

“Bouquets” producers and modularity:

Connecting the space of knowledge and the space of needs

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Abstract:

In services-based capitalism, a growing number of firms are endeavoring to base their competitiveness on their capacity to offer solutions to certain categories of problems facing the targeted customer base. To do so, firms design a business portfolio covering a set of goods and services that complement one another in generating the desired useful effects, for which we propose the term “bouquet”. This article looks at the conditions that determine the competitiveness of bouquet offers. It shows that bouquets and modularity are two competing ways of mediating between the space of knowledge and that of needs. The commercial potential of bouquets begins where the benefits of modularity end and where integration effects lie.

1. Introduction

Two major competitive focuses have gradually arisen for firms in many markets. The first lies in innovation. By enabling offers to be renewed more rapidly, innovation

stimulates consumers' appetite and boosts markets. An innovative firm benefits from a monopolistic rent and temporarily avoids the consequences of destructive competition. Faced with shorter periods of exclusivity, the current aim is continuous innovation capacity that rebuilds the competitive advantage at the same time as it is eroded. The second competitive focus consists of improving clients' satisfaction by meeting their needs more closely, in order to increase loyalty and endeavor to enhance the resulting value flow. This second process is based on the observation¹ that it costs much less to retain a client than to win a new one. Hence the client base – especially when deemed “attached” to the firm – becomes a major component, alongside innovative skills, of the intangible assets that currently make up the true value of companies.

The diffusion of these new competitive focuses contributes to differentiating contemporary capitalism from its Fordist form. The place now held by innovation in company strategies reinforces the implantation of a knowledge-based economy, in which knowledge and skills, more than ever before, are the critical production factors. To successfully innovate at a sustained pace, companies have adapted their internal organizations in order to improve their learning capacity. Meanwhile, the customer satisfaction focus strongly contributes to contemporary capitalism's service bent, well beyond the distinction between secondary and tertiary sectors. Satisfying customers does of course require an offer of quality products. However, even more so, it implies implementing a veritable service relationship through which the firm affords itself the means to know precisely the type of needs, to meet them in a differentiated way according to individual expectations, and especially, to focus the relationship on useful effects for the client rather than completing a product-based transaction. The customer satisfaction objective is also embodied in new organizational forms often grouped together under the label “customer-orientation”².

The diffusion of these new competitive focuses is causing an upheaval in the productive system's organization and functioning. The productive system linked to Fordism is structured around "products". It breaks down into industries that bring together producers of the same products that share the same production conditions. In other words, the criterion of production technique homogeneity dictates the business portfolio of firms and delineates the various markets, where, at the end of the chain, production is run down. The production system's structure is gradually shifting to other principles. The objective of continuous innovation incites companies to focus less on products than on the competences that yield innovations. These competences are defined in comparison to fields of knowledge and not directly in reference to products, which means that very often innovation for a certain product requires various competences to be mobilized, and likewise, a particular competence can be used for various products. When companies are restructured to refocus on their core business, they quite often implement a cognitive specialization that consists in gathering their resources into a limited number of knowledge blocks, each of which are designed as homogenous learning units. A cognitive division of labor³ is thus progressively being implemented, which combines the production of firms specialized on complementary competences. In other words, *the objective of continuous innovation leads firms to define their activity no longer in the space of products, but rather in the space of knowledge.*

The objective of customer satisfaction incites companies to focus on the reasons that cause customer to express demand. This leads to the observation that the product itself is not what is sought, but rather its supposed capacity to offer a solution to the client's "problem". Targeting customer satisfaction thus prompts the firm to go beyond a product offer rationale to target directly a solution for the client's problem. A solution is seldom possible by means of a single product; it generally presupposes building a

package of complementary products in response to the targeted problem. We propose to use the term "bouquet", given the image it conveys, to refer to such packages. Designing a bouquet does not depend on industrial considerations; it is based on identifying certain types of problems encountered by the targeted clients for which the bouquet provider intends to offer a solution. The bouquet, from an upstream standpoint, goes beyond the notion of product. While a bouquet is obviously composed of products (goods and services), these are now viewed only as vectors of a solution, i.e. as a means, not an end. *Thus, the firm no longer projects its activity in the space of products, but rather in the space of needs.*

Our hypothesis is that companies (and, on a larger scale, the structure of the production system) are increasingly torn between the space of knowledge and the space of needs, even in areas other than the structuring of the productive system, with the space of products gradually declining in pertinence. These two spaces are not superimposed: integrally satisfying a need generally requires mobilization of products that call for heterogeneous competences, while products derived from a given competence are seldom able to form a pertinent bouquet for the resolution of a certain type of problem. The new economic system implies the implementation of mediation processes between the space of knowledge and the space of needs. Two types of mediation processes are gaining ground and both complement and compete with each other: *modularity* and the process of *bouquet production*. Modularity refers to the property of a system that can be broken down into independent components. When the elements brought together to satisfy a need make up a modular set, this mediation can take place by means of "ordinary" market relations, even if they are generally strongly supported by institutional processes that define standards to facilitate the integration of elements. Bouquet producers are the "visible hand" which, on the one hand, conceive of bouquets

that can effectively respond to the problems targeted, and on the other, coordinates the contributions of complementary competences in order to design a bouquet. The notion of modularity has benefited in recent years from significant research, which has led to abundant academic literature. The notion of a bouquet, as well as the “bouquet producer” type, has thus far not been the subject of a similar analytical effort. The aim of this article is to contribute to the economic analysis of this type of offer by focusing on an analysis of the conditions that determine its competitiveness¹.

