

Innovation Factory and Innovation Atelier Business Design for 'Routinized Innovation'

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ABSTRACT

The paper aims at addressing the challenge how to design the firm's innovation activities while taking into account requirements stemming from the progressive routinization of innovation, the need for ambidexterity and contingency. The authors adopt a perspective of business design and introduce the complementary concepts of 'Innovation Factory' and 'Innovation Atelier'. In combination with

findings from a series of case studies of business design, the approach builds on insights stemming from systems theory, economic theories of growth, process philosophy, theories of business design, and theories of contingency on organization. The authors support their argument with a case study of a Fast Moving Consumer Goods (FMCG) manufacturer.

Keywords: *Innovation Factory, Innovation Atelier, Business Design*

INTRODUCTION

The paper aims at addressing the challenge how to design the firm's innovation system combining the design imperatives of design for 'routinized innovation', 'design for ambidexterity', and 'design for contingency'. It adopts a perspective of business design and introduces the complementary concepts of 'Innovation Factory' (referred to as I-Factory) and 'Innovation Atelier' (referred to as I-Atelier). The approach builds on insights stemming from systems theory, economic theories of growth, process philosophy, theories of business design, and theories of contingency on organization as well as a series of case studies of business design.

A. Design for 'routinized innovation'

A variety of economic growth theories (among others Schumpeter, 1955; Baumol, 2004) have underlined the importance of 'routinized innovation' in generating growth. In a number of industries, routinized innovation activities have become a must for survival. Practitioners must therefore embrace the phenomenon of 'routinized innovation' and reap the growth-benefits associated with it. Specifically, they need to give particular attention to the design of efficient innovation structures, since (i) routinized innovation has "everything to do with organization and attitude and very little to do with nurturing solitary genius"

(Hagardon and Sutton 2000) and (ii) “(i)nnovation becomes an internal bureaucratically controlled process” (Baumol, 2004). Based on this, we define the business design imperative of ‘design for routinized innovation activities’.

B. Design for ‘ambidexterity’

Theories on ambidexterity (among others Duncan, 1976; O’Reilly and Tushman, 2004) advocate that companies need to adopt a dual innovation strategy combining the imperatives of ‘exploit’ and ‘explore’. Innovation structures need to have the ability to simultaneously generate heterogeneous types of innovations such as incremental (small improvement in the existing products), architectural (fundamental changes of some component of the business), and discontinuous (radical advances) innovations. Based on the above, we define the business design imperative of ‘design for ambidexterity’.

C. Design for ‘contingency’

Theories of contingency on organization (among others Thompson, 2003), maintain that there is no universal way or one best way to manage an organization, that effective organizations have a proper ‘fit’ with their environment and between their sub-systems, and that the needs of an organization are better satisfied when they are properly designed and the management style is appropriate to both, the tasks undertaken and the nature of the work. The design approach thus needs to accommodate for the specific context of the firm. Based on this, we define the business design imperative of ‘design for contingency’. The authors present a conceptual discussion supported by a case study of a Fast Moving Consumer Goods (FMCG) manufacturer. We set out by discussing the company’s innovation system and its sub-systems ‘I-Factory’ and ‘I-Atelier’ (section 2). We then proceed by differentiating

these concepts with regard to their innovation scopes (section 3), approaches to structure their innovation scopes (section 4), and innovation processes (section 5). Subsequently, the matching of the innovation scopes and the innovation processes is presented (section 6). As the concepts are discussed, we gradually introduce the case study of an FMCG manufacturer. The paper concludes with a discussion of the I-Factory of the FMCG manufacturer (section 7).

INNOVATION SYSTEM (I-FACTORY AND I-ATELIER)

We view the firm's innovation activities as a complex adaptive system aimed at generating a continuous flow of innovations to secure the firm's current and future strategic positions. The innovation system can be structured into an 'exploitative' and an 'explorative' sub-system. This is supported by theories of ambidexterity and systems theory.

A. Ambidexterity

Theories of ambidexterity claim that companies need to develop explorative and exploitative innovations simultaneously to secure current and future strategic positions. The concepts of exploration and exploitation are well established by a variety of research streams adopting perspectives, such as organizational learning and strategy (Levinthal and March, 1993; Vera and Crossan, 2004), innovation (Daneels, 2002; Rothaermel and Deeds; 2004), and entrepreneurship (Shane and Vekataraman, 2000) (compare Jansen, Van den Bosch and Volberda, 2006).

From the business design perspective adopted here, we conclude that companies need to embrace dual innovation strategies accommodating simultaneously for the requirements of 'exploration' and 'exploitation'. The firm's innovation system thus needs to generate simultaneous streams of 'incremental' and 'more disruptive' innovations.

B. Exploitative and explorative sub-systems

From an organizational perspective, various authors of theories on ambidexterity argue that organizations develop explorative and exploitative innovations simultaneously in different organizational units (among others Tuschman and O'Reilly, 1996; Benner and Tushman, 2003). However, they also conclude that companies have not been very successful at implementing ambidextrous organizations (Kaplan and Henderson, 2005; O'Reily and Tushman, 2004). Issues encountered were associated with the difficulty of consolidating the different scopes and organizational requirements of the exploitative and explorative sub-units.

From a business design perspective, it is therefore key to adopt a holistic view of the firm's innovation activities and embed the two sub-units into the parent innovation system of the company. This calls for a clear differentiation between the two units with regard to their innovation scopes, structures and processes.

Combining these findings with insights from systems theory, we start our considerations at the level of the firm's overall innovation activities, i.e. its innovation system (in the following referred to as I-System). It is defined as a 'system of processes' that is hierarchically structured into an 'exploitative sub-system' and an 'explorative sub-system'. We refer to the first as the I-Factory and the latter as the I-Atelier.

