three levels (captured in the lower half of Table I). These represent an increasing level of integration, in which the packaging either:

(iv) simplifies aspects of the product's use; e.g. Simms and Trott, 2010; Rundh, 2005; Underwood, 2003.

(v) contributes to the preparation or consumption of the product, or

(vi) is integral to the product's consumption or its quality.

Consumption process: The second variable (and vertical axis) originates from the food provisioning process, which identifies the key stages in the acquisition and consumption of foods that impact upon satisfaction (Goody, 1982; Marshall, 1995): acquisition, preparation, cooking, eating, and disposal. Focusing on the activities related to preparation, cooking and eating, we suggest that integration can be measured by the number of activities to which the packaging contributes. This provides a novel perspective which differs from prior packaging studies, which have focused largely on pre-consumption and the point of sale (evidenced in Table I).

INSERT TABLE I ABOUT HERE

We draw these two elements together in Figure 1 which presents our conceptual framework of product packaging integration. This consists of two axes that capture the varying extents to which the packaging contributes to the product offering, which we refer to as integration.

The framework portrays the relationship between these two elements. It consists of three main types of packaging-integrated-products:

- Type I- Convenience packaging: The presence of the packaging facilitates use and if it were removed the consumer would be inconvenienced.
- Type II- Inseparable packaging: The consumer does not differentiate between the product and its packaging, which enhances key aspects of the consumption experience.
- Type III- Packaging dependent products: The consumers experience and evaluation of the product are dependent on the packaging, which is inseparable. Without the packaging, the entire consumption experience and/or quality would be diminished.

INSERT FIGURE 1 ABOUT HERE

Figure 2 integrates the preceding discussion and distinguishes between the integrated and non-integrated functions of packaging. We argue the need for a new approach that accounts for the increased role played by packaging activities within projects in a firm's portfolio. The potential for improving the management of packaging within the front end of NPD and capturing the opportunities it presents can only be achieved through an understanding of the differing levels of product-packaging integration. We aim to characterise the front end of NPD management for packaging-integrated NPD projects, which will optimise NPD opportunities. In particular, the preceding review and Table I identify the lack of studies examining the development of products in which packaging forms an integrated part of the offering and thus underpins the following research questions addressed in our study: (i) How is the front end for the development of packaging-integrated-products characterised? (ii) What are the project management requirements necessary within the front end for the development of packaging-integrated-products?

INSERT FIGURE 2 ABOUT HERE

Research Design and Methodology

Given the limited research into the management of packaging within NPD, this study adopted an inductive exploratory approach (Strauss and Corbin, 1998). We have adopted the grounded theory methodology advocated by Gioia et al. (2013). Our data collection consisted of multiple longitudinal case studies (of FMCG firms), examining embedded cases of NPD projects (e.g. Eisenhardt, 1989; Yin, 2009). This was considered appropriate for three main reasons. Firstly, it was consistent with our study of NPD, which is dynamic and process in nature (Aaboen *et al.*, 2012). Secondly, it is well suited to study the overall picture

and context using a longitudinal approach (Dyer and Wilkins, 1991; Eisenhardt, 1989). Finally, it strengthened validity, through the comparison of findings across a range of situations, pattern matching, and observations of managerial actions over a period of time (Eisenhardt, 1989; Yin, 2009). This methodology closely follows other works involving front end theory building (e.g. O'Connor and Rice, 2013; Stevens, 2014).

The data collection consisted of two phases. In its entirety the data collection spanned the period of March 2016 to December 2019. The initial phase involved a broad pilot study to explore the proposed framework. This informed the second main multiple case study data collection phase. Our pilot stage was conducted with twenty-one key informants from our research project informant database (see Appendix A). These informants were selected on the basis of their expertise with respect to packaging development. We explored their experiences of product and packaging development management, and presented them with the framework, which enhanced our discussion and enabled them to better understand and articulate different project types (e.g. Dubois and Araujo, 2007).

Case Study Selection and Unit of Analysis

We selected seven separate cases from a detailed database consisting of a total of thirty-eight projects (current and historical). This database is formed from a larger ongoing collaborative research project within the sector. The cases are selected from four firms: two retailers (private label NPD) and two branded manufacturers. The pilot stage of the data collection informed the selection of our cases. Through consulting experts in the field (see Johnson and Christensen, 2004) we were able to obtain a consensus over the applicability of our initial framework and the three main product types identified. This enabled us to follow the principles of purposive sampling to select cases representing four key project types: non-integrated, convenience, inseparable, and dependent (e.g. Patton, 1990). We decided to choose fewer cases based on their validity and rich insights, in comparison to randomly selected cases (Flyvberg, 2005). Despite the limitations of such a research design, we believe it is well suited to providing new insights within this area of underdeveloped theory and to achieve analytical generalisation (e.g. Eisenhardt, 1989).

Case Study Data Collection and Analysis

The data were collected through forty face-to-face interviews, with a total of thirty two interviewees involved in the projects (see Table II, company names are omitted for confidentiality). Interviews ranged from one to three hours. As Yin (2009) recommends, protocols were created for each interview, which were rooted in our intention to explore the activities and factors involved in the front end (Miles and Huberman, 1994). Deviations from

the protocol were allowed to explore fruitful points. Notes were taken and triangulated with data collected through our access to pertinent departments, observed meetings, and documentary data, such as project schedules, written reports, briefs and dossiers, and project meeting minutes (e.g. Yin, 2009). Combining these measures enhanced the validity of the interview data and avoided biases or inaccuracies in the recalling of events (e.g. Maxwell, 1996).

INSERT TABLE II ABOUT HERE

Our analysis followed a three-step grounded theory approach (Gioia et al., 2013; Strauss and Corbin, 1998). Initially, we focused on each individual case, beginning with the development of first-order categories and subsequently second-order themes. Interview transcription was followed by repeated reading, which enabled the researchers to become familiar with the data. In this first stage the researchers made notes and marked down initial ideas for coding (Braun and Clarke, 2006). In this open-coding step we utilised informant statements to develop codes. The second step involved axial coding, in which we connected codes that were related in order to form initial more abstract preliminary categories. In the second key step we iterated between our coding and the data itself. This enabled the research team to refine our initial categories. Comparing different project types further enhanced this analysis process. To resolve any disagreements the researchers undertook a complete content analysis. Finally, categories were classified into themes that summarized the core unifying dimensions (Strauss and Corbin, 1988). In this process we also sought to understand how these themes interacted.

Throughout this process each of the researchers communicated to discuss the methodological decisions employed (LeCompte and Goetz, 1982). The researchers also reviewed each other's interview transcripts to ensure consistency in the analysis (e.g. Simms and Trott, 2014). We also used research assistants to review transcripts and parts of the data, as well as the final report (Yin, 1994). As well as ensuring the reliability of our coding, this allowed us to eliminate any ambiguous components or potential overlaps between the elements of our mapped data structure. The researchers developed several conceptual models in an attempt to capture the interrelationships. Following the completion of this process our findings were sent to interviewees and follow up discussions were conducted to confirm the accuracy of our understanding. Figure 3 provides an overview of the overarching dimensions, themes and codes generated through our data analysis. Appendix B provides evidence to support our coding, in the form of selected representative quotes.

INSERT FIGURE 3 ABOUT HERE

Analysis of Results

This section presents the results of our analysis of the two phases of data collection. Firstly, we discuss the opportunities uncovered for packaging-integrated-products. Within our analysis, we present propositions identifying the front-end characteristics for packaging-integrated-products and the management requirements necessary to deliver them.

Packaging-Integrated New Product Opportunities

The results of phase one enabled us to gain an understanding of the applicability of our conceptual framework of product packaging integration in practice. For example, we uncovered sub-types of dependence: *"I think there are products where the experience of the consumer is massively simplified or assisted throughout their use of the product [in other cases] the actual product quality and characteristics are dependent on the packaging, such as the new roast chicken bags that help to create a better and safer result"* (I18). Likewise, we were able to differentiate between different types of inseparable packaging: *"consumers liked the new resealable soup containers we recently launched as you can microwave in the pot, they are easy hold when hot and resealable, then we have also got a porridge pot you just add milk to… both are inseparable, but the latter is playing more roles for the consumer"* (I19). Based on these findings, within the original three types (convenience, inseparable, dependent), we uncovered a total of nine specific product opportunities. This enabled us to populate a framework, which includes examples of new products (Figure 4).