After defining “bouquet” (2), we will present the notions of modularity and integration effects (3), which are indispensable to the economic analysis of the bouquet. We will then describe the various types of integration effects that can determine the competitiveness of a bouquet (4). Lastly, we will address the issue of bouquet production governance mode (5).

2. What is a “bouquet”?

A razor with a set of replacement blades; a multimedia IT system with a CPU, monitor and printer; a maintenance and insurance offer that comes with a new car purchase; the sale of all the components of a customized bathroom, delivered and installed in the client’s home; a homeowner’s insurance policy attached to a mortgage; a bespoke holiday service comprising a flight, car rental and hotel reservations for each leg of the trip... What do these commercial offers have in common? They all offer the client a set of products normally sold separately, with the goal of making life easier, generating savings, providing a more effective response to his or her needs or expectations... Each of these offers entails what we would call a “bouquet”.

¹ For a more exhaustive analysis, see Moati (2008). 5

We define a bouquet as a commercial offer comprising a set of products (goods and/or services), each of which is the subject of distinct demand and is associated with a specific market, and all of which are complementary in that they produce useful effects that correspond to a particular function for the intended client. A function is a unit of need, and the latter term should be understood in the broadest sense.

The metaphor is aimed at highlighting the specific features of this kind of offer: the multiple and heterogeneous content, as well as the harmony and coherence that bring together the elements thus combined. In a bouquet, the set is supposed to have greater value than a sum of its parts. Lastly, a bouquet's quality depends crucially on the competences of a "florist", which we shall refer to as a "bouquet producer".

The bouquet is not at present a subject for analysis per se, and has not been the subject of specific theoretical approaches to determine its contours, properties, development potential, and so forth. However, research in economics and management has focused on analyzing specific types of composite offers: bundles⁴, complex products⁵ or, more recently, "CoPS" (complex products and services)⁶. Aside from their specific features, we believe it useful to consider these composite offers as a single category: the bouquet. Our stance is not motivated by a desire to add a new notion to this already long list, but by the need to trace the development of all these types of composite offers in a single dynamic, the coherence of which lies at the more global level of transformations in the economic system, at the heart of the characteristics of the new growth regime that has taken the place of Fordian capitalism.

Bouquets have undoubtedly always existed. They coexist with the activity of some sectors. Restaurant offers are, by their very nature, a bouquet. Real estate developers and, further upstream, building contractors offer bouquets that require the contributions

of various building trades to be mobilized in order to build a project. For a long time now, tour operators in the tourism industry have positioned themselves as bouquet producers. The venerable commercial practice of bundling, which consists of combining complementary products in a single unit (e.g. a razor and blades), is a type of bouquet offer. There are no statistics enabling us to track the diffusion of bouquet offers in the economy. However, by observing markets and company strategies, along with analyzing the contents of managerial press publications, the message of consultants and academic literature on strategic management, we find clues on the development of this type of offer and its increasing complexity, in terms of field, architecture and contractual form.

Bouquet offers appear to have gained ground first and foremost in the B-to-B segment. Beginning in the late 1980s, the automotive, aerospace, telecommunications or business services industries showed a trend of enriching offers in a rationale of bouquets, most often under the impetus of major clients that forced their suppliers to accept their terms. While it is more recent and probably less advanced, the diffusion of bouquets can also be seen on B-to-C markets. Firstly, we note their presence among the ranks of some service providers. Beginning in the 1990s, the borders between the banking and insurance sectors were blurred due to the development of “bancassurance”, which, for banks, entails enriching their range of client services with life insurance products, then non-life insurance. The insurance sector responded rapidly to this initiative by developing “insurbanking”, which entails rounding out the insurance offer with banking products, even current account management. The deregulation of the energy market triggered a deep reflection from energy sector players with a view to exiting their role as simple energy suppliers exposed to intense competition. In France, national electricity group EDF, via its *Vivrelec* brand or its “*objectif travaux*” offer, and Gaz de France-

Suez, via its *Dolce Vita* offer, are endeavoring to position themselves as suppliers of bouquets that meet clients' needs in terms of optimizing energy consumption and "comfort" in the home. Their bouquets are gradually expanding to encompass diagnostic services, equipment, assistance during home renovations, etc. Bouquets have also made their entry in the retail sector, where a growing number of banners propose assortments designed to be complementary for clients⁷.

The notion of bouquets refers to a wide variety of concrete offers that are not equivalent in terms of production and marketing conditions. The various types of bouquets can be described using three dimensions:

- The purpose: What type of problems or functions is the bouquet aimed at? What kind of useful effects are targeted for clients?

