REVIEW ARTICLE

The Firm as an Institution for Product Design and Value Web Orchestration
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Abstract
Institutional theory of the firm focuses on firm boundaries and the activities firms internalize within their hierarchies. However, an examination of disintegrated firms that influences activities beyond the scope of their hierarchies suggests that firms also perform other economic functions. By analysing these functions, the aim of this paper is to suggest a theory of the firm that goes beyond internalization. Sometimes firms specialize in the economic functions of product design and value web orchestration. With large markets, complex and composite goods and complementarities among producers, firms reap advantages of skill and scale by pooling demand and realizing complementary positive externalities. Hence, firms are able to make products that customers never knew they would demand and that suppliers never knew they would be part of supplying, and that is more efficient than if customers and individual suppliers performed these functions. Case material from Nike, a large and highly disintegrated firm, illustrates the analysis.

Keywords: New institutional economics; comparative institutional analysis; theory of the firm; disintegrated brand-name firm; product design; value web orchestration; pooling advantages; combinatorial benefits.

1. Introduction
Neoclassical economics see the firm as a unit of production in which input is transformed to output. Why entrepreneurs and managers are needed is not further explained, as was early observed by Coase [1]. Coase argued that it is the costs of using the price mechanism, the transaction costs of discovering relevant prices, that explain why resources are allocated within firms. These ex ante costs are reduced by replacing series of discrete market contracts with an open, long-term contract in which one party (labour) agrees to provide continuous services to another party (entrepreneur/manager). The contract specifies the price (wage) and in general terms, the services to be provided. Coase stated a theoretical development in which the firm is analysed as an alternative institution to markets and as an institution that internalizes market transactions (see Demsetz [2] for an early discussion, arguing for a comparative institutional analysis).

Contributions following on Coase developed the analysis by observing ex post transaction costs due to measurement problems and information asymmetries. These imperfections cause incentive problems in market transactions, expressed as moral hazard or opportunistic behaviour. One situation when these problems arise concerns teamwork or joint production [3–5]. Here, market coordination is costly since the participants have to make joint decisions that require intensive communication and negotiations. If individual contributions are difficult to measure, incentives to be free riders put individual participants in moral hazard and there might be conflicts over rewards.
An authority – the manager of a firm – can reduce these transaction costs by acting as a centre for communication and by centralizing decision making, clarifying the contributions expected by each participant, the rewards and the sanctions.

Asset-specific investments (also termed transaction- or relation-specific investments) provide another explanation to why economic activities are integrated into the unified hierarchical governance structure of firms [5–7]. If one party invests in an asset that is specifically adapted to another party, they both become dependent on each other. A few party exchange problem arises in which each party risks to become the victim in a “hold-up” situation. Again, the risk of opportunistic behaviour (moral hazard) calls for a unified governance that centralizes and integrates interdependent stages of production processes, especially if transactions are frequent and there are uncertainties involved [7].

A related theory of the firm emphasizes the distribution of property rights [8]. According to this view the ownership of non-human resources defines the firm. One reason for ownership is, again, the existence of asset-specific investments. Ownership of asset-specific investments enables the firm to secure future control, which reduces the risk of future bargaining problems and secures future residual incomes. Ownership is chosen when its benefits (control and residual rights) exceed the benefits of using alternative market contracts. Again, firms use incomplete contracts and claim residual rights because it is difficult to, ex ante, specify outcomes and rewards. The principal is given the right to direct other parties’ activities and is rewarded with residual incomes [9–11].

Another explanation emphasizes the use of knowledge in firms (information, capabilities and competence). Specific, unique knowledge is difficult to protect and exploit in market transactions. The seller risks losing control of the knowledge when it is sold and if the knowledge spreads, its value deteriorates [12]. From this point of view, the firm is an institution that develops, protects, transfers and integrates specific knowledge [7, 13–15]. This view can be related to theoretical traditions emphasizing capabilities that are unique to the firm, such as evolutionary economics [16] and the resource-based view of the firm [17]. For a discussion on knowledge-based approaches to the firm, see Foss [18].