Interviewees frequently described how developing products with a higher level of integration held the potential for greater opportunities than the food itself. Linking this to our subsequent phase two findings, in Project VI for example: *"a new to market innovation that would provide us with a unique, value added, offering. Fish itself offers little opportunity for differentiation so this would enable us to charge a premium… it's a significant opportunity for the category"* (C1). In Project V, it was highlighted that wine itself offered few opportunities to improve sales beyond the selection of different varieties. The project: *". . . warranted investment as portion sized wine is relatively price elastic . . . we should be able to increase our premiums through a change that increases convenience for consumers, turning the packaging into the product"* (C5).

INSERT FIGURE 4 ABOUT HERE

Despite the opportunities presented by packaging-integrated-products, informants described difficulties in capturing them. Differences in the management of the front end were described between products that were integrated and those that were not. This further informed our second data collection phase, the results of which are presented in the sections that follow.

Project Characteristics

The first aggregate dimension uncovered by our analysis identified the specific characteristics of the front end of packaging-integrated NPD projects, which are summarised in Table III.

INSERT TABLE III ABOUT HERE

Firstly, packaging-integrated-products were characterised by increased project management complexity. This was due to an increased level of technical packaging considerations and interrelationships between the packaging and food product; this also influenced the production process. Thus increasing packaging integration commonly resulted in a prolonged front end during which each of these aspects were addressed. Further, this complexity increased the level of perceived risk. The industry is characterised by high volume production processes and packaging change is largely constrained to smaller modifications to the design and artwork on packaging. Hence our informants described significant challenges to ensuring each project progressed through formal evaluations. Thus, we propose:

> *Proposition 1:* Increasing the integration of the packaging with the product results in an increased scope of activities due to resulting effects on the food product, production process, and on suppliers. This increases project complexity and perceived risk, which hinders the progression of projects beyond the front end.

Secondly, our cases uncovered differences in the characteristics of the front end for each of the packaging-integrated project types. Existing process models suggest that packaging activities occur late within projects and are design orientated (e.g. Francis *et al.*, 2008). By contrast within packaging-integrated NPD projects the front end was characterised by either concurrent or integrated product and packaging development activities. Thus, different projects resulted in different front end characteristics (Floren et al., 2018; Nobelius and Trygg, 2002).

Product and packaging development activities were described as concurrent within convenience projects, whilst it was necessary for them to be extensively integrated within

dependent projects. High levels of packaging integration required packaging to be considered from the outset in order to ensure a clear and defined product and packaging concept emerged. This was evident in the wine and fish cases, classified as inseparable and dependent projects respectively. Within the wine glass case, the packaging team *"worked in parallel… tasked with identifying what new opportunities might exist"* [C1], this was possible as *"when developing the packaging there was no need to establish how it functioned with the wine itself to ensure a convincing case for the project"* [C2]. In the case of the fish project it was critical to *"demonstrate and clarify the feasibility of the packaging from a product and production perspective, which formed an integral part of the early development to gain support"* [C1]. The integration of these activities underpinned the reduction of risk and ensured that the proposed product was perceived as viable amongst decision-makers. Initial prototypes were created and tested on the product, and the team conducted basic production experiments and consumer tests. Prior research has demonstrated the importance of product definitions (Floren et al., 2017). Our findings reveal the need to clearly define the packaging, product and process within integrated projects. This leads us to propose:

> *Proposition 2:* Increasing the integration of the packaging with the product requires the concurrent integrated management of product and packaging development activities in the front end.
>
> *Proposition 3:* Projects with increased integration of the packaging with the product require a formalised packaging, product and process definition prior to successfully progressing beyond the front end into formal development.

Building on prior studies suggesting the benefit of concurrently managing product and packaging development activities (Ahmed et al., 2005; Simms and Trott, 2010), the above findings reveal how this influences project management in the front end.

Finally, the nature of existing supplier relationships held the potential to hinder project progression, creating a path dependent effect: *"we have been using this same packaging format with almost no change for over thirty years. This has enabled us to develop a core competence in the technology and lower our costs to about as lower level as can be possible…. [However] It would be extremely costly to switch to another type of packaging, even small changes would have a big impact... on us and our established suppliers who are reluctant to incur high costs…"* (Project VII, D1). Hence supplier relationships and the core competencies developed between food firms and their suppliers created a path dependence (e.g. Leonard-Barton, 1992). This in turn held the risk of constraining the scope of packaging opportunity identification. Thus:

Proposition 4: The ability to capture opportunities for products with increased integration between the packaging and the product in the front end of product development is hindered by the path dependent nature of long-term packaging supplier relationships.

Each of the above characteristics formed challenges when managing the front end. The following section reveals the project management requirements necessary to address them.

New Product Development Process Organisation

Our second aggregate dimension uncovered two NPD process management characteristics that contributed to the consideration of packaging-integrated-product opportunities within the front end. Firstly we uncovered, the significance of a process framework within the organisation or strategic business unit that captured the integrated functions of packaging. Models, tools and checklists used to assist in project management often failed to address these aspects of the packaging and this risked opportunities being overlooked. The likelihood of opportunities being overlooked was reinforced by *"little incorporation of packaging within our evaluation gates"* (A2). Hence this lack of formalization heightened the risk that opportunities for integration would not be captured. By contrast, packaging-integrated development cases highlighted that these projects were commonly supported by management procedures that assisted opportunities being captured. Notably, in Project VI one informant discussed that: *"our frameworks place a high emphasis on packaging. Its explicitly stated as a priority in our product development strategies and this is transferred down into our process… Packaging is integrated as a core activity in each stage and the checklist's we use require the packaging team to 'sign off' on the format that has been proposed... We are required to work together to demonstrate how we have evaluated that the packaging is optimal for the product and its use"* (C4). Existing studies of NPD highlight the importance of a structured process (e.g. Cooper, 2008; Cooper, 2019; Cooper *et al.*, 2002), our insights reveal the need to ensure formal frameworks capture the integrated functions of packaging with respect to the product's use, consumption and food quality. Thus, we propose:

Proposition 5: The extent to which an organisation's new product development framework captures all opportunities from packaging is positively associated with the level of integration of packaging in the front end.

Second, the project manager further influenced the orientation of activities. This was particularly important when the initial project brief was constructed, for example in Project III: *"initially the brief that was put together had emphasised redesigning the existing packaging.*

The project manager had worked together with the marketing team…. He had overlooked the potential to move beyond the existing packaging…. [Hence] We were ultimately fortuitous to uncover the opportunity for the squeezable pack during idea generation" (A2). By contrast, within both the Fish and Wine cases, the project manager's each perceived packaging as playing a potentially critical opportunity. For example: *"My perspective was… The packaging offered us the opportunity to add value to the Fish in several respects… for me it was integral to the brief to incorporate the cut of the fish itself, the sauce and the pack"* (C4). Prior studies have identified the important role of the project manager in the front end (Kim and Wilemon, 2002). We reveal that the extent to which the manager considers packaging as an integrated and potentially value adding part of the product influences the orientation of activities:

> *Proposition 6:* The extent to which the project manager conceptualizes packaging as an opportunity to add value within the consumption of the food product is positively associated with the level of integration of packaging into the front end.

Role of Marketing

The third aggregate dimension identified the role of marketing in capturing opportunities. Our interview results revealed that many managers argued that new product opportunities were overlooked. Marketing managers were under pressure to improve sales: *"Often the emphasis is so heavily on improving sales and shelf presence, how consumers interact with the packaging and use it beyond this point barely receives attention…. Small changes to the label are easy and hold the potential for an immediate sales bump, but the potential for whole new products can easily be neglected"* (A1). This was evident within Case I, where the Marketing Manager's emphasis was on consumer brand perceptions within different stores. Consequently, the team did not acknowledge opportunities to enhance its contributions beyond the point of sale. In the packaging-integrated development projects, managers demonstrated a greater emphasis on the packaging's contributions to the product's use, leading to the identification of opportunities: *"It's critical to look at how the packaging can add value when the consumer is actually using the product, I think that is part of the marketing team's role… we were looking for those opportunities for the pack to help the consumer"* (C7). These findings build upon Simms and Trott's (2014), who identified the influence of marketing on the emphasis of development activities. Hence:

> *Proposition 7:* Where marketing and brand managers in the product development team possess a high level of awareness of packaging's contribution to the product's

use beyond the point of sale, this is positively associated with the identification of opportunities for increasing the extent of packaging integration in the front end.