- The architecture: What components comprise the bouquet? How are they combined? In particular, each bouquet is characterized by a certain degree of integration that refers both horizontally, to the intensity of interdependence between its components in producing the useful effects, and vertically, to the extent that the client's problem is taken in hand by the bouquet producer.

- The marketing conditions: What kinds of ties connect supply and demand? What principles of contractualization are adopted? Here, we distinguish in particular between "open" bouquets, where the client can freely chose whether or not to purchase the various bouquet components, and "closed" bouquets, where components are only sold together. We also distinguish between bouquets sold on a unit basis (i.e. the client purchases all or a portion of the components) and bouquets sold on an access basis, whereby the client purchases the right to access a set of means needed to produce the

desired solution. In the most highly integrated types of bouquets, the transaction is not based on products, but on a commitment for results.

3. Modularity and integration effects

How can we explain that most consumers prefer to eat all courses of a meal at the same restaurant, rather than having a starter at one restaurant, the main course in another, and eating dessert at home? How can the success of tour operators be explained while holiday makers can (and some do) buy a plane ticket, reserve a hotel room and schedule activities on their own? A bouquet's competitiveness is never a given; it must prove its capacity to create value for the client compared to the alternative of potential clients purchasing the various goods and services needed to resolve their problem from different suppliers, and carrying out the integration on their own. The terms of this trade-off call into play two key notions: modularity and integration effects.

3.1 Modularity

The notion of "modularity" was developed in the field of systemic analysis, in the wake of H. Simon's seminal work⁸. Over the past fifteen years, modularity has given rise to abundant literature in the fields of engineering, strategic management and industrial organization. Modularity is defined as "a continuum describing the degree to which a system's components may be separated and recombined"⁹. Thus, a modular system is decomposable, i.e. it can be broken down into sub-systems, modules or components. For a system to be perfectly decomposable, each of its components must work independently of the other components¹⁰, which is difficult to achieve, as most modular systems show in fact "near decomposability"¹¹, as the interactions between system

components are weak but not inexistent. The degree of modularity in a system (i.e. a complex product, a bouquet, etc.) therefore expresses the level of functional interdependence between its components¹²: a perfectly modular system is one designed in such a way as each function is associated with a single component; conversely, zero modularity corresponds to a case where all functions are carried out simultaneously by each component.

Baldwin and Clark (2003) propose a distinction between three types of modularity, which is useful for an analysis of bouquets:

- *Modularity-in-design*, which refers to the possibility of designing the various components in the system independently. This depends on the degree of cognitive interdependence between the components, i.e. the way in which they interact on a functional level within the system, which underpins the importance of interdependence during the design work. For instance, in an automobile, GPS is independent on a functional level from the vehicle's other components and can, without difficulty, be designed in a very broadly autonomous fashion. Conversely, the body, chassis, engine, etc., must be designed in a tightly coordinated process in order to optimize the vehicle's performance in terms of noise, vibration, flexibility, etc.¹³

- *Modularity-in-production*, which enables the various components to be produced concurrently before being assembled. This refers to the degree of interdependence of the production processes of the various components, which in turn notably depends on the definition of standardized physical interfaces that facilitate assembly. Since the end of the 19th century, the development of mass production has been accompanied by a search for greater modularity in production, which has been emphasized to an even higher

degree in the past few decades with the need to meet a wider variety of needs while controlling costs.

- *Modularity-in-use*. This notion refers to the possibility for the end-customer himself to assemble the system that produces useful effects, to separate components, to replace them at different times, etc. It depends on the degree of functional interdependence among components, and also on the economic and commercial choices of suppliers, which may opt to create artificial unity between independent components or, conversely, to separate interdependent components by complying with standardized interfaces. We propose a distinction between a narrow form of modularity in use, whereby the client's capacity to assemble the system himself is limited to components supplied by a single producer, and a broad form in which the client can assemble components acquired from different suppliers. Strengthening modularity in use currently appears to be a frequent means to offer customers the possibility to personalize products or systems manufactured on a mass production model.

These three types of modularity overlap partially but have a high degree of independence. Thus, a laptop computer has a high level of modularity in design and production, but is not modular in terms of use. An automobile is very modular in production, but has low modularity in design and no modularity in use. Likewise, the three types of modularity do not necessarily correspond to the same breakdown of the system into its components. For instance, in an automobile, the search for modularity in production prompts carmakers to require that some suppliers deliver entire modules (e.g. a dashboard) that are often non-modular compared to the rest of the vehicle from a design standpoint.

Literature on modularity has essentially focused on complex products (and more particularly the IT, automotive and aerospace sectors) and chiefly covers modularity in design. Research can easily be transposed to the issue of bouquets, and generates useful results.