The different approaches described above provide various explanations to why transaction costs can be reduced if they are internalized within the hierarchy of a firm. But, of course, there are limits to internalization and transaction costs sometimes are higher in firms than in markets. One problem in firms is that outcomes can be difficult to measure. Therefore, rewards have to be based on measures other than output, creating hierarchical incentives that are weak and biased compared to market incentives [7]. Another problem is that agents can have information advantages compared to principals, which may give rise to moral hazard/opportunism within firms. Such agency problems raise the question of efficient control in firms [7, 19, 20]. One solution is to develop firm-internal market mechanisms, as illustrated by piece-rate payments and profit centres [7]. Another solution is to develop trust between agent and principals to mitigate the risk of opportunistic behaviour. Trust characterizes intermediate institutions such as clans and networks [21–24]. A third problem occurs in multitask situations, when an agent performs different kinds of work and some tasks are measurable whereas others are not. Here the situation becomes especially problematic [25].

The contributions explain the choice of institutional structure from a transaction cost perspective, stressing problems due to imperfect information, bounded rationality and behavioural risks. A somewhat different approach is to study how the choice of coordinative mechanisms encourages different kinds of behaviour. Roberts [26] argues that market-oriented incentives in firms encourage employees to explore new opportunities and to be innovative. On the other hand, hierarchical mechanisms encourage cooperation and the exploitation of existing advantages. Roberts also notes that trust between the involved parties can expand the trade-off between innovative and cooperative behaviour.
Common to the various contributions above is that they describe the firm as a substitute to market coordination, an institution that internalizes certain transactions within the boundaries of its hierarchy. This approach can be criticized for being too limited. Holmström and Roberts [27] argue that the economic theory of the firm is too focused on hold-up problems and on the hierarchy as a solution to such problems. They observe that hold-up problems are solved in several different ways, such as hybrid organizations and cooperation between firms, as well as integration within the firm, but economic theory fails to explain this variety. Garrouste and Saussier [28] conclude that “...there is still no unified theory of the firm. /...many competing theoretical frameworks coexist, with only partial answers concerning the nature of the firm, its boundaries and its internal organization” (p. 194).

The aim of this paper is to contribute to this discussion, arguing that today’s comparative institutional approach provides a too limited understanding of the economic function and nature of the firm. Theories that explain the firm focus on the boundaries and the choice of hierarchal rather than market coordination. This view is too narrow considering that firms influence economic activities far beyond the scope of their hierarchy, which is illustrated by the fact that many firms today are extremely disintegrated. By analysing the economic functions performed by disintegrated firms, an additional understanding to why firms are needed in the market system can be developed. This paper is structured as follows: Part 2 discusses contributions on disintegrated firms. Part 3 relates the role of disintegrated firms to the economic role of entrepreneurs. Part 4 discusses product design and why a disintegrated firm can have advantages in specializing this function. Part 5 identifies value web orchestration as an additional function performed by disintegrated firms and discusses when it is efficient to specialize in this function. Part 6 discusses the arguments for keeping the design and orchestration together. Part 7 concludes the main arguments of the paper; firms perform other important functions than production and hierarchical coordination and, sometimes, they specialize in product design and value web orchestration.

2. Firms Do More
Disintegrated firms are anomalies in today’s comparative institutional analysis of the firm. However, in the adjacent fields of organization research, disintegrated firms and firms that influence activities far beyond the scope of their hierarchies have been observed for several years. Miles and Snow [29] summarized organizational innovations over time. In the early 1800s, “agency structures” for small, single-product and owner-managed firms predominated. From the 1850s, more integrated “functional structures” followed, with large firms producing standardized products. In the early 1900s, the “divisional structure” gave rise to large diversified firms with different products and geographical markets. The “matrix structure,” invented in the 1950s, made it possible for firms to handle more than one dimension of operations, that is, both standardized and innovative products and stable and changing markets. In the late 1900s, Miles and Snow observed a new innovation and named it a “dynamic network.” This organization centres around firms that supply product designs for changing global markets, as illustrated by international construction firms, global consumer goods companies and selected electronics and computer firms. Miles and Snow argued that new information technologies facilitate the development of these broker-assembled temporary structures, but they provided little information about why these structures are needed. They claim:

Organizations of the future are likely to be vertically disaggregated: functions typically encompassed within a single organization instead to be performed in independent organizations. That is, the functions of product design and development, manufacturing and distribution, ordinarily integrated by a plan and controlled directly by managers, instead to be brought together by brokers and held in temporary alignment by a variety of market mechanisms.