C. Integration of I-Factory & I-Atelier

I-Factory and I-Atelier serve different innovation sub-strategies and have varying organizational requirements. However, they are complementary and 're-compose' (Simon, 1996) into the parent I-System to jointly deliver on the company's dual innovation strategy. As the landmark between I-Factory and I-Atelier one could see "the initiation of the diffusion of the innovation among potential adopters"

(Rogers, 1995). This differs from the conventional separation between pre-development and development or the distinction between research and development. In practice, we observed that this usually happens at the stage of 'proof-of-concept'. An overarching process of 'Innovation Integration' (I-Integration) ensures the horizontal integration of the two sub-systems, but also their vertical integration into the parent I-System (Fig. I). It guarantees and monitors the compatibility of the company's innovation activities with the company's strategic objectives. It is also in charge of resource allocation and definition of strategic frameworks for the I-Factory and I-Atelier. Importantly, I-Integration decides whether an innovative output from the I-Atelier should be transferred into the I-Factory or be sold externally. For perspective, companies such as Procter & Gamble have adopted the policy to commercialize innovative outputs externally, if they have not been adopted by the organization within a certain time period from development.

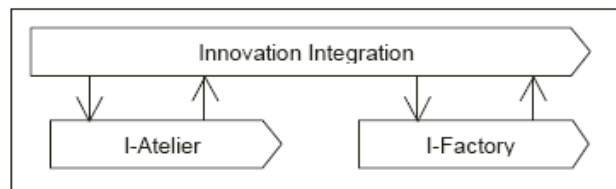


Fig. I: I-System and its sub-units

As illustrated in Fig. I, the systemic approach adopted to structure the I-System allows for a modular integration of I-Factory and I-Atelier. This accommodates for their different organizational requirements without jeopardizing their integration. I-Factory and I-Atelier are combined by the overarching Innovation Integration (I-Integration) to ensure the compatibility of their activities with the innovation strategy.

D. Case study - company presentation and issue set-up

Cocoa Ltd. produces and distributes branded packaged chocolate goods. Increased competition and price pressure eroded Cocoa Ltd.'s market share and margins. In a news-driven market, the company repeatedly failed to establish new initiatives, either because it missed out on consumer trends or because initiatives were late. Promotions based on price appeared as the main means to fight the erosion of current market positions. The principal driver behind this was the insufficient innovation capability of the company as evidenced by its long time-to-market, 24 months versus 6 months for leading competitors, and the lack of systematic capability-building in the company. Top management revised the company strategy. Besides aggressive internationalization the following innovation objectives were defined: (i) establish sustainable innovation leadership in current product categories by generating a continuous flow of upgrades, line extensions, promotional and seasonal offerings; and (ii) exploit the convergence trend in the food sector by leveraging current capabilities into new product categories and market segments.

The product development organization had undertaken substantial efforts to increase the efficiency of its project-based development process by introducing lean techniques such as cross-functional project teams, multi-tasking, and concurrent development. In the face of the new innovation objectives, it became however clear that a major organizational re-shuffle was needed to allow for the generation of a continuous flow of product news.

INNOVATION SCOPE (I-FACTORY AND I-ATELIER)

The scope of the I-System is to generate a continuous flow of streams of heterogeneous innovative outputs, including 'incremental' and 'more disruptive' innovations. From a business design perspective, this

heterogeneous scope of the I-System needs to be structured into sub-scopes that are attributed to the I-Factory and the I-Atelier respectively. Typologies of innovation have to be identified, which allow for a clear allocation of the company's innovation activities either to the scope of the I-Factory or of the I-Atelier.

A. Typologies of innovation outputs

A literature review showed that there is a variety of typologies of innovation outputs associated with the concepts of 'exploitation' and 'exploration'. Such 'object-based' typologies include incremental vs. radical innovations (Abernathy, 1979); continuous vs. discontinuous technological innovations (Porter, 1986); incremental vs. breakthrough innovations and competence enhancing vs. competence-destroying innovations (Tushman and Anderson, 1986); conservative vs. revolutionary innovations (Abernathy and Clark, 1985). Studies confirm significant differentiation levels when considering individual theories of innovation types. However, Damanpour and Gopalakrishnan (2001) report that studies combining several theories of innovation types did not confirm any significant differentiation among the innovation types. For example, the typology 'incremental vs. radical' does not qualify the degree of newness in absolute terms. It is contingent on the specific organizational context. In line with findings from theories of contingency on organizations, we need to find a typology of innovations, which accounts for the specific perspective of the individual company. This implies the need to conceptualize the specific context of the organization and its innovation scope. Concepts approaching 'new-to-the-organization' to 'disruptive' innovations are not specific enough and thus not actionable from a business design perspective.

B. Broadening scope of Innovation studies

Literature reviews of innovation theories in fields of management science such as R&D, marketing and business strategy showed that the object of innovation studies has been broadening over the past decades. We notice, that the perspectives of separate disciplines are converging towards a more holistic view of innovation. Based on insights from R&D, marketing and business strategy literature, we introduce the concept of 'value delivery system' to differentiate incremental from more disruptive innovations.

1) Perspective of R&D

From the perspective of R&D management, a literature review (Mitterdorfer-Schaad 2001) illustrates the broadening understanding of innovation from a narrow and fragmented focus on products, technologies, and processes to a broader focus on 'company performance' including aspects of 'effectiveness', 'profitability' and 'customer satisfaction'. More recent definitions view innovation as the first-time and successful economic use of a novelty by the specific company (Mitterdorfer-Schaad, 2001). The core of organizational research on R&D is more concerned with innovation aspects in the field of product, technologies, and manufacturing and does not systematically adopt a holistic view considering innovation areas such as marketing, distribution and promotion on a par with areas related to technology, product and manufacturing. This need for a holistic view is also not adopted by other popular typologies such as 'product vs. process innovations' (Utterback and Abernathy, 1975), 'technical vs. administrative innovations' (Daft, 1987), and 'continuous vs. discontinuous technological innovations' (Porter, 1986). However, in a variety of industries, companies are facing markets driven by innovations not exclusively related to the physical product and

associated processes, but to other dimensions of a company's 'value delivery system' (see following paragraph), such as brand development, promotion, distribution, primary services and after-sales services. This trend sets in latest when the differentiation potential of product innovation is exhausted.