We can put forth the hypothesis that bouquets are, generally speaking, more modular than complex products. This hypothesis is tautological for usage modularity: in principle, complex products show little or no modularity in use; conversely, by definition, the components of a bouquet are linked to specific markets, which implies that they are potentially modular in terms of use (in the broad sense). With regard to modularity in production, the very fact that a specific market is associated with each component of a bouquet is an indication of their autonomous production. Lastly, things are undoubtedly more complex for modularity in design, as the components of a bouquet are interdependent in producing a response to a certain category of need. However, satisfying a need – especially if this is defined in the broad sense – can entail carrying out various sub-functions, which are admittedly complementary in terms of use, but are not necessarily interdependent on a functional level (the way in which one function is carried out does not interfere with how the others are). This is the case, for instance, for the combination of a razor and shaving cream: the two are entirely complementary in terms of use, the shaving cream has little impact on how the razor works, and the razor's action has no effect on how the shaving cream works.

If we assume that the more a composite product set is modular (in every sense of the term), the more likely its production and commercialization are carried out in a decentralized fashion by means of the market, then modularity calls into question a bouquet offer's competitiveness. In other words, the strategic space in which bouquets

can be developed lies in exploiting the imperfections of modularity. *The field of bouquet producers begins where the benefits of modularity end and where integration effects lie.*

3.2 Integration effects: A definition

We define integration effects as the gains generated by a bouquet producer for its clients due to the former's involvement in integrating the components of the bouquet. These are seen in lower costs for obtaining the solution and/or improving its quality. The notion of integration effect is a general one that covers a variety of phenomena or mechanisms that are very familiar to economists.

Integration effects derive directly from the imperfect modularity of the bouquet offer. They can be static (i.e. taking effect all in one go) or dynamic (placing the bouquet offer within a trajectory of improvement).

Integration effects – with the saving the client make of his own resources - form the basis of the value generated by the bouquet offer, which can make it preferable to the client integrating the components on his own. These integration effects are therefore naturally at the heart of the analysis of the competitiveness conditions of the bouquet offer.

4. The competitiveness conditions of the bouquet offer

4.1 Financial savings

The benefit derived from the bouquet offer can lie in the opportunity that it affords customers to enjoy a certain range of useful effects at a financial cost that is lower than alternatives. Three sources of integration effects are at play here: economies of scope, savings of assembly costs and reduced transaction costs.

4.1.1 Economies of scope

A bouquet producer can enable customers to benefit from financial savings by harnessing economies of scope, which are by definition inaccessible for specialized suppliers of each component in a bouquet.

Economies of scope have various sources, all of which consist of mutualizing an asset. This mutualized asset is at the origin of interdependence between the components in question, in opposition to the bouquet's perfect modularity in production. Economies of scope can result, for instance, from the mutualization of productive equipment or purchases of raw materials. The potential of this type of scope economies on production costs is relatively modest in terms of a bouquet offer, which, by definition, tends to bring together components that are complementary from the client's viewpoint but have no presumable reason to share the same raw materials and/or production processes.

The shared asset can be a network, in which case the level of scope economies generated depends on the weight of network access costs in obtaining the useful effects for the customer. The appeal of triple-play offers (Internet+telephone+television)

largely derives from the use of the same infrastructure – which is quite costly – to transport data bits¹⁴. However, the composition of the bouquet thus depends as much on technical considerations (which components can use the same network?) as on the objective of combining complementary components in the production of certain types of useful effects. This type of bouquet could therefore lack coherence.

The brand is another asset category that can be mutualized. For instance, selling a set of bouquet components under a single brand name can generate financial savings for customers by a significant reduction in marketing expenditure compared to what would have been spent by specialized suppliers. This is one of the main sources of appeal for open mega-bouquets offered by major food retailers via their private-label brands.

4.1.2 Savings of assembly costs

A second source of price competitiveness for a bouquet offer can lie in its ability to reduce assembly costs. Unlike economies of scope, assembly cost savings do not involve the cost of bouquet components themselves, but the cost related to combining them, i.e. their “physical integration”, in view of producing the targeted useful effects.

An initial source of assembly cost savings lies in economies of scale, which are traditionally associated with the mobilization of specialized production equipment, fostering productivity gains during the assembly process. These economies of scale are one of the main explanations for the fact that complex products, such as automobiles or aircraft, are sold as integrated units and not as separate parts¹⁵. A second source of assembly cost savings can arise from the intensity of interdependence between bouquet components at the time of assembly. The air conditioning system in an automobile is a good example of this. The physical integration of the air conditioning system into the vehicle is very interdependent with the other assembly processes, which is not the case

(for example) for rear-view mirrors. This explains the considerable difference in the cost of the air conditioning option when it is integrated into the vehicle's initial assembly and when it is added afterwards to an already-assembled vehicle.

This potential savings in assembly costs is undoubtedly important and applies very broadly to complex products. This is not necessarily the case, however, for bouquets, which do not always involve components that are “physically” integrated but, in a minimal configuration, are present side by side in a catalogue or, for more integrated bouquets, implemented at the same time in view of producing the useful effects sought by the customer. The bouquet of “automobile + maintenance” is a perfect example of the type of assembly cost savings that can derive from a bouquet offer: the car's maintenance is (supposedly) more efficient when provided by the car's manufacturer given the specific equipment required, the specific inventory of spare parts, the specialized training and accumulated experience of the personnel, etc. As this example suggests, savings of assembly costs in the case of bouquet offers are often more in terms of information than “physical” assembly.