Marketing's influence was also evident within the consumer research. This influenced the scope considerations: *"Brands often put a great deal of effort into understanding how different packaging formats are perceived on the shelf, optimizing designs and how to attract attention…. The actual use of the packaging after it is purchased often receives less attention…"* (D5). By contrast, capturing opportunities for packaging-integrated-products required a consideration of the complete 'journey' of the consumers use of the packaging post-purchase: *"We have a twelve-stage model through which we analyse the steps involved in the use and consumption of our products. We can utilise this to gain detailed insights into how they use it in their home and where packaging can make a greater contribution or solve problems"* (B1). This was evident in Project V, which was initiated as a result of the findings of focus groups that examined consumers preparation and use of the product: *"…consumers consumption of fish was reduced as …they do not like preparing fish, because of the smell it left on their hands and which permeated their home… We also found that consumer's are not confident in their ability to cook fish"* (C4)]. These insights led to the exploration of a new pouch within which: *"the fish can be steamed perfectly to deliver an improved flavour and texture"* (C1). Likewise, in the wine project, consumer research identified that the format was mostly used for *"picnics and 'on the go' consumption… consumers don't want to carry a glass and bottle separately"* (C7). Simms and Trott (2014) identified that an emphasis on consumer research can risk a focus on costs. Yet, in our study incorporating the consumer journey with respect to preparation, cooking and eating played a key role in uncovering opportunities. Thus, we propose:

> *Proposition 8:* The incorporation of the complete packaging user journey, coupled with increasing the extent of integration between the packaging and the product, within consumer research is positively associated with an increase in the identification of opportunities for integrating packaging and the product in the front end.

Role of Packaging

Increased packaging integration resulted in better technical activities in the front end. Within both the inseparable and dependent projects a technology gap was evident. The technological change required heightened concerns over the increased complexity, higher costs, and notably the costs of introducing a new packaging format into the production process. This in turn presented challenges to project progression. This impacted on the contributions of packaging personnel. For example, the wine glass was a new to industry

format, whilst the fish pouch involved *"significant application development to modify an existing format for meat.. as a result we had to work closely with the production team and other functions to find solutions to deliver the project"* (C3). Hence their role in integrating production managers and engineers, as well as networking with both packaging and equipment suppliers, underpinned the identification of potentially viable production solutions, formed key activities for packaging team members. This proved decisive in mitigating concerns over the required production investments.

Building upon the insights of Simms and Trott (2014), our findings reveal the need to include technical packaging personnel within the front end. The above findings identify their boundary spanning role networking and utilizing knowledge between internal groups (e.g. Friedman and Podolny, 1992), they helped to keep an idea 'alive and active' (Conway and McGuiness, 1986: p. 287). Hence we propose:

> *Proposition 9:* The integral involvement of technical packaging personnel from the initiation of a product development project is positively associated with the ability to identify the opportunities presented by increasing the extent of integration between the packaging and the product.
>
> *Proposition 10:* Where technical packaging development personnel act as an internal boundary spanner, proactively integrating activities with ensuring feasible production solutions are identified, this is positively associated with the ability to capture opportunities presented by increasing the extent of integration between the packaging and the product.

Packaging personnel played a second boundary spanning role, which also proved central in redressing supplier path dependence. They frequently proactively undertook extensive searches for potential suppliers of new technologies and worked with existing suppliers to uncover solutions, whilst ensuring these could be delivered at an acceptable cost. In the case of the wine glass format: *"a search began to identify potential packaging suppliers interested in jointly developing a format... we had to identify external partners to uncover production solutions to deliver the proposed packaging"* (C1). The team negotiated with the co-packer to agree a joint equipment investment, which proved crucial to the project's progression. Likewise, within the 'spread project', the team proactively sought to identify a solution that would reassure management: *"we identified production experience for 'doy' packs in another SBU... the investments were lower than anticipated"* (B2).

Further supporting the important role of technical packaging personnel, both the inseparable and dependent projects were characterised by *"..collaborative technical packaging evaluation"* (C3;D2). Prior studies identify the role of suppliers (Francis et al., 2008). We reveal a second boundary spanning role; integrating internal and external supplier activities and knowledge to ensure that opportunities are captured. Hence:

> *Proposition 11:* Where packaging personnel act as an external boundary spanner, coordinating internal activities with the identification of packaging technologies from external suppliers, this is positively associated with the ability to capture opportunities presented by increasing the extent of integration between the packaging and the product.

Discussion

Research in the marketing management literature has failed "to capture the complexities of new packaging development" (Simms and Trott, 2014, p. 2024), having primarily focused on its ability to enhance marketing communications (Simms and Trott, 2010). It is here that the current research contributes by expanding theoretical knowledge on the opportunities packaging presents and providing new understanding of its management in product development. Our inductive analysis of the Phase One and Phase Two findings enabled the development of a framework, presented in Figure 5. Firstly, in the center, it captures the identified characteristics of the front end of packaging-integrated projects. Secondly, surrounding this, it captures how three interrelated front-end management requirements, which are necessary to ensure opportunities are recognised and subsequently progressed into formal development. This model is grounded in the themes and dimensions discussed in the preceding analysis. We have also identified nine product types that packaging integration can generate. Whilst increased integration is likely to be of benefit to the vast majority of consumers, we recognize it may not add value for all. For example, those consumers with greater time, cooking skills and interest. This reflects the sovereignty of heterogeneous consumers (e.g. Hutt, 1940), who can select products in supermarkets that best satisfy their specific preferences based on an appropriate extent of integration and convenience.

INSERT FIGURE 5 ABOUT HERE

Our research and analysis have shown distinct project management requirements are necessary for the development of packaging-integrated-products (e.g. Floren et al., 2018; Nobelius and Trygg, 2002). These additional requirements represent an increased challenge

to NPD teams at the front-end. Whilst aspects of some of these requirements may seem obvious considerations, such as capturing the user journey, our cases uncovered that an absence of their consideration distinguished non-integrated from integrated projects. Hence, whilst it may be possible for packaging-integrated-product opportunities to be captured with an absence of some of the factors identified in our Framework (Figure 5) a failure to put each in place increases the risk of opportunities for each of the nine product types being overlooked.

Theoretical Contributions

Our study contributes to a small but growing body of literature on packaging development and innovation (e.g. Simms and Trott, 2014; Simms and Trott, 2010; Ahmed et al., 2005). First, we have introduced the concept of packaging-integrated-products and proposed two variables upon which integration is dependent. This enabled us to develop a novel conceptualization of the different types of opportunities that these products can present (Figure 1). Our framework contributes to Underwood's (2003) understanding of product-packaging relationships. Notably, our findings from Phase One provide a detailed categorisation of nine types of packaging-integrated-products. This unique conceptualisation advances understanding of the opportunities that product packaging presents in a new and more systematic way than has been captured previously by Simms and Trott (2014) and Simms and Trott (2010). Specifically, we show that prior studies (see Table I) emphasis on the point of sale fails to recognise the variety of opportunities presented by integrated packaging.

Our study has provided new empirical understanding of the differences in the characteristics of projects with increased packaging integration. The research presented here is one of the first empirical studies to have looked at packaging in the context of front end of new product development. Our findings have provided a first step in responding to Simms and Trott's (2014) call for in-depth comparative studies in practice. The findings of each phase of our study show the distinct characteristics and requirements of packaging integrated projects, and as such address an important gap in the packaging literature. Our results led to the development of eleven propositions, which build upon Simms and Trott's (2010) conceptual paper on packaging idea generation and provide a contribution to new product development theory. An implication of our findings for researchers is that when examining new packaging development it would be wise to consider the need to distinguish between different levels of packaging integration evident within their data and how these could be affecting their results.