2) Perspective of marketing and business strategy

Also the disciplines of marketing and business strategy have broadened their perspective over the past decades. Anterasian and Phillips (1988) and Webster (2002) illustrate the evolution of the marketing and business strategy perspective over the past decades. It went a long way from Drucker's 'marketing concept' (Drucker, 1991) advocating that the fundamental purpose of the firm is to create a satisfied customer. This led to the introduction of concepts such as market segmentation, targeting, and positioning. Subsequently, the marketing concept and strategic planning were integrated into a common concept of long-range planning. The first of a series of approaches to combine market needs with the company's capabilities was Kaldor's concept of 'imbricative marketing' (Kaldor, 1971). Subsequently, strategic planning was dominated by financial management viewing return on investment and profit as the objective of business activity at the expense of creating satisfied customers. In the mid-1980s the rediscovery of the marketing concepts was driven by severe market in-roads of Asian competitors better able to capitalize on the tastes, preferences, and buying habits of customers. The concept of 'total quality' was equalled to 'customer orientation'. More recent authors propose the concept of 'value to the customer' as the strategic force driving company performance. Sources of value, and thus also sources of innovation, are associated with product and service, customer intimacy, and operational excellence (Treacy and Wiersenna, 1995). Webster (2002) defines the marketing concept as the process of

defining, developing, and delivering customer value in the modern business environment. Anterasian and Phillips (1988) maintain in their 'value delivery theory of competitive advantage' that "sustainable competitive advantage is rooted in the abilities of a business to deliver superior value to customers at a profitable cost (...). This skill-based advantage may manifest itself in one or more areas of a business' value delivery system, i.e. its abilities to choose, provide, and communicate a superior value proposition to target customers. Skill(s) may reside in individual workers, functions, or may even become institutionalized and possessed by the business unit as a whole. Once institutionalized, these skill-based advantages become difficult for competitors to easily replicate, forming the basis for truly sustainable advantage" (Anterasian and Phillips, 1988).

From these findings we conclude that the 'value delivery system' of a company is a dual construct consisting of (1.) the value a company proposes to the customer and (2.) the way it structures the value for delivery. It is a highly contingent construct enclosing the essence of what the company is about.

C. Typology based on 'value delivery system'

Combining insights from innovation literature and literature on marketing and business strategy, we define a typology of innovation activities based on the concept of 'value delivery system' (in the following referred to as VD-system). Innovation activities can thus be differentiated based on whether they aim at generating incremental changes within the current 'VD-system' of the company ('exploitative innovations' associated with I-Factory), or whether they aim at more disruptive changes of the 'VD-system' (i.e. 'explorative innovations' associated with I-Atelier). This typology is also confirmed by analogy by the pragmatic view shared by many R&D practitioners. They differentiate innovation activities based on whether they are

associated with generating changes within the product architecture or changes of the architecture.

From a business design perspective, adopting the concept of VD-system addresses two needs identified earlier. First, it allows for a holistic view of the company's innovation activities. Second, it accommodates for the requirements of theories of contingency on the organization, since the VD-system is highly contingent on the company's strategy and specific context.

D. Scope of the I-Factory

The I-Factory's innovation scope covers the company's current VD-system. Exploitative innovation activities are about scrutinizing all elements of the company's VD-system for incremental innovations, product upgrades, product and module variants, line extensions and new combinations of existing modules. The aim is to generate a continuous flow of incremental innovations. This flow enables the company to adapt to immediate and mediate environment changes and exploit the opportunities presented by these changes.

E. Scope of the I-Atelier

The I-Atelier's innovation scope covers the company's future VD-system. It deals with the 'creative destruction' associated with a corporation's long-term competitiveness and performance (Foster and Kaplan 2001). Explorative innovation activities aim at replacing the company's current VD-system or significant parts of it with new VD-systems. This includes fundamental changes of some key component of the business, architectural changes, new platforms, new technologies and new business models. The scope of the I-Atelier is a 'landscape of projects'. Its outputs are completed development projects (either single-

projects or portfolios of projects) ready for diffusion and adoption internally or externally.

F. Case study - Defining the scopes of I-Factory & I-Atelier

The innovation activities associated with the I-Factory of Cocoa Ltd. include a continuous flow of news in terms of product variants, upgrades, line extensions, seasonal collections, promotional sizes, fillings and ingredients (Fig. II). They are associated with an exploitative process.

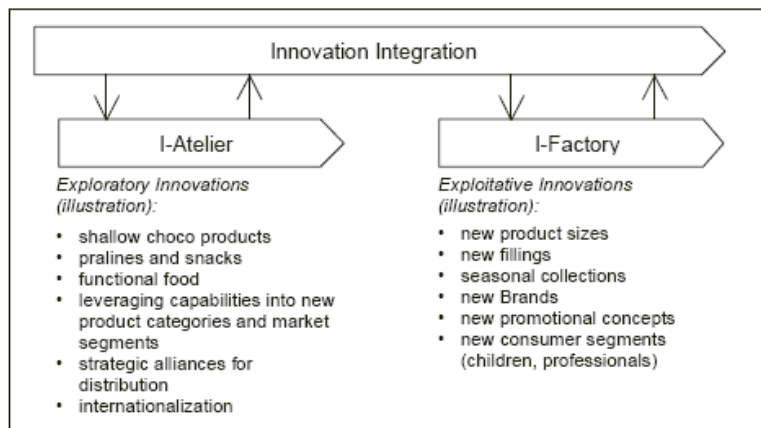


Fig. II: I-System of Cocoa Ltd.

Innovation activities associated with the I-Atelier are radical from a company perspective and require an explorative process. They include: the development of new product formats such as chocolate candies, moulded chocolate products, functional food products, leveraging capabilities (e.g. brands and distribution) into new product categories

such as biscuits, exploring new distribution possibilities (e.g. web-based and alliances) and entering new markets (specifically Central and Eastern Europe). Historically, the company had not made the distinction between 'exploitative innovations' and 'explorative innovations' and handled all innovation activities as single-projects based on a new product development process (NPD) .