4.1.3 Reduced transaction costs

The most obvious source of client value associated with the bouquet offer lies in the latter's potential to reduce the client's transaction costs. For the time being, we will focus solely on monetary or “monetizable” transaction costs.

The first source of transaction cost savings in a bouquet offer lies in access to a “one stop shop”, saving the client the need to cover transaction costs for the separate purchase of each of the bouquet components (Davies, 2003). The “one stop shop” effect constitutes a sort of specific category of economies of scope, generated directly by the customer. We note, along with Garud et al. (2003), that the modularity in use (in the

broad sense) is a diametrically opposite means to reduce transaction costs, insofar as the standardization of interfaces (when present) facilitates the comparison of offers, reduces the perceived risk, and facilitates monitoring...

4.2 Performance gains

The value attributed to a bouquet by its potential client base may lie in superior performance in the production of useful effects compared to alternative solutions. This superiority results from a higher production of useful effects (which can refer back to the issue of financial savings) or from increased quality in the useful effects produced. “Integrity gains” are at the base of this category of integration effects. The gain in performance for the client can also result from the offer’s increased pertinence, i.e. adapting the useful effects more closely to the specific needs of the customer.

4.2.1 Integrity gains

Integrity gains¹⁶ constitute the main level of integration effects leading to performance gains for the client. The degree of integrity in a system shows to what degree its overall performance will be optimized at a given time by the quality of the integration of the forms, functions and interactions of its various components. Thus, integrity refers to the system’s architecture.

The bouquet producer can create client value if, by controlling the architecture of the bouquet, it successfully increases the integrity of the system compared to alternative integration forms within reach of the potential clients. The bouquet supplier activates this performance lever by using its advantage in managing the interdependence between bouquet components, which implies imperfect modularity in production and/or design.

Integrity gains can be located at the production level. General construction companies illustrate the type of integration gains related to interdependence in production: controlling the order of all related tasks, for example in renovating a house, enables a certain optimization, with an impact on costs (this again brings us back to assembly cost savings) and on the quality of the service. For instance, installing the heating system at the same time as wall insulation and floor finishing enables the ductwork and pipes to be concealed.

Imperfect modularity in design opens another space for integrity gains, as the bouquet supplier can then endeavor to intervene on the characteristics of components in order to optimize the product of their interdependence (which is something that most customers are unable to achieve). The gain can then derive from the “technical” performance of the bouquet in carrying out the targeted function, as in the case of Microsoft Office, where the control over the design of each component ensures interoperability for the entire system, which is a source of customer value. The integrity gain can also be at the level of aesthetics, harmony or intangible coherence. Harmony of styles, shapes and colors is often the basis of the competitiveness of bouquets offered by personal apparel specialists.

4.2.2 Gains in pertinence

The bouquet offer can base its competitiveness in the adjustment of useful effects produced to meet clients’ specific expectations, in other words, by better adjusting the quality of the offer to demand relative to alternative offers.

This source of integration effects may appear counterintuitive insofar as the bouquet offer most often amounts to reducing the range of choice left up to clients compared to

self-integration of components acquired from different suppliers. Gains in pertinence can arise chiefly in two types of situations:

- When the selection and integration of components require specific skills that the customer may not have, which opens up the risk that the solution will not be adapted to the specificity of his/her needs;
- When the bouquet supplier has the means to “audit” the customer’s needs and to use this knowledge base to adapt the features of the bouquet and each of its components, which is presumably not possible in the case of self-integration of components acquired on the market. The leverage is undoubtedly stronger for dynamic rather than static integration effects.

Gains in pertinence form one of the foundations of the competitiveness of bouquet offers in the retail sector. Banners that have targeted fairly narrow and uniform client bases and have given themselves the means to evaluate, with a certain degree of precision, the expectations of these clients can endeavor to present themselves as “selectors”, taking advantage of their twofold knowledge of customers and products in order to boost the credibility of their capacity to built a very pertinent composite offer.

4.3 Saving the client’s resources

Lastly, resorting to the services of a bouquet producer can limit clients’ financial commitment and enable them to generate savings in terms of cognitive resources.

4.3.1 Saving financial resources

At an equivalent value for money, the bouquet offer can produce a benefit for the client compared to alternative solutions simply because it removes the requirement to commit funds to producing a solution. This category of client benefit is nevertheless limited to bouquets that provide access or results on a contractual basis, or to bouquets that incorporate a financing component.

For client companies, this type of bouquet offer can be a means to curb capital commitments and thus generate leverage on their return on equity. In some cases, the bouquet offer can also be a means to transfer a certain proportion of the clients' payroll expense¹⁷ to the service provider. From a more general perspective, using bouquet offers can be part of a strategy to refocus firm resources on the core business. Outsourcing of functions can also yield benefits in terms of flexibility for client companies' fixed cost base.