Beyond studies of packaging, our research connects to the broader literature on the front end of product development. In particular, we have responded to the need for research on the differing requirements in the management of the front end for different project types (e.g. Floren et al., 2018; Nobelius and Trygg, 2002). We identify seven specific project management characteristics that are required within the front end. Building on Nobelius and Trygg's (2002) identification of differences in the organisation of activities in the front-end phase, we have also revealed how the different types of projects diverged with respect to the contributions of different organisational functions.

Practical Implications

A critical argument of this article is that marketing and NPD managers can capture new opportunities through a recognition of the integration between the product and its packaging. For marketing managers, the matrix presented in our paper provides a more nuanced understanding of the types of NPD opportunities that are possible through packaging development. This leads to several specific recommendations. First, marketers should take into account how a product's packaging can provide greater contribution to the function of the product, such as simplifying its use, assisting in preparation or consumption or even enhancing the quality of the product. Second, marketers should consider how these functional contributions can be enhanced within each stage of the preparation and consumption process. This would allow marketers to expand the scope of product ideas generated.

Our findings highlight the risk to firms of overlooking NPD opportunities by failing to recognise the different product packaging types. The findings provide managers with new understanding of the conditions that must be put into place to deliver the three main types of packaging-integrated-products. This can be addressed by integrating packaging activities into formal development workflows from the commencement of the product development process.

Packaging decision-making is often seen as marketing's domain (e.g. Prendergast and Pitt, 1996). Marketing managers play an important role in ensuring opportunities for packaging-integrated-products are analysed. Each of the projects presented were initiated as a result of marketing research generating relevant consumer insight. Hence appropriate marketing research plays a critical role in packaging-integrated development projects. Marketing must ensure that consumer research extends beyond the point of sale to the 'user journey' to ensure it uncovers all potential opportunities. Our study of packaging primarily has implications for the food and drinks sectors, but also more broadly for Fast Moving

Consumer Goods and other sectors in which packaging is of significance, such as pharmaceuticals. With respect to the latter, for example, enhancements for pharmaceutical packaging could address specific requirements for the elderly and infirm, helping them to maintain independent lives, as well as third party carers.

Limitations and Further Research Directions

As with any empirical exploratory study our research has its limitations and further studies of product development are required to examine the management of packaging activities. Firstly, our exploratory study examined seven cases of NPD projects. Further studies are required to explore each of the nine packaging-integrated-product types identified within our matrix and their characteristics. For example, identifying potentially distinguishing characteristics of the three types of inseparable packaging: i) beneficial, ii) critical and iii) product enhancing. Secondly, our research was confined to the packaged foods sector, whilst packaging is most significant in this sector, our findings are relevant beyond this domain. To understand this, future studies should broaden our understanding to include drinks, household goods, pharmaceuticals and other sectors in which packaging is critical (Simms and Trott, 2014; Lorenzi et al., 2018). Third, survey studies should examine potential differences in the duration, complexity, and success of each project type. Our propositions guide the way forward for future research, which should test each quantitatively and across each of the different project types.

Packaging has a significant environmental impact (Simms et al., 2020); our study has not addressed the sustainability aspects of packaging-integrated-products. Research should examine whether packaging-integrated products impact on waste, for example do higher levels of integration increase packaging volume and thus waste? Packaging integration could also lower food waste, through increased convenience reducing the extent of food left unused and the reduction of errors in cooking for example. Future research could adopt our framework to offer strong guidance to researchers to understand how Front-End characteristics influence the different types of packaging-integrated products. Further research could operationalise the proposed framework to identify antecedents and moderators of packaging-integrated product developments. Such a deeper model could be of help in designing a dashboard for the Front-End journey (e.g. Skora, 2017). Alternatively, scholars could move forward in advancing the theoretical underpinnings of the front-end characteristics of packaging-integrated products as part of new product development theory.

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Table I: Extent of functional product integration and the classification of prior studies

Extent of integration	*Key roles/contributions*	*Classification of key prior studies in relation to packaging's roles and integration with product*	*Proposed characteristics of packaging*
Low extent of product integration	Protection, containment, identification	Studies of packaging's basic functions to the core product: ensuring effective protection and handling of the product in the supply chain, and the communication of the packaging's contents and its correct use to the consumer (e.g. Lee and Lye, 2005; Stewart, 1996; Vidales Giovannetti, 1995).	-Low integration; product may be decanted, frequently disposed of prior to consumption/post purchase. -Little/no contribution to consumption, preparation or use.
	Above, plus contributes to marketing communications	Studies on the optimisation of consumers perceptions of the product through packaging labelling and graphics, as a marketing communications tool at the point of sale (e.g. Ampuero and Vila, 2006; Davies and Wright, 1994; Han and Pandelaere, 2021; Marckhgott and Kamleitner, 2019; Nancarrow et al., 1998; Prendergrast and Pitt, 1996; Swahn et al., 2012; Underwood and Klein, 2002).	
	Above, plus (physical/structural) design contributions to product/brand perceptions	Studies of aesthetic and structural packaging design within marketing, examining their influence on consumers perceptions of the product and brand (e.g. Becker et al., 2011; Berg-Weitsel and van de Laar, 2001; Celhay and Tringuecoste, 2014; Jinkarn, and Suwannaporn, 2015; Little and Orth, 2013; Orth and Malkewitz, 2008; Reimann et al., 2010; Silayoi and Speece, 2007;)	
High extent of product integration	Simplifies aspects of the product's use, increasing convenience e.g. easy dispensing, resealable.	Packaging design and development optimisation frameworks, emphasising the functions packaging must perform for the product within the supply chain, at the point of sale, and in order to meet the basic needs of the consumer (e.g. Rundh, 2005; Simms and Trott, 2010; Underwood, 2003).	-High integration, normally retained until consumption or use. -Commonly influences product quality or characteristics. -Contributes or reliant on packaging for consumption, preparation or use.
	Contributes to aspects of preparation or consumption e.g. microwave rice pouches, pre-apportioned single serving cereals packaged with milk.	*Lack of studies.*	
	Integral/required for the product's use, consumption or quality e.g. microwavable meals, beverage in-can systems.	*Lack of studies.*	

Explanatory note: Table capturing the differing extents of product and packaging integration, which is divided into two main parts: low (upper part of table) and high extent (lower part of table) of product integration. The table also classifies the literature in relation to the differing extents of integration.