For perspective, Cocoa Ltd. associated some apparently 'incremental' innovation activities, such as the development of shallow chocolate products, with the I-Atelier, because it was a disruptive innovation from the perspective of the company and did not enter its actual VD-system. A competitor, however, associates similar initiatives with its I-Factory, since it is part of its specific VD-system. The typologies contrasting 'incremental' and 'disruptive' innovations are thus not absolute, but contingent upon the specific context of the firm.

STRUCTURING THE INNOVATION SCOPES

A. Structuring for manageable sub-scopes

Having clarified the broad innovation scopes of the I-Factory and the I-Atelier respectively, these scopes need to be fragmented into manageable sub-scopes. In line with systems theory and the theory of modularity, we define the scopes as hierarchical 'parts-within-parts' structures. These can be further fragmented into modular sub-scopes (Simon, 1996) until scopes of a manageable size are identified. Being different in nature, the scopes of the I-Factory and the I-Atelier can be structured based on different criteria without jeopardizing their integration into the parent I-System. We adopt the concept of 'value delivery architecture' (VD-architecture) to structure the scope of the I-Factory. Commonly, project architectures combined with grouping strategies are used in the context of I-Ateliers.

B. VD-architecture for I-Factory

The scope of the I-Factory is the company's current VD-system. In analogy with the concept of 'product architecture' that has been used as a basis to structure R&D activities, we introduce the concept of 'VD-architecture' as a base to structure the innovation scope of the I-Factory. The concept of 'product architecture' is well documented in literature of engineering and product development. In organizational research, it has been established as an efficient base for structuring R&D organizations (Oosterman, 2001). However, the approach of organizational design based on the product architecture appeared as insufficient in industries driven by innovation in areas not exclusively related to the physical product.

Thus, we integrate the concepts of VD-system and VD-architecture into our design approach. They accommodate for innovation areas such as brand development, promotion, distribution, primary services and after-sales services. The current VD-system is structured into a VD-architecture composed of modular parts. Being a 'nested system' composed of 'parts-within-parts' (Simon, 1996), the architecture can be decomposed until modular sub-scopes of a manageable size are reached. Establishing a VD-architecture is highly contingent upon the company's context and has a series of strategic implications, since it defines the way a company structures its VD-system.

It also appears to be relevant to traditional manufacturers facing increased pressure for non-product innovation, such as establishing brands, internationalize their business, and develop new distribution opportunities. In some cases the VD-architecture can also be used as a framework to develop company strategy or to delimit business divisions.

C. 'Project architecture' for I-Atelier

The I-Atelier specifies projects in line with the company's exploration strategy and generates a set of completed development projects (either single-projects or portfolios of projects) ready for diffusion and adoption internally or externally. The scope of the I-Atelier covers the company's future VD-system and is in most cases a 'landscape' of more or less pre-defined projects. This was also the case for Cocoa Ltd.'s I-Atelier (Fig. II). Concepts associated with the 'project architecture' can be used to structure the scope of the I-Atelier. The basic idea is to structure innovation projects into modular and manageable portions. Highly heterogeneous and unique projects are usually structured based on their dedicated project architecture. More homogeneous projects are clustered into portfolios of projects for which consolidated portfolio architectures are designed. Such techniques are also referred to as strategic project mapping. A variety of tools are proposed by the burgeoning literature on project, lean project, and multi-project management. In the case of a maintenance company, the I-Atelier was structured into 'Innovation Fields' that are explored systematically to generate ideas and broadly defined projects. They are closely associated with strategic business development.

D. Case study - Cocoa Ltd.'s VD-architecture

After defining the innovation scopes of its I-Factory and I-Atelier in line with company strategy, Cocoa Ltd. proceeded by structuring these innovation scopes. It adopted the VD-architecture and the 'project architecture' to structure the scopes of the I-Factory and the I-Atelier respectively. Importantly, innovation areas not related to the physical product were systematically introduced into the scope of the I-Factory to account for the specific FMCG context. Thus, the VD-architecture underlying the I-Factory provides a framework integrating all areas of

Cocoa Ltd.'s activities prone to incremental innovation: product, marketing, promotion, and distribution. The VD-architecture for the I-Factory is illustrated in Fig. III.

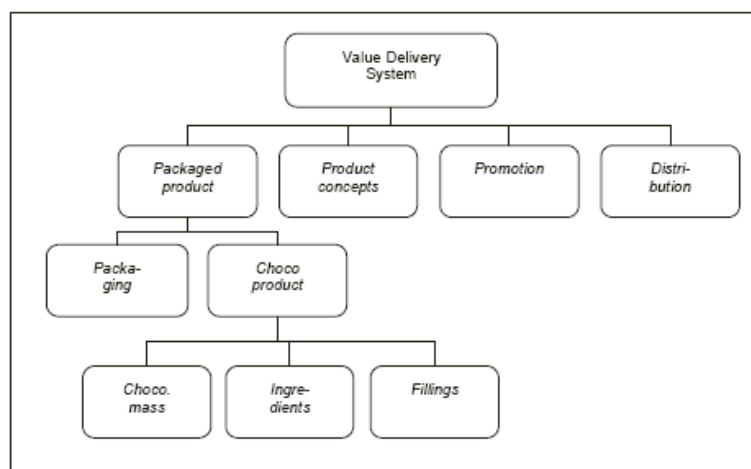


Fig. III: VD-architecture of Cocoa Ltd.

INNOVATION PROCESS (I-FACTORY AND I-ATELIER)

A. Processes for I-Factory & I-Atelier

Having structured the innovation scopes of I-Factory and I-Atelier into architectures, the processes best suited to handle these innovation scopes need to be designed. Conventional models of innovation processes adopt a broad view covering the entire innovation cycle from a unitary perspective. We advocate that this perspective does not meet the requirements of the business design perspective adopted here. It appears that the exploitative process of the I-Factory is significantly different from the explorative process of the I-Atelier and that these

processes need to be tailored contingent upon the innovation scopes they will be associated with.