Individual customers may also be interested in limiting their financial commitment in obtaining the useful effects they seek: as for company clients, bouquets fit a rationale of access, removing the need to spend significant amounts at once, and can thus also be a financing solution for obtaining the solution (as in the case of automobile leasing bouquets). A bouquet offer can also be a means for clients to avoid committing their time resources to producing a solution.

4.3.2 Saving cognitive resources

Here, we focus on the bouquet offer's ability to reduce the client's commitment of problem-solving or computational resources to obtaining the useful effects desired. The opportunity for savings of cognitive resources is undoubtedly a more important factor in the appeal of bouquets in B-to-C than in B-to-B. While the customer benefit can

possibly be expressed partly in financial terms, what is emphasized here is the bouquet's capacity to obtain more "comfortable" useful effects for the customer. In this case, the benefit for the client is a psychological one.

First of all, the bouquet offer endeavors to limit (to a greater or lesser degree, depending on its type) the cognitive resources used in choosing which components to purchase in order to meet a need. Here, we recognize a particular type of transaction cost savings. Secondly, the bouquet offer may be such that it relieves the client of the task of integrating and implementing the components in view of producing the desired useful effects. The weight of the subjective cost of this commitment of cognitive resources depends on the following:

- The complexity of the components and the degree of uncertainty as to their quality¹⁸;
- The complexity of the integration and its more or less uncertain effects¹⁹;
- The level of competence already acquired by the client in producing the solution on his/her own²⁰;
- The client's degree of commitment vis-à-vis the type of need to be satisfied (the psychological importance of the need, the consequences of making a wrong choice, etc.). The stronger this commitment, the more the client is inclined to committing its own cognitive resources to satisfy the need.

The bouquet producer that enjoys a strong brand reputation or significant level of trust with the potential client base will find here a means to boost this lever on competitiveness: an image of quality, either overall or based on one of the bouquet components, can thus be a signal for quality (and compatibility) applying to the bouquet as a whole²¹.

Note that recognized and shared standards, if they exist, offer an alternative for reducing the cognitive complexity of the integration process, and therefore potentially favor a client opting for self-integration.

4.4 Dynamic gains

All the bouquet competitiveness factors analyzed thus far are static, insofar as their impact on the bouquet's competitiveness is harnessed in one go. This analysis must be completed by incorporating dynamic integration effects, i.e. all the factors that can increase a bouquet's capacity to produce client value over time.

Dynamic integration effects break down into two main analytical categories:

- *Continued improvement of client knowledge.* This is in no way automatic and requires that the bouquet producer implement explicit systems and processes. As the bouquet producer's activity is focused on satisfying a need that calls for a set of products, it can be imagined that the producer has a natural competitive advantage in knowing clients, their expectations, how all the products are used to satisfy a need, etc., over "traditional" players focused on a "product" offer. From a static standpoint, this information advantage is a source of gains in integrity and pertinence. From a dynamic standpoint, it can lead to an improvement in the offer.

In the most integrated types of bouquet offers, the producer assists clients in implementing the solution. This is an opportunity to create a "thick" relationship enabling the producer to benefit from feedback concerning the implementation conditions of the offer, its uses, the type of useful effects produced, potential component malfunctions or breakdowns in compatibility between components. The production of

this feedback data can be facilitated by the implementation of “sensors” on the client side, thus favoring a more or less automatic return of information that then provides input for a learning loop that enables the offer to be improved by adapting components, or by modifying the integration mode to achieve better integrity or greater pertinence in the solution. This learning process can focus on the client base as a whole (i.e. from an overall, or aggregate, standpoint) or on each client individually.

- *Dynamically exploiting cognitive interdependence.* The cognitive interdependence that exists between the components of a composite bouquet that is not entirely modular in terms of its design comes into play in the learning dynamics for each bouquet component. These interactions occur when innovation on one of the bouquet components makes necessary adjustments in other components in such a way as to affect the technological aim of these components, or when lessons learned in the production and implementation of a component can fuel the innovation efforts on another component. For instance, in “product-service systems” bouquets²², providing maintenance services offers a means to observe the implementation of other bouquet components in order to accelerate the feedback loop that fuels the innovation process.

In all, exploiting sources of dynamic integration effects can give the bouquet an advantage over alternative offers in terms of “upgradability”²³, which consists of a higher capacity to improve over time in satisfying the targeted need.

4.5 The drawbacks of bouquets

This overview of factors that can boost the competitiveness of bouquet offers would not be complete without a look at the limits of this type of offer from the standpoint of

potential clients. These limits can be divided into two categories: those resulting from resistance on the client side, and those resulting from integration “diseconomies” on the supply side.