Figure 1: Conceptual Framework of Packaging-Integrated-Products

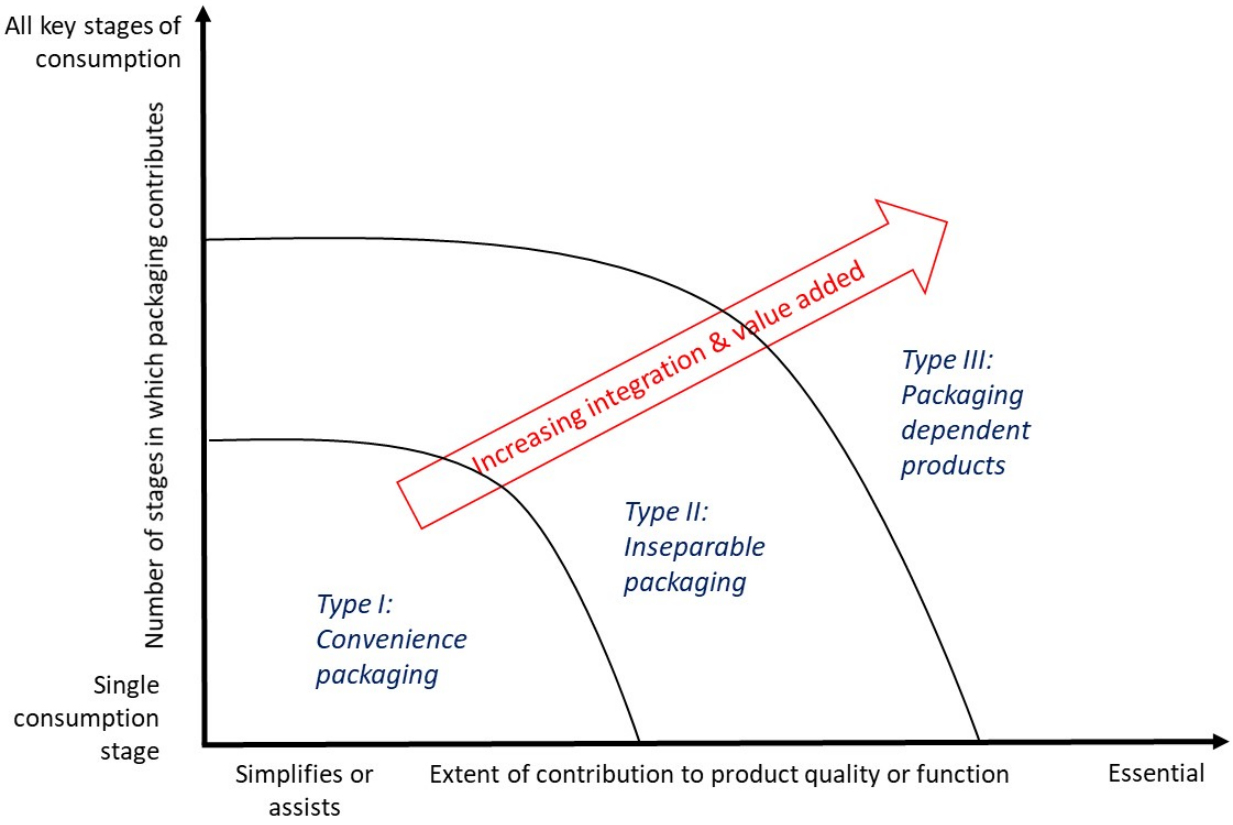
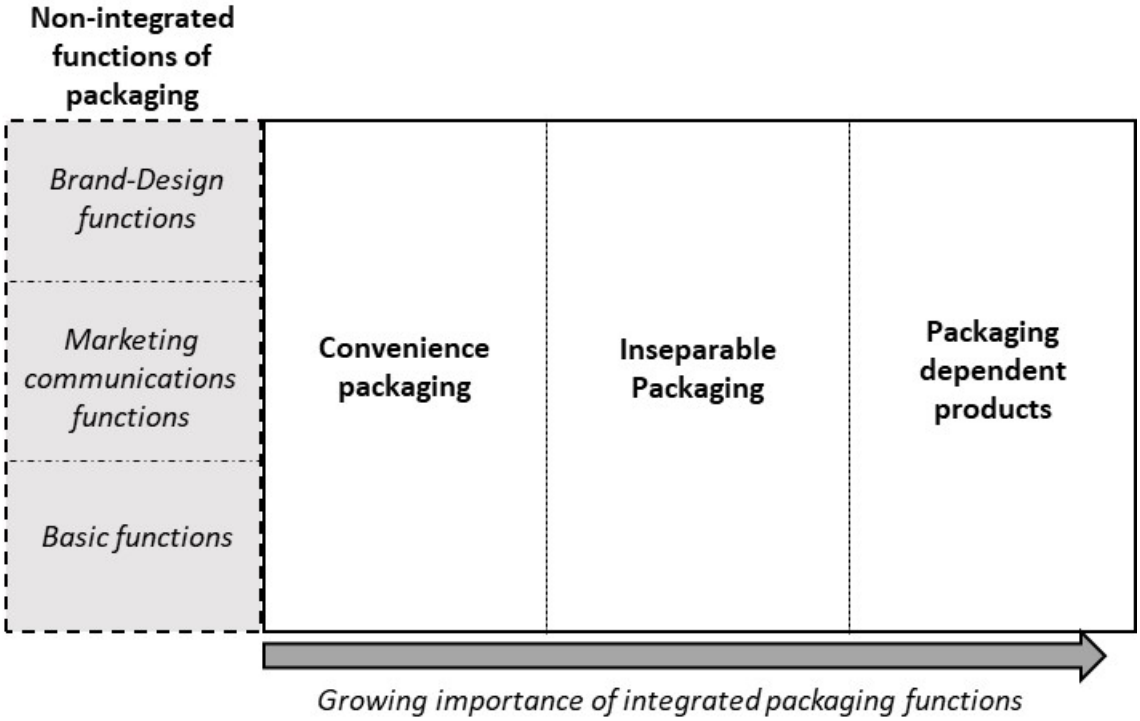


Figure 2: Integrated and non-integrated functions of packaging



Explanatory Note: This brings together the traditional functions of packaging on the left side (in grey) with the three integrated functions of packaging on the right (in white).

Table II: Summary of case projects, classified on extent of integration, and project outcome

Embedded cases:	**Project I: Premium sandwich packaging**	**Project II: Chocolate box for premium chocolates**	**Project III: 'Doy pack' squeezable pouch with nozzle to deliver chocolate spread**	**Project IIII: Plastic packaging format for wrap sandwiches**	**Project V: Wine sealed into a plastic glass**	**Project VI: Sealed pouch for oven cooking pre-prepared fish**	**Project VII: Microwavable gusset bag for heated potato crisps**
Project classification:	Non-integrated	Non-integrated	Integrated: Convenience	Integrated: Convenience	Integrated: Inseparable	Integrated: Dependent	Integrated: Dependent
Case company:	Company A: Premium UK food retailer	Company B: International food and drinks brand owner	Company B: International food and drinks brand owner	Company A: Premium UK food retailer	Company C: Premium UK food retailer	Company C: Premium UK food retailer	Company D: International food and drinks brand owner
Summary of Project:	Aim: improved sandwich packaging format with more premium positioning that clearly positioned brand with a view to extending distribution to petrol forecourts.	Aim: packaging development for new chocolate brand to be sold alongside a premium chocolate brand with box to be designed for mail order distribution	Aim: initial project to redesign an existing tub, unanticipated identification of opportunity for a new packaging squeezable packaging format to enable delivery of chocolate spread directly onto food.	Aim: Development of new sandwich range wrapped in lettuce required new packaging format that would unfold to enable consumers to use as a plate.	Aim: new plastic wine glass format with sealed lid, developed for outdoor use to enable consumers to easily drink the wine directly from the packaging (e.g. picnics and outdoor events.	Aim: new pouch for fish pre-prepared with sauce, to avoid consumers from touching the fish, reduce odors produced in cooking and improve the ultimate result of the cooked product.	Aim: easy to open bag that enables crisps to be served to groups within packaging, whilst also providing the opportunity to microwave the crisps in order to provide a new warm crisp product
Interviewees:	Marketing manager (A1), Head of packaging development and sustainability (A2), Packaging technologist (A3), Buyer (A4), Category manager (A5), Supplier R&D manager (A5).	Head of packaging design (B1), Packaging industrial designer (B2), Product manager (B3), Innovation manager UK confectionary (B4), Project manager (B5), Supplier: technical sales manager (B6).	Head of packaging design (B1), Packaging industrial designer (B2), Packaging graphic designer (B7), Marketing Manager (B8), Project manager (B9).	Marketing manager (A1), Head of packaging development and sustainability (A2), Senior packaging technologist (A6), Product development manager (A7), Supplier: technical development manager (A8).	Head of Packaging Development (C1), Packaging technologist (C2), Assistant head of packaging development (C3), NPD manager (C4), Former head of packaging development (C5), Supplier: innovation manager (C6).	Head of Packaging Development (C1), Packaging technologist (C2), Assistant head of packaging development (C3), NPD manager (C4), Marketing manager (C7), Supplier: technical development manager (C8).	Head of packaging innovation (D1), Technical development manager [packaging] (D2), Head of production [UK] (D3), Head of NPD [UK] (D4), Head of Marketing (D5), Supplier: R&D manager (D6), Development manager (D7).
Final Project outcome:	Product launched	Product launched	Product launched	Definition of technical packaging concept. Failed to proceed into formal development.	Product launched	Definition of technical packaging concept. Failed to proceed into formal development. Supplier later licensed to an international brand and launched.	Definition of technical packaging concept. Failed to proceed into formal development: high perceived format cost and risk.