1) Conventional models of innovation processes

Our literature review produced a variety of well-established models of innovation processes. However, most adopt a unitary view of NPD and cover the broad scope from the decision to begin research on recognized or potential problems, to development, commercialization, diffusion, decision to adopt, implementation, and consequences (Rogers, 1995). For a review of models of innovation processes, we refer to (Anterasian and Phillips, 1988). However, a unitary perspective of the innovation process does not account for our perspective of the I-System, in which the I-Atelier develops explorative innovations, which are subsequently transferred into the I-Factory. Table I shows an overview of conventional models of innovation processes.

2) Organizational view of processes

Benner and Tushman (2003) maintain that units engaging in explorative innovation pursue new knowledge and develop new products and services for emerging customers or markets. Units pursuing exploitative innovation build on existing knowledge and extend existing products and services for existing customers (Benner and Tushman, 2003). It can be concluded that the two units innovate in different ways: Exploration is more emergent and can be characterized by variation, search, experimentation, and discovery, whereas exploitation is more planned, and can be characterized by selection, refinement, choice, and execution (Damanpour and Wischnevsky, 2006). Damanpour and Wischnevsky (2006) liken their concepts of 'generation and adoption processes' to 'exploitation and

exploration' respectively and conclude that these processes differ considerably and have different organizational requirements.

Table I: Models of Innovation processes (adapted from (Antesarian and Phillips, 1988)

Study	Model of Innovation process
Kanter (1988)	Idea generation → coalition building → idea realization → → transfer or diffusion
Klein and Sorra (1996)	Research → development → testing → manufacturing → packaging → dissemination → awareness → selection → adoption → implementation → routinization
Roberts (1988)	Recognition of opportunity → idea formulation → problem solving → prototype solution → commercial development → → Technology utilization and/or diffusion
Rogers I (1995:133)	Needs/problems → research (basic and applied) → development → commercialization → Diffusion and adoption
Rogers II (1995: 392)	Agenda-setting → matching → redefining/restructuring → clarifying → routinizing
Rothwell and Robertson (1973)	Idea generation → project definition → problem solving → design and development → production → marketing
Tornatzky and Fleischer (1973)	Research → development → deployment → adoption → implementation → routinization
Zaltmann et al. (1973)	Knowledge awareness → attitudes formation → (adoption) decision → initial implementation → continued-sustained implementation

Table II: Exploitative and explorative processes

	I-Factory (exploitative processes)	I-Atelier (explorative processes)
Objectives	Generate continuous flow of 'exploitative innovations' within the company's current VD-system.	Generate and complete 'exploitative innovations' of the company's current VD-system.
Strategies	Routinizable problem-solving and information-processing	Creative problem-solving, creation of new ideas and outputs
	Generation of continuous flow of innovative outputs	Completion of single-projects (or clusters of projects)
Mgmt focus	Increasing the efficiency of the flow generation from the perspective of the entire I-Factory.	Increasing the efficiency of the project completion at the level of either single-projects or portfolios of projects.
Process	Process is "relatively orderly, more like a periodic and sequential progression of phases" (Cheng and Van de Ven 1996)	Process is "relatively disorderly, more like a random process of chance and chaotic events" (Damanpour/Wischnevsky 2006: 274)
Output	Flow of outputs with a high degree of similarity.	Highly differentiated single-outputs or categories of outputs.
Repetitiveness	A given set of clearly defined activities is repeated regularly with a high similarity between successive cases.	A given set of broadly defined activities is completed at relatively low frequency with a low similarity between successive cases (single-projects or portfolios of projects).

Table II: Exploitative and explorative processes (continued)

	I-Factory (exploitative processes)	I-Atelier (explorative processes)
Orientation (process vs object)	Process-orientation: continuous, highly repetitive process delivering a sustained flow of outputs.	Object-orientation: Tasks with distinct beginning, end and deliverable.
Driver of novelty	Process-orientation: the exploitative process is itself the source of continuous novelty.	Object-orientation: the completed project is the source of novelty.
Routinization	High degree of routinization (exploitation processes)	Low degree of routinization (project management processes)
Organizational Design	Process-orientation	Project-orientation
Fragmentation (<i>de- composition</i> ' <i>Simon 1962</i>)	I-Factory is structured based on process typologies.	I-Atelier is structured based on project typologies.
	Structure exploitative sub-system into modular sub-processes for scope and scale economies	Structure explorative sub- system into groups of projects, then groups of tasks for efficient coordination.
Integration (<i>re- composition</i> ' <i>Simon 1962</i>)	Integration of specialized sub-processes based on 'VD- architecture' underlying the I-Factory	Integration of tasks based on project or portfolio architecture underlying the single-project or the portfolio of projects
	Secure the integration of specialized sub-processes at the level of the I- Factory.	Secure the integration of project tasks at the level of single-project or portfolio of projects.

This was also confirmed by our findings from business design cases and interviews with R&D managers. These findings are compiled in

Table II showing a non-exhaustive list of contrasting characteristics of 'exploitative' and 'explorative' innovation processes. From a business design perspective, it is important to understand these differences and customize the processes accordingly.

B. Process for I-Factory

To secure the generation of a sustained flow of incremental innovations, the I-Factory continuously searches its dedicated innovation scope for 'existing' ideas and assimilates them to address recognized needs. The exploitation process is characterized by "selection, refinement, choice and execution" (Damanpour and Wischnevsky, 2006). It is about routinizable "problem-solving", "information-processing" (Nonaka, 1990) and not about creating 'new' ideas. Exploitative processes adopt the perspective of continuous and efficient exploitation of defined innovation scopes or sub-scopes for new variants, upgrades, alternatives, and elsewhere available solutions. The developed ideas are stocked for assembly.

The process of integrating the outputs of the exploitative processes is of secondary importance, since the associated innovation sub-scopes are modularly linked in the VD-architecture and integrated in the overarching integration process at the level of the I-Factory. From a perspective of 'design for routinized innovation', exploitative processes are particularly important, since they need to be designed for a high degree of routinization. This includes developing object-independent knowledge such as routinized problem-solving and information processing. In fact, "to create incremental innovations, a firm often needs to do no more than make key organizational processes routine in order to maximize organizational effectiveness" (Cusumano and Nobeoka, 1998). From a business design perspective, we maintain that

the core of ‘routinized innovation’ is associated with the exploitative I-Factory.