Among the reservations that clients may have regarding bouquets, we note the following:

- Fear of becoming dependent on the bouquet provider. This fear is particularly well founded in the case of professional clients that are completely outsourcing a function, which leads to a loss of internal competence, thus making the decision irreversible;
- Doubts as to the bouquet producer’s ability to be fully able to excel in each bouquet component, particularly when these components are numerous and non-uniform in terms of production conditions;
- In the case of closed bouquets, fear of being forced to purchase unwanted components;
- Overpriced bouquets compared to self-producing the bouquet, due to the difficulty in factoring in the full cost of self-production. This risk is higher among individual clients, who sometimes have difficulty taking into account the time opportunity cost.

To these reservations, we add sources of possible integration “diseconomies”:

- The bouquet offer may suffer from a drawback in terms of integrity and/or pertinence, as it restricts clients’ range of combinations among components, along with the risk that an industrial integration approach (in the case of highly integrated bouquets) may lead to standardization in the solutions proposed. On mass markets, where the large number of customers encourages standardization, this limitation can prove substantial, particularly in the current context marked by consumers’ apparently growing desire to

play a more active role in consumption, to personalize offers, etc. Thus, in some cases (for instance, DIY), customers view self-integration as a positive point²⁴.

- Along the same lines, when the integration of bouquet components relies on proprietary, exclusive interfaces that compete with standard interfaces, the bouquet supplier is deprived of the benefit of network externalities and a broader range of complementary products, which could expand the bouquet's value for clients. This aspect was probably the major disadvantage for Apple's Macintosh-based bouquets, which were competing against the PC.

- Lastly, bouquets may suffer from a disadvantage in terms of upgradability compared to the option of purchasing components separately, insofar as clients then have the possibility of integrating components themselves gradually as significant innovations appear.

5. Governance mode for designing bouquets and exploiting potential integration effects

A bouquet offer's competitiveness is strongly rooted in its producer's ability to harness integration effects. The intensity of potential integration effects lies in the limits of the modularity of the system formed by the bouquet components. A set of complementary goods and services that are entirely modular in terms of design, production and use presumably lends itself less easily to a bouquet offer, as is the case, for instance, of the razor/shaving cream or toothbrush/toothpaste combination. While such bouquets do indeed exist, they are not the favored grounds for the development of bouquet offers,

but instead often fit a more traditional rationale of commercial or promotional policy, which consists of generating cross-sales in a pattern described very well in the economic analysis of bundles²⁵.

The development potential for bouquet offers also appears fairly limited when the functional interdependence between the components combined to satisfy a need is fairly weak and effectively managed via standardized interfaces, as is the case for hi-fi stereo components or personal computers. However, even in this case, a bouquet offer can claim competitiveness by exploiting gains in integrity or pertinence, as well as its ability to reduce clients' transaction costs.

A bouquet offer's competitiveness thus depends on the potential integration effects, but also on the bouquet producer's ability to actually exploit this potential. This ability refers in particular to the governance mode for the bouquet design process implemented. A large share of integration effects (particularly assembly cost savings and integrity gains) lies in the means for coordinating the design and/or production of the various components. However, full and complete control over the design and production of the bouquet components exposes the producer to the requirement to mobilize potentially very broad and heterogeneous competences, which can prove impossible when it entails mobilizing complex knowledge, or can weigh on the bouquet's competitiveness compared with separate components produced by firms that have specialized knowledge. In other words, the governance of bouquet offers is torn between centripetal forces encouraging internalization (the need to coordinate interdependence) and centrifugal forces encouraging outsourcing (the offer's cognitive heterogeneity). A bouquet producer's competitiveness depends largely on its aptitude to overcome this contradiction. This generally entails adopting a network organization in which the producer acts as an integrator of the complementary competences of partner companies,

which supply all or a portion of the components. Bouquet producers are thus players in a cognitive division of labor, mediating between specialized competences and the needs of clients. In turn, this economic function requires specific competences that cover both the marketing dimensions (identifying problems to be solved, drawing up bouquets, managing customer relations, etc.) and network management (evaluating competences, drawing up coordination mechanisms, defining incentives, etc.).

6. Concluding remarks

We have endeavored to show that the competitiveness of a bouquet producer's offer lies largely in the exploitation of integration effects. The latter derives from the imperfect modularity in the design and production of the components used in the offer, and fully exploiting these effects requires implementation of a specific type of governance that can ensure strict coordination of the contributions of complementary specialized competences. Mediation by bouquet producers and modularity are thus, to a certain degree, alternative processes for combining specialized competences in view of providing an integrated solution to client needs. The ramp-up of markets for solutions and bouquet producers is therefore likely to affront the progress achieved in terms of modularity in design and production, thanks to normalization and standardization processes, which offer alternative decentralized and market-based paths to manage the cognitive division of labor ensured by bouquet producers.

Bouquets and modularity are linked to a series of specific advantages and limitations, which have been broadly highlighted in literature on modularity²⁶. These advantages and limitations can be understood from either a static or a dynamic standpoint.