Figure 3: Data structure

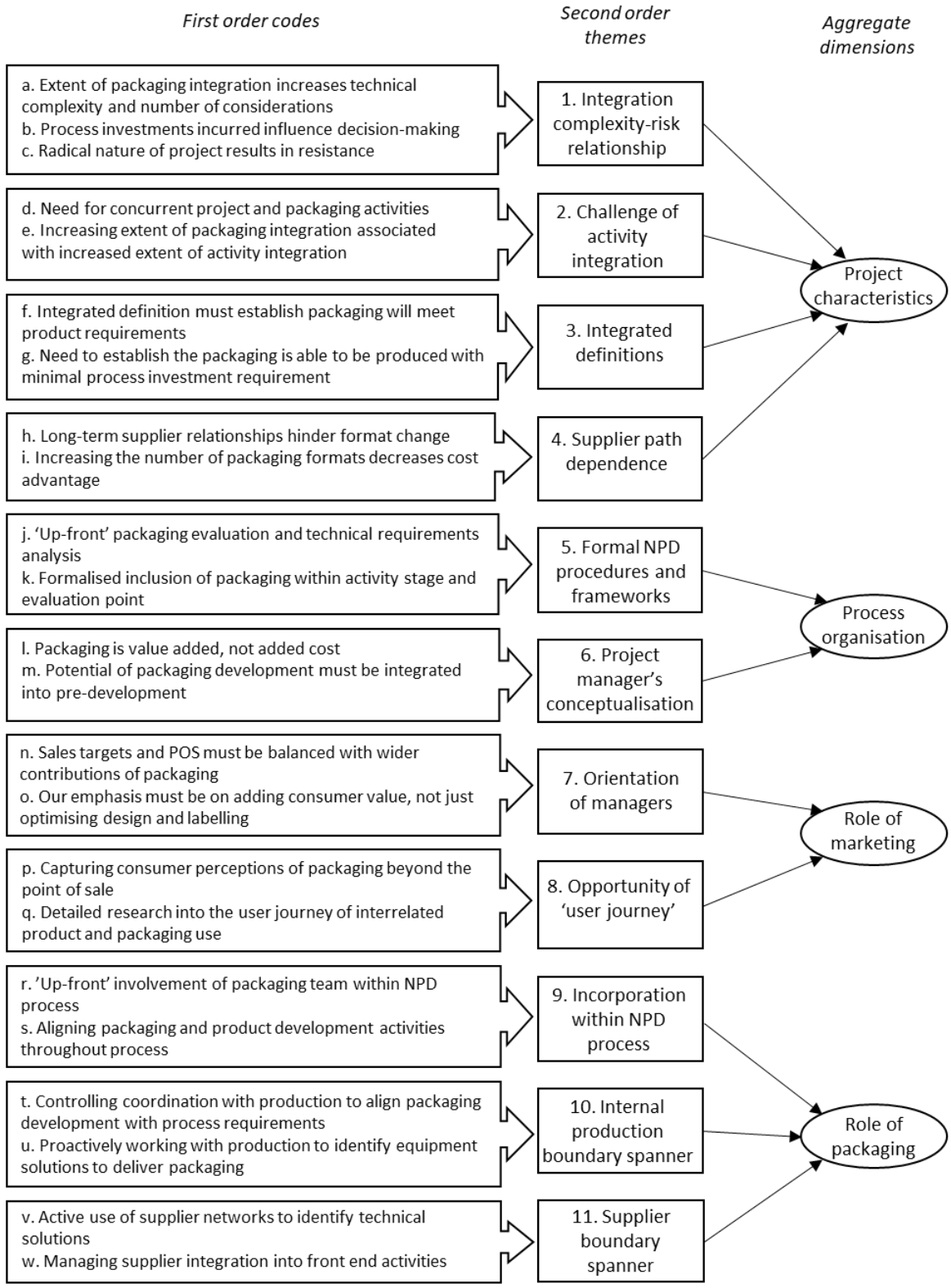
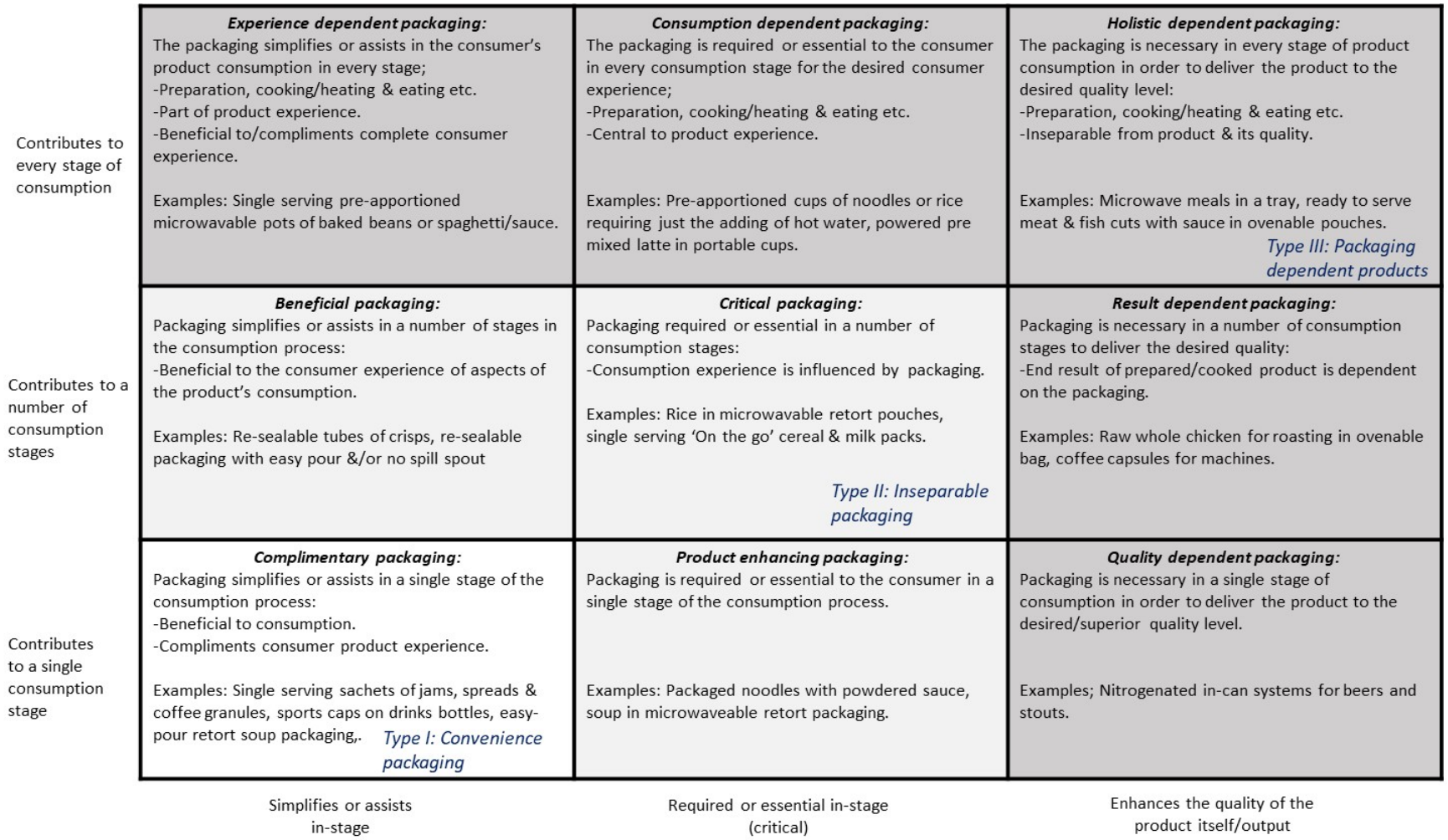