[29, p. 181]
Jarillo [30] presented a similar view and identified the “strategic network” as a specific type of interorganizational relationship in which a central “hub firm” acts as a network orchestrator who coordinates relations to other firms. Jarillo used transaction cost economics to analyse the phenomenon and identified strategic networks as a coordinative mode besides markets, bureaucracies and clans. The hub firm develops long-term trust among disintegrated actors in a network of market relations and reaps greater benefits of specialization, flexibility and cost discipline than integrated firms. The perspective of strategic networks later became an interest for various fields of research and has since been used for analysing industry structure, market power and firm positioning within an industry [31], as well as firm value and knowledge creation [31–33]. The benefits developed by strategic networks, compared to alternative systems of pure market relations, were described as “non-zero-sum games” and “opportunity of joint-value creation” [30]. The analysis discuss how the hub coordinates (trustful vs. arm’s length market relations), but the economic function performed by the hub in the first place is not theoretically analysed.

Rugman and D’Cruz [34] also identified the importance of firms that act as centres in larger contexts of suppliers and customers, using the concept of “flagship firms.” Flagship firms develop relations to key suppliers and customers and implement a strategy for a larger network of firms. The flagship:

...determines and sets limits to the product/markets in which its network partners will be allowed to operate, it chooses the courses of action they will adopt to develop competencies in these fields of endeavor and it directs their capital investment programs. In return, network partners are given membership in the flagship’s network which usually carries with it prospects of significant sales volumes, access to advanced technology and participation in the benefits of the brand-image of the flagship.

[34, p. 405]

Also Rugman and D’Cruz used a transaction cost analysis to describe how flagship firms and network partners coordinate. They explained the relations as long-term, collaborative and different from the short-term competitive relations in traditional markets and different from the internal relations in large divisionalized corporations. The flagship firm is described as providing leadership and strategy to the network. But – again – why these functions are performed by a specialized firm is not analysed.

The same lack of theoretical explanation is found in the discussion of firms that perform the role of “system integrator,” as illustrated by Hobday et al. [35]. In their analysis, specialized firms with capabilities to design and integrate systems and manage networks of components and subsystem suppliers, are identified. The authors conclude that the more complex, high-tech and costly the product, the more significant system integration becomes. However, why this is the case is not explained.

Christensen et al. [36] analyse disruptive technologies and identify disintegrated firms at the later stages of product evolution, when modulation and clearly defined interfaces between components and subsystems are clearly specified. Disintegrated firms come into the picture at a stage of development when integration is no longer necessary. These companies “mix and match the best components from the best suppliers to respond to the specific needs of individual customers” [36, p. 76]. Hence, the industrial logic shifts from large, vertically integrated firms competing with continuous improvements, to firms that are more specialized in horizontal dimensions of the value chain competing with price, flexibility and speed. Why firms specializing in “mix and match” are needed is not analysed further. Argyres and Bigelow [37] continue this approach and relate it to transaction costs theory. They explain vertical integration in its early stages as a result of asset specificity and the interdependencies that exist when complex new system products are built. As components become
more standardized, asset specificity is reduced; hence, production becomes more disintegrated. The analysis illustrates how the rationality for integration changes as new innovations develop, but also in this case, there is no explanation for why firms are needed, beyond internalization.

That there is more to the economic function of the firm than internalization is illustrated by the number of important firms that influence activities far beyond the scope of their hierarchies and by firms that are extremely disintegrated. An example is Nike, a global market leader in athletic footwear. Nike keeps the design of new products and marketing activities to retailers in-house, but relies on well managed market relations to coordinate production and distribution [38]. Other examples of disintegrated firms are H&M in the fashion industry and Hewlett Packard in the electronics industry, firms that compete with integrated firms in their respective industries [39].

As illustrated above, firms specialize in functions other than hierarchical governance, functions which are neglected in the comparative institutional analysis of the firm. Some researchers in adjacent fields describe boundary-spanning firms and disintegrated firms and analyse their relations to suppliers and customers by the use of a comparative institutional analysis, but there is no comparative institutional analysis of the economic function of these firms.