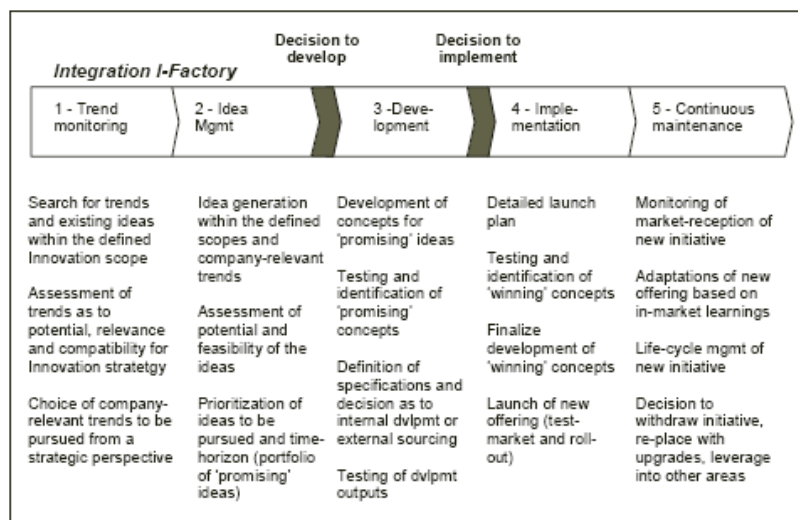


Fig. IV: Exploitative process of I-Factory (Cocoa Ltd.)

C. Process for I-Atelier

The I-Atelier’s explorative process generates a highly heterogeneous set of completed development projects. The process is about creating new ideas, making them work and preparing them for diffusion, internally or externally. As mentioned above, the exploration process is characterized by variation and discovery. It is a creative process in which new and existing ideas are combined in a novel way to produce an invention or a configuration that was previously unknown (Duncan, 1976). In the context considered here, the explorative process of the I-Atelier adopts an ‘object-based’ perspective of ‘structuring and

integrating tasks for the completion of complex projects' (single-projects or portfolios of projects). The explorative process is managed based on approaches described in project management literature (project, lean project, and multi-project management) (Cusumano and Nobeoka, 1998).

From the perspective of 'design for routinized innovation', explorative processes are not about routinizable problem solving and information processing. Nevertheless, increasing attention is given to the routinization of explorative processes. This is in line with Schumpeter's view that most innovation activities are positioned somewhere between routine and non-routine behaviour (Schumpeter, 1955). The dichotomy of 'routinized' vs. 'non-routinized' routines appears to be thus merely conceptual. Additionally, in analogy to Schumpeter's process of 'progressive rationalization' (Schumpeter, 1950), it can be theorized that once processes are put in place correctly, their degree of routinization tends to increase with the number of occurrences. Thus, if the I-Atelier is 'designed for routinization', each case will add to the company's capability of 'integration for project completion'. The FMCG manufacturer considered the development of such capabilities as an important asset to face a market environment of accelerating innovation rates, internationalization, consolidation and significant price pressure on conventional offerings. It can be maintained that explorative processes are less prone to routinization, since they have limited similarity and low frequency levels and aim at achieving highly differentiated innovative outputs. However, we maintain that if a company wants to reap the full benefits associated with 'routinized' innovation, it needs to achieve a combination of both, exploitative and explorative routines. For perspective, the standardization of processes documented in project management literature can be associated with an attempt to design for 'routinized innovation'. The benefits of process standardization in

product development go beyond ready-made templates for development schedules, which can be used for each new development project. It is also different from mostly informal carry-over benefits from one project to the next. Standardization provides 'pivot points' which make similar experiences possible, even when the product changes. It allows a project to profit from past learning (capabilities) and to add its own learning (capability development). These systematic learning effects and the associated development of organizational capabilities are the main benefit of standardization. Some authors in project management literature associate this standardization with routinization of innovation. In fact, they describe a variety of 'routines' in the context of single-project, lean project, and multi-project management. Nevertheless, we maintain there is a significant difference between innovation activities as routinized in the I-Factory and as routinized in the I-Atelier and consider the first of higher degree of routinization as compared to the second.

D. Case study - Process design (I-Factory)

Having defined the scope of its I-Factory and its underlying VD-architecture, Cocoa Ltd. proceeded by designing the exploitative process of the I-Factory and the explorative process of the I-Atelier. The processes were designed accounting for their differences and to systematically reap the benefits associated with 'routinized innovation'. We limit our discussion to Cocoa Ltd.'s I-Factory, whose exploitative process is illustrated in Fig. IV.

I-FACTORY OF COCOA LTD

The following discusses the process architecture and the organizational set-up of the I-Factory of Cocoa Ltd.. The process architecture is established by matching the innovation sub-scopes and the innovation

process (Fig. V). Further, Cocoa Ltd. decided to adopt a process-based organization in line with the process architecture (Fig. VI).

A. Process architecture

Based on an analysis of the capabilities and resources required to exploit the innovation sub-scopes of the I-Factory, Cocoa Ltd. proceeded by grouping these sub-scopes into manageable and coherent clusters to be allocated to core processes of the I-Factory. The matching of scopes and processes thus produced the process architecture of the I-Factory shown in Fig. V. It consists of the core processes of marketing innovation, packaging innovation, recipe innovation and ingredients & fillings innovation. These are integrated by the overarching integration process of the I-Factory.