From a static standpoint, modularity (and the concurrent standardization) enables realization of economies of scale in the production of components, as it is taken in hand by specialized producers addressing the entire market of end-users. Modularity also enables a reduction of transaction costs by facilitating a comparison of offers, increasing the number of potential competitors, narrowing the specificity of assets and informational asymmetry, and sharply simplifying the needs for coordination between supply and demand. Furthermore, modularity can increase the diversity of supply and thus enable it to respond to heterogeneous demand while controlling costs. On the other hand, the mediation provided by bouquet producers, by means of the implementation of dedicated interfaces, can increase the level of integrity of the offer²⁷, and reduce transaction costs for clients by simplifying the selection process and offering a “one stop shop”.

From a dynamic standpoint, the main advantage of modularity lies in stimulating innovation by enabling a wide range of players to work in parallel on innovation for each component, but also by avoiding bottlenecks at the composite offer level, which could arise from unequal technical progress at the component level (as modularity always makes it possible to recombine components, notably by replacing one component with a higher performance version). Modular systems thus benefit from an advantage in terms of upgradability. Bouquet producers’ coordination of the cognitive division of labor offers the advantage of orchestrating and channeling more coherently the innovation efforts on each component. It also enables greater feedback between design and production²⁸, or even between use and design. Above all, it facilitates architectural innovations, i.e. those that involve not components, but rather the combination of components and the interfaces that govern interaction among components. The stability of architecture and interfaces constitutes a prerequisite for the

dynamic efficiency of composite offers coordinated in a decentralized fashion via modularity; it is because the players in the division of labor know they can count on this stability that they undertake innovation efforts autonomously. However, the stability of the architecture can eventually form an obstacle to the overall dynamic of the composite offer, which thus runs the risk of becoming blocked. Following in the steps of Brusoni et al. (2004), we can say that in modular architecture, the selection of innovations is made at the fine component level, which provides for a more rapid but essentially local research process that can become blocked at the level of local optimization. In an integral architecture (corresponding to a bouquet), research is more comprehensive, which dispels the risk of blockage, but at the expense of slower research in a more complex space.

Despite these differences, both forms of managing the division of labor in producing composite offers are, to a certain extent, more complementary than opposed to each other. From sets of perfectly modular products, integrated by the clients themselves according to ordinary market mechanisms, to bouquet offers whose architecture is entirely controlled by providers, we see a continuum of organization types that are more or less decentralized, which mediate the structuring of production around innovation challenges to build composite offers that can respond to clients' needs. For a specific need, the position along the continuum depends on considerations that are technical, strategic and institutional (at the origin of defining standards), and which together help to determine the more or less modular nature of the set of complementary products and delineate the field of integration effects. The analysis presented in this article has highlighted some of the dimensions of this trade-off. Much work remains to be done, particularly by referring to literature on standards, in order to better take into account

how modularity, when not a “natural” property of the systems offered, can result from strategic maneuvers or institutional arrangements.

In any case, there is a grey area where modularity and bouquet production can appear as competitive modes for managing the cognitive division of labor. The story of the IT market reflects the victory of modularity. The story being written in the banking and insurance industries appears to be turning to the advantage of bouquet producers. Better comprehending the terms of this competition and the comparative advantages of each of these modes is an objective for future research aimed at better understanding how markets work and how the production system is organized in contemporary capitalism.

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Notes

¹ See notably Jones and Sasser (1995), Reichheld (1996), and Meyer-Waarden (2004).

² Cornish (1988), Grönroos (1989), Day (1996)...

³ Moati and Mouhoud (1994).

⁴ Stremersch and Tellis (2002), Kobayashi (2005).

⁵ Pugh (1991), Ulrich and Eppinger (2000).

⁶ Rothwell (1992) and Hobday (1998, 2000), Davies and Hobday (2005).

⁷ Moati (2001), Moati and Larue (2003).

⁸ Simon (1962).

⁹ Schilling, (2000, p. 312).

¹⁰ Garud and Kumaraswamy (2003).

¹¹ Simon (1962).

¹² Ulrich (1995).

¹³ Sako (2003).

¹⁴ In other words, once the network is built to offer clients access to the Internet, the marginal cost of the telephony or television broadcast services is slight.

¹⁵ Langlois and Robertson (1992).

¹⁶ Garud and Kumaraswamy (1995).

¹⁷ Thus, Xerox Global Services commonly “takes on” its client’s staff devoted to document reproduction.

¹⁸ Holt and Sherman (1986).

¹⁹ Schilling (2000).

²⁰ Harris and Blair (2006). Along the same lines, Spiller and Zerner (1997) affirm that bundle offers are particularly appealing when the products are complex in terms of implementation and clients are not very

competent in the field, as the integration then appears to entail a high cognitive investment and exposure to a risk of the system functioning poorly if the integration is not entirely successful.

²¹ Simonin and Ruth (1995).

²² Goedkoop et al. (1999).

²³ Garud and Kumaraswamy (1995).

²⁴ Schilling (2000).

²⁵ Kobayashi (2005).

²⁶ Ulrich (1995), Garud et al. (2003), Langlois and Robertson (1992), Baldwin and Clark (2003), Schilling (2000), Schilling and Steensma (2001), and Prencipe (2003), among others.

²⁷ Garud and Kumaraswamy (2003).

²⁸ Pavitt (2003).