Figure 4: Matrix of Packaging-Integrated-Product Types



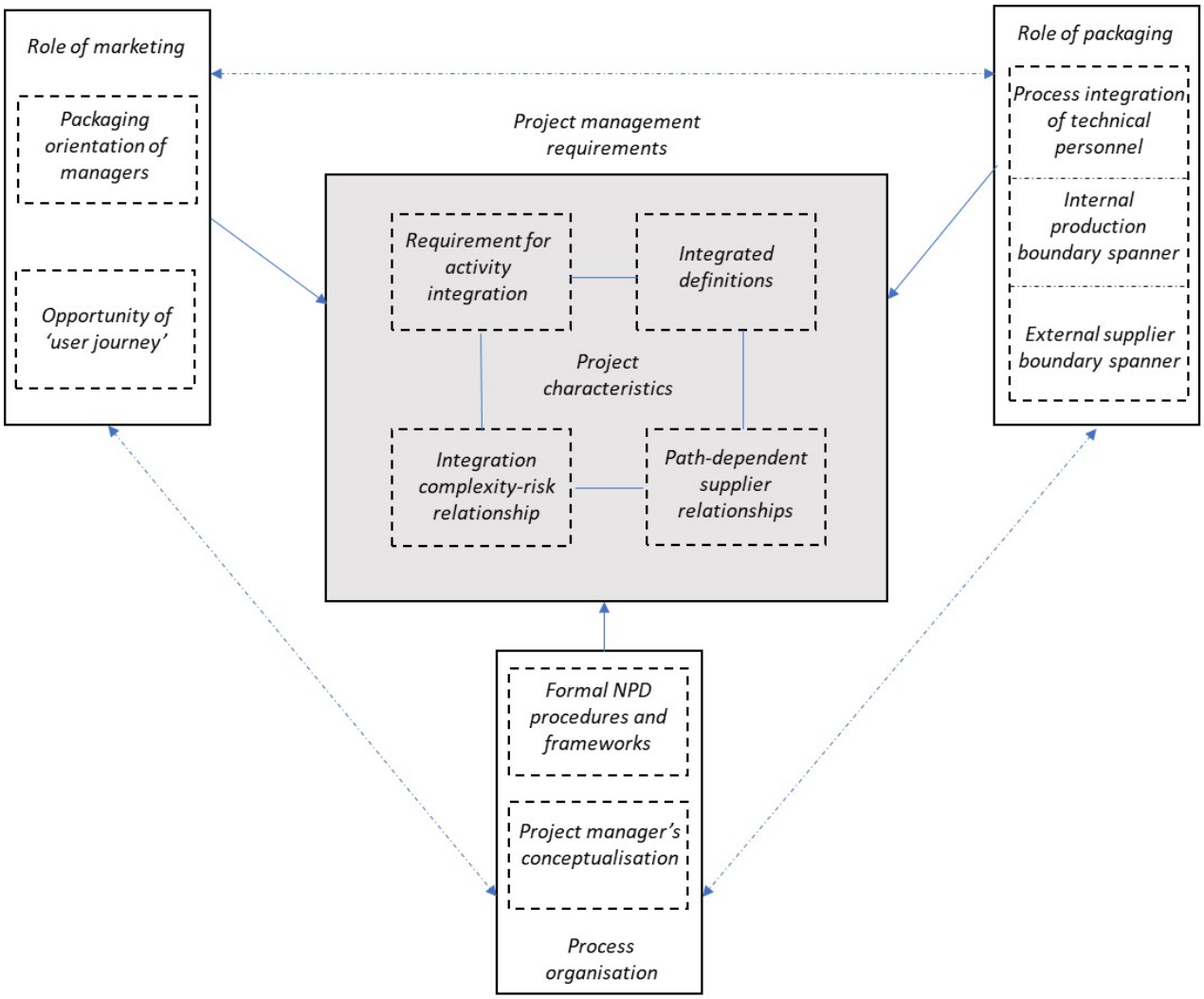
Explanatory note: Figure illustrating the nine main types of product opportunities presented by the increased integration between packaging and the core product.

Table III: Key informant findings on the influence of Packaging-Integrated-Product type on front end of NPD process characteristics

Insights into Front End NPD Process Characteristics	***Non-integrated***	***Type I: Convenience***	***Type II: Inseparable***	***Type III: Dependent***
Project Brief	Core product driven brief	Potentially product or packaging centered	Packaging emphasis	Product & packaging emphasis
Packaging Emphasis	Packaging small aspect of overall project	Short packaging development processes & low technical complexity	Moderate, new to sector	Extended front end with emphasis on packaging and high technical complexity
Initial consideration of packaging in development	Consideration and activities late in process, largely following the front end	Considered within front end stages in project	Considered from project inception	Considered from project inception
Technical packaging challenge	None; application of formats the firm has experience of	Moderate, adaptation of existing format	Moderate to high, may involve new technologies	New format/technology or new to category
Nature of activities required	Emphasis of activities on label or design changes to an existing packaging format	Primarily packaging technical development, testing & refinement for application	Technical solutions critical: technical development & new production equipment installation & investment required	Development of format with core product necessary from project inception. Investment in new production line equipment ultimately required.

Explanatory note: Table summarizing the key findings of the first phase of the data collection, which reveals the differences in the characteristics of the three main types of packaging-integrated-product development projects.

Figure 5: Framework of Front End characteristics of Packaging-Integrated-Product and Associated Project Management Requirements



Appendix A: Summary Phase 1 interviewees, their job role and company details

Interviewee (I)	Employing Organisation, and turnover or number of employees (based on information accessible)
1. Chief Marketing Officer	-Manufacturer and Brand Owner, Turnover £10.5m
2. Head of Packaging Innovation and Sustainability	-Manufacturer and Brand Owner, Turnover £10.5m
3. Chief Marketing Officer	-Snack Foods and Breakfast Cereals Brand Owner, Turnover £18m
4. Chief Executive	-Snack Foods and Breakfast Cereals Brand Owner, Turnover £18m
5. Marketing Manager	-Own Brand and Branded Food Manufacturer, Turnover £7m
6. Head of Marketing (Europe)	-Food and Beverages Brand Owner & Manufacturer, International conglomerate
7. Head of Packaging Innovation for UK SBU	-Food and Beverages Brand Owner & Manufacturer, International conglomerate
8. Head of Packaging Design (Confectionary & Beverages)	-Intl. Food and beverages brand owner & manufacturer, Turnover £1.5bn (UK)
9. Head of UK R&D	-International Packaging Manufacturer, Turnover $8.8bn
10. Vice President Innovations (Europe)	-International Packaging Manufacturer, Turnover $1.6bn
11. Packaging R&D consultant	-Global Consultancy, Not available
12. Packaging Innovation Consultant (22 years experience)	-Consultancy, 10 employees
13. Senior Figure	-Industry body: Packaging, Size: N/A
14. Senior Figure	-Industry body: Packaging, Size: N/A
15. Senior Figure	-Industry body: Packaging and Production Machinery, Size: N/A
16. Partner/Technical Consultant (30 years experience)	-Industrial/Aesthetic Packaging Design Consultancy, 12 employees
17. Packaging Innovation Manager	-Top 6 UK Food Retailer, Turnover £5.6bn
18. Marketing Manager	-Top 6 UK Food Retailer, Turnover £5.6bn
19. Head of Sustainable Sourcing (Packaging)	-Top 6 UK Food Retailer, £16.3bn
20. Head of Packaging (Technical)	-Top 4 UK Food Retailer, £10.8bn
21. Head of Marketing	-Top 4 UK Food Retailer, £55bn

Appendix B: Coding of interview data with representative quotes selected from phase two interviews