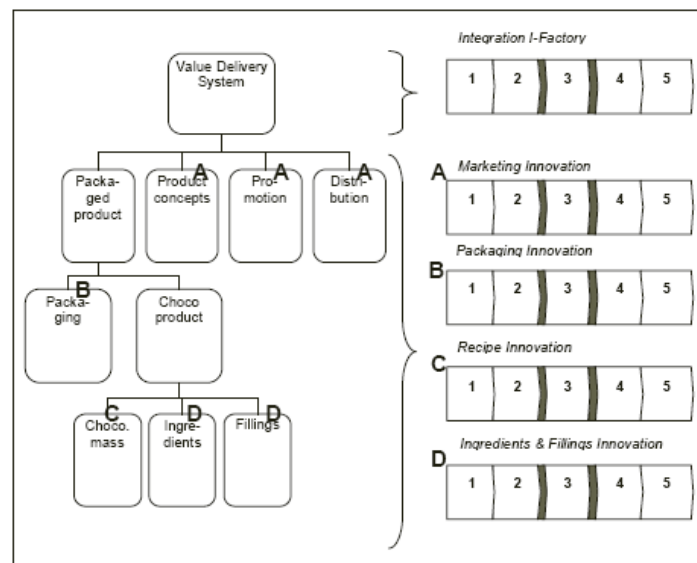


Fig. V: Matching Innovation scopes and processes (I-Factory)

B. Organizational set-up

Literature on Business Process Re-engineering (BPR) documents the advantages of the congruency between formal organizational set-ups and business processes. It is associated with lower levels of complexity in the organization, as evidenced by fewer interfaces among organizational units and less conflictual objectives. The formal organizational structure thus reflects the way in which the overall scope of the I-Factory is decomposed into modular sub-scopes. Based on the same principle, organizational units can be re-composed into its higher-level organizational unit, the I-Factory.

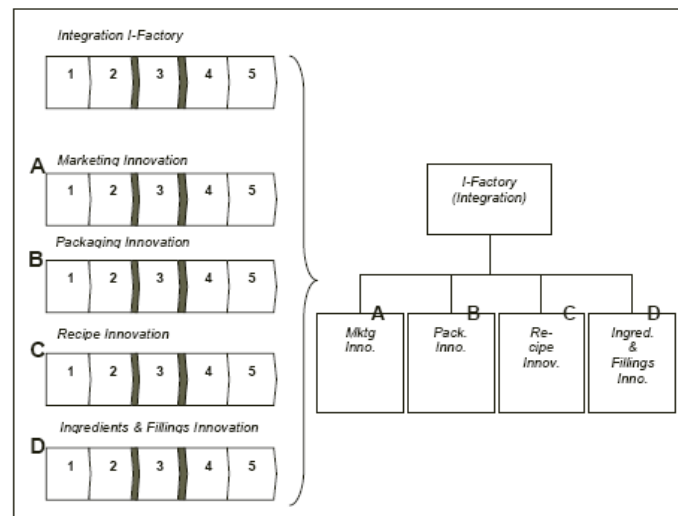


Fig. VI: Process-based organizational set-up

Cocoa Ltd. thus designed its formal organizational set-up based on the underlying process architecture. Organizational units are allocated a defined 'innovation sub-scope' and integrate into the I-Factory. The organizational units exploit their innovation scope based on an

innovation process which they can further detail based on their specific requirements in terms of process detail, capabilities, resources (such as human, technological, infrastructure) and other organizational requirements.

MECHANICS OF THE I-FACTORY OF COCOA Ltd

The following proceeds with a discussion of the mechanics of Cocoa Ltd.'s I-Factory. The integration of the core processes of the I-Factory is based on its Integration process, whose innovation scope is the company's current 'VD-system'. The Integration process has a dual function: it contributes to company strategy and ensures the compatibility of the I-Factory's activities with company strategy. To achieve this, the Integration process oversees and integrates the core processes of the I-Factory based on (1.) innovation cycles and (2.) portfolios of pre-, semi-, and final development outputs.

A. Innovation cycles and portfolios

The integration process of the I-Factory is in charge of steering and integrating the core processes to deliver a continuous flow of market-relevant innovations. Specifically, it details their innovation scopes based on company strategy and keeps their development activities in line with company strategy. This is achieved through a series of innovation cycles with associated portfolios (Fig. VII):

1) Cycle 1 - Trend monitoring

Within their dedicated innovation scopes, the core processes systematically identify and qualify the key trends. These collectively constitute the I-Factory's portfolio of 'qualified trends'. The Integration process then consolidates these trends from its perspective of the 'VD-

system' and scrutinizes them for compatibility with company strategy, relevance and feasibility. Subsequently, it identifies among the 'qualified trends' a series of 'promising trends'.

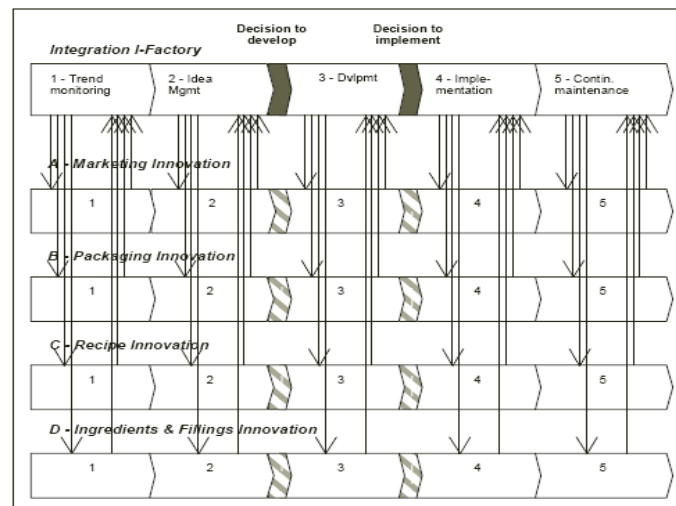


Fig. VII: Mechanics of the I-Factory

2) Cycle 2 - Idea management

The core processes (A to D in Fig. VII) develop and qualify ideas against the 'promising trends'. These constitute the I-Factory's portfolio of 'qualified ideas'. The Integration process combines these ideas from its perspective of the 'VD-system' into the I-Factory's portfolio of 'qualified ideas' and scrutinizes them based on medium-term market developments and company strategy. 'Promising ideas' are selected and a decision to develop is made.

3) Cycle 3 – Development

Subsequently, the core processes develop ‘qualified concepts’ against these ‘promising ideas’ and feed the I-Factory’s portfolio of ‘qualified concepts’. From a combined ‘VD-system’ perspective, the integration process determines the potential of these concepts in the view of specific short- and mid-term market opportunities and defines a selection of ‘promising concepts’, for which final development is undertaken.

4) Cycle 4 – Implementation

A launch plan is then established at the I-Factory level and further detailed at the level of each core process. After final development and integration of the ‘promising concepts’, these core processes are tested against the specific market opportunity to identify the ‘winning concepts’ that are subsequently launched. For the first 6 months after their launch, initiatives are considered as part of the portfolio of ‘new initiatives’. Based on the initiative’s reception by the market, they are scrutinized by the core processes to identify areas for improvement to be made to the new initiatives. As part of the management of the portfolio of ‘new initiatives’, the integration process reviews the identified ‘areas for improvement’ and decides how to proceed, i.e. either silently make the adjustments, plan for the subsequent launch of an upgrade, or in the extreme case withdraw the initiative from the market.

5) Cycle 5 - Continuous maintenance

An initiative is considered as part of the ‘portfolio of in-market initiatives’ beyond 6 months after launch. The core processes scrutinize these initiatives for maintenance and life-cycle requirements. This

includes replacing and/or upgrading some elements that approach the end of their lifecycle (e.g. for regulatory reasons), and extending proven concepts to other brands or product variants. Importantly, the portfolio of 'in-market initiatives' is managed by the integration process of the I-Factory from a 'VD-system' perspective. This includes decisions regarding product upgrades, new product variants, and discontinuation of a product.

B. De-coupled innovation processes

The following will present the concept of 'de-coupled innovation' as adopted in our I-Factory and subsequently highlight the differences between these concepts and the widely adopted concepts of 'multi-tasking' and 'parallel development' and its various forms.

1) De-coupled innovation at Cocoa Ltd.

The design of Cocoa's Ltd.'s I-Factory accounts for the different time horizons of the core processes by de-coupling these processes. In fact, processes follow each their own time horizon and generate innovative outputs for stock (i.e. the various portfolios at I-Factory level). Thus each of the core processes develops within its innovation scope a variety of 'qualified trends' and 'qualified concepts' for stock. For perspective, Marketing innovation develops and tests concepts for brands, upgrades, flankers and line extensions. Recipe innovation develops and qualifies a variety of partial or integral chocolate recipes. The qualified concepts are stocked for further reference. Similarly, nutritional engineers in charge of ingredients innovation continuously define technical specifications (e.g. compatibility, tolerance, consistence, durability) for a variety of ingredients. Additionally, 'qualified concepts' for a variety of fillings (e.g. alcohol-based liquids, fruit-based liquids, vegetable pastes) are developed. These include the definition of

their technical specifications. Cocoa Ltd. thus created a stock of readily available 'qualified ingredients' and 'qualified fillings' that can be referred to and quickly inserted into new offerings. The introduction of the I-Factory and the concept of 'de-coupled' innovation, allowed Cocoa Ltd. to reduce lead-times significantly from 24 months to 6 months on average.

2) De-coupled innovation vs. parallel engineering

Historically, Cocoa Ltd. adopted a 'unitary' project-based NPD process (see section 5) to undertake its innovation activities. The product development organization had introduced lean concepts such as multi-tasking and simultaneous development, however, its lead-times remained far off competitive benchmarks. The concept of 'de-coupled innovation' is different from the various concepts of parallel engineering. In 'multi-tasking' complex projects are structured into tasks, which are scheduled to allow critical resources to work on different projects alternately. Classical 'simultaneous engineering' defines tasks based on their time-dependence and aims at executing these tasks not in a sequential, but in a partially parallel manner. The I-Factory, however, goes beyond making a variety of tasks in parallel and de-couples its innovation activities. Innovation processes are not sequential and not even parallel, they are asynchronous to each other. Its core processes develop pre-, semi-, and final development outputs for 'stock'. These are combined by the integration process in line with the underlying 'VD-architecture'. We define this as 'de-coupled innovation' or 'asynchronous innovation'. In a variety of industries the de-coupling of innovation activities has produced significant reductions of lead-times. In the pharmaceutical industry molecule-concepts are qualified (i.e. qualification of physical characteristics and synthesis) and developed for the library (i.e. for stock). When product development needs a molecule, it refers to this

library to select target-molecules that are subsequently tested based on the specific product concept.

C. Planning of the I-Factory: “Keeping the beat”

Cocoa Ltd. adopted a cyclical approach to planning the activities of the I-Factory. This is based on the analogy with planning in manufacturing and sourcing management, where items are ordered at the latest possible time based on their sourcing lead-times. Longer lead-time items need to be sourced based on a forecast of 12 months or beyond, mid-term items can be sourced based on the rolling monthly forecast. The procurement of short-term items can be delayed until receipt of the actual customer order. Similarly, the activities of the core processes are not planned and initiated based on a defined project, but based on their allocated innovation scopes and their specific time horizons. In line with company planning, Cocoa Ltd. adopted also for its I-Factory the Master Planning (established once a year for the following 5 years), the rolling Development Planning (established every 3 months for the following 24 months), and the Launch Planning (established once a month for the following 12 months).

D. Benefits of the I-Factory at Cocoa Ltd.

A variety of benefits were associated with the introduction of the I-Factory at Cocoa Ltd. Within 36 months of introduction, the company had reduced its time-to-market from 24 months to 6 months and increased share of turnover of product news (less than 12 months) by 25 percentage pts. Importantly, awareness studies among users rated the company's brands highly for their innovativeness and suggested that Cocoa Ltd. succeeded in conquering back users. In some markets, the company achieved market leadership and innovation leadership. This was mainly driven by the seasonal collections the I-Factory

allowed the company to launch every quarter, each including 12 new product variants. The increased innovative capacity translated into higher market share, higher price levels, and higher margins. Separately, the I-Factory is seen today as a major contributor to the successful internationalization of the company's activities. In fact, in a food context driven by national and regional concepts, the I-Factory was able to develop a variety of new product concepts within very short lead-times.

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