Overarching dimensions	Second-order themes	First order categories	Representative quotes
Project characteristics	1. Integration complexity-risk relationship	a. Extent of packaging integration increases technical complexity and number of considerations	Non-integral: *"as there was no change to the core food, and the packaging would not impact on its characteristics, there wasn't a need for joint development before we reached the point of production line trials"* (A2) Convenience project: "the development project was focused on the packaging, little food development was necessary… It was necessary to basically demonstrate the packaging could work on the product, and establishing its basic functionality and integrity. Later we completed more kitchen and factory level work" (B2) Inseparable project: "in some stages the activities were concurrent but independently managed… other times the development and decision-making was integrated and interlinked… [collaboratively] We undertook application testing of the packaging to ensure its efficacy, integrity and safety" (C4) Dependent project: "Most of the development work and testing was concurrent and integrated, we undertook extensive packaging of the packaging on the core product even at an early point in the project.. thus we had to involve both production and our suppliers in decisions" (C1)
		b. Process investments incurred in change influence decision-making	"what might seem like a relatively minor change to someone outside the firm has significant implications… you're talking about adding additional folding stages to the production process, integrating a different specification of bag, and adding a top seal. This results in large investments and the need to run the line in two separate configurations or run an entirely new line for the product… That's suddenly a lot of production development and considerations and a high cost… people are reluctant to commit to that kind of project" (D3)
		c. Radical nature of project results in resistance	"The project was seen as risky. It was going to impact on the food, how it was actually consumed and its retailing… moving to this plate like format would mean displaying the project on the shelf vertically as opposed to horizontally, the pack itself would have less room for marketing messages…. This was seen as high risk, we weren't sure the consumer would understand the product and how to use it… much of the team felt we would need to introduce new shelf displays to at least partially counteract these risks" (A7)
	2. Challenge of activity integration	d. Need for concurrent product and packaging activities	"In order to develop the 'doy' pack we would need to consider how its introduction might impact on the product specifications… whilst much of the technical development in the project could occur separately we would need to change the formulation to make sure it would 'squeeze' out of the packaging, and that would that result in the product separating due to the more liquid formulation… the development of the product and packaging had to occur concurrently" (B9)
		e. Increasing extent of packaging integration associated with increased extent of activity integration	"The packaging would define the quality of the cooked fish…. In comparison to the project where we developed the wine glass, which required interlinked testing for example to establish the effectiveness of the seal… in this project much more joint work within the early stages was required both technically and with consumers" (C1)
	3. Integrated definitions	f. Integrated definition must establish packaging will meet product requirements	"When talking to [senior manager] it was clear that there concerns remained over whether the packaging would impact on the product and whether it would negatively affect the performance, flavour, shelf life etc. It was only clear we would be able to proceed when this had been addressed" (A2)
		g. Need to establish	"You cannot progress unless you formally establish the investments. When you are changing the packaging you are

		packaging is able to be produced with minimal process requirements	changing the process to some extent almost always. In this project the concern was how much and what the cost would be. That had to be integrated into our proposal… If we haven't demonstrated how we were going to get it to work on the line the project would have stalled" (B1)
	4. Supplier path dependency	h. Long-term supplier relationships hinder format change	"We have used basically the same packaging format since the 1980's with very little change. Working with our suppliers we have become a world expert in the material and running this format throughout packaging line… The flip side of this is that we have driven the costs so low that changes to the format or material would massively impact on both us and them [the supplier]… switching to another format or material is just inconceivable" (D4)
		i. Increasing the number of packaging formats decreases cost advantage	"This packaging would not be used across all the range of products we sell, and therefore you are now talking about introducing two formats running on your line. You are looking at having to purchase different formats, which reduces your cost advantage… it also means introducing a line changeover, which also increases complexity on the line and cost. This acts as a real barrier to the project…" (B9)
Process organisation	5. Formal NPD procedures and frameworks	j. 'Up-front' packaging evaluation and technical requirements analysis	"In my experience its all too easy for packaging to be overlooked in a new product development project. Often the team is so focused on the core product itself the packaging is not considered until much later… I recently joined XXXX [name of firm removed], their procedures require both early consideration of packaging, which in itself also helps to ensure the involvement of the packaging team at this point in the project. In this case the combination of these led to a variety of group activities to generate ideas, visits to supermarkets, [consumer] research and even trips to other countries…. Working together led to the recognition of many of these ideas" (A2)
		k. Formalised inclusion of packaging within activity stage and evaluation point	"Our organisation has a strong strategic emphasis on packaging, which is reflected in our strategic plans, a strong packaging strategy…. this effectively trickles down to the product development process, which integrates packaging into all the key stages. The requirements to evaluate the technology itself and undertake a detailed assessment of the packaging help to safeguard its consideration relatively well." (C3)
	6. Project manager's conceptualisation	l. Packaging is value added, not added cost	"The active pursuit of packaging is in my opinion often overlooked or avoided by managers who see packaging as either just a problem or as an expense… Whereas on other projects the manager really integrates the packaging and the packaging team." (A7)
		m. Potential of packaging development must be integrated into pre-development	"The project manager actively worked with us when developing the project brief…. It differs between individuals quite significantly, this manager often works with the packaging team. He places a strong emphasis on exploring the packaging and the opportunities it presents…" (C1)
Role of marketing	7. Orientation of managers	n. Sales targets and POS must be balanced with wider contributions of packaging	"A big problem in this project, which is often the case, was the desire to emphasise improving sales over and above everything else. This is difficult in the food sector as there is so much emphasis on volume, margins and short term improvements…. When developing the new wrap packaging, concern over the potential to harm sales was just too great for the opportunity the format presented to overcome these issues." (A2)
		o. Our emphasis must be on adding consumer value, not just optimising design and labelling	"In this project we were quite fortuitous, initially the brief was focused more on optimising the existing design and less on trying to find a new way of improving the use of the product… We worked with the packaging team and pushed to move beyond just changing the design. Whilst this would achieve the initial project aims, not to develop the new 'doy' pack would have been an opportunity lost to provide something much better for the consumer" (B8)

	8. Opportunity of 'user journey'	p. Capturing consumer perceptions of packaging beyond the point of sale	"The marketing team's recognition of the potential for a new packaging format to add value to the consumer were fundamental to the progress of the project…. Initially marketing research was central to understanding all the opportunities that existed…. Later in our idea generation we uncovered the opportunity for the 'doy' pack, although it was nearly dropped. The marketing team saw the potential for the packaging to extend the brand's market share by adding value to the consumer in their home and pushed to keep the project progressing" (B7)
		q. Detailed research into the user journey of interrelated product and packaging use	"we have a twelve stage model which sets out the key stages in the user journey, we utilise this within our idea generation, and also often to assist in our consumer research… in this case using this framework helped us to uncover challenges with regards to consumers disliking putting the existing tub on the table… it wasn't considered table worthy… we also found that using a knife spreading, and then getting the product still in the pack dirty with crumbs was an issue. These findings were ultimately key to both projects." (B1)
Role of packaging	9. Incorporation within NPD process	r. 'Up-front' involvement of packaging team within NPD process	"In both the fish and wine glass project the packaging team formed an essential part of the new product development team from the offset of the project. This was vital to identifying the potential technical solutions to the proposed development and understanding how this might actually be able to work…" (C7)
		s. Aligning packaging and product development activities throughout process	"The packaging team, and particularly the head, were central to ensuring the product and packaging were developed together, they worked to establish the fish could be cooked well in the bag and this helped to convince stakeholders that the desired could ultimately be achieved" (C4)
	10. Integration with production development	t. Controlling coordination with production to align packaging development with process requirements	"Its all to easy to have a packaging team finding and developing a format and then there is a missing link in terms of developing this into process requirements, ensuring it will work on the line, and testing the new packaging. If no one addresses this missing link then the project will struggle to progress…. Packaging development and production are integrally interlinked, especially in this kind of the project where the packaging impacts on the food, its production and obviously the heating." (D4)
		u. Proactively working with production to identify equipment solutions to deliver packaging	"The assessment of investments formed a key activity within the analysis of the case for the project… we worked hard to identify an affordable production solution that would deliver the proposed format. Initially it did not seem feasible and the production development team effectively ruled out the change… We worked actively with them to rectify this. Their focus is on costs and day-to-day running… I think it's down to us to find the solution and effectively campaign to get it to work" (B2)
	11. Supplier boundary spanning	v. Active use of supplier networks to identify technical solutions	"I don't think there are many firms in the sector that have the internal capability to develop new packaging themselves, this is always done by or in combination with suppliers….. In this project the team contacted entrepreneurs, suppliers in the wine sector and other sectors and looked far and wide until they found and established the right solution" (C2)
		w. Managing supplier integration into front end activities	"The packaging manager worked as a linchpin between our internal development and the supplier, coordinating the activities and ensuring the packaging would meet our requirements…" (D4)