3. The Entrepreneurs
In neoclassical economic theory, the entrepreneur/manager determines quantities of input and products. Price signals guide these decisions and determine trade-off between the alternatives. However, as early writers on entrepreneurship observed, entrepreneurs also perform the important tasks of developing new products, finding new ways to combine resources and putting them into practice [40]. In addition, entrepreneurs handle uncertainties related to new unpredictable ventures [41] and specialize in making judgmental decisions [42]. Later theories on entrepreneurship discuss what entrepreneurs do and the personal characteristics of entrepreneurs, as illustrated by Casson [43], who suggests entrepreneurship as a basis for synthesizing theories of the firm. Casson identifies the entrepreneur as a market maker, an “originator” who comes up with new ideas and an “organizer” who realizes them. Casson argues that entrepreneurs have a specific kind of judgment due to superior access to information, a relative optimism, self-confidence, low risk-aversion, an effective social network and a reputation for honesty. Hereby, Casson continues a tradition that focuses on, who becomes an entrepreneur, the specific psychology, etc., rather than why there is a need for a specialized entrepreneur in the market system in the first place.

A comparative institutional approach has been used to compare decisions made by entrepreneurs with decisions made by centralized bureaucracies in planned economies, as was early discussed by von Mises [44] and Hayek [45]. However, a comparative institutional analysis of the entrepreneur within the market system needs to be developed. The alternative to the specialized entrepreneurial function in such a system is the individual customer and producer and the question is why a specialized agent sometimes performs these functions more efficiently. Entrepreneurial theories take entrepreneurs for granted and neglect such alternative solutions to the market-making problem. A comparative institutional analysis needs to explain why a specialized entrepreneurial function can be efficient compared to alternative solutions, an analysis that would provide a basis for a theory of disintegrated firms.

The argument here is that the function performed by disintegrated brand-name firms is similar to the function performed by entrepreneurs. Therefore it should be analysed in comparison with individual customers and producers. The advantages of disintegrated firms can be traced to two different economic functions: the design function, in which a disintegrated brand-name firm acts as a specialized agent who designs a product, and the orchestration function, in which a dis-integrated brand-name firm is a specialized value chain coordinator, residual claimant and quality controller. A conclusion is that disintegrated brand-name firms reduce transaction costs compared
to individual customers and input owners in the realization of complex and composite products, products that the customers never knew they would demand and suppliers never knew they would supply. This discussion will be elaborated below.

4. Product Design

Among the few economic researchers who had observed these entrepreneurial functions in a comparative setting are Cheung [46] and McNulty [47]. Cheung [46] discussed composite products, with several inputs and combined producers and observed that it can be costly for individual customers and producers to measure all contributions and prices. Cheung summarized his arguments as follows:

In principle, all contributions of producers as well as the services of the coordinator can be separately priced and sold to customers by measuring directly various attributes related to each contribution. In this case product and factor markets coincide. But the determination of prices is costly because of the numbers of transactions, because consumers lack detailed information on the use of each component or contribution to a commodity, because of the difficulty of measuring varied and changing activities and because of the need to separate contributions.

[46, p. 9]

Cheung analysed the firm as a coordinative function that specializes in deciding which components to use, measuring contributions and discovering prices. McNulty [47] added to this approach by dividing economic activities into two kinds: transformation of resources into goods and exchange of goods for other goods or money. Decisions on the qualitative dimensions of a product cannot be made solely by market exchanges. Deciding on transformation is an economic activity in itself which requires resources (information, skills and creativity) and here we find an explanation for why firms exist. McNulty writes:

The determination of quality is a unique province. The qualitative dimensions of goods /…/ can be traded and priced, but not determined or changed, within the network of market relationships. The market provides an arena in which consumers can accept a certain product /…/. But it requires the organization we call a firm to determine which of these, or of something else, will in fact be available in the market.

[47, p. 248]

Cheung and McNulty describe the firm as specialized in developing knowledge about components, input prices and in deciding the various qualitative dimensions of products. But these insights have neither prevailed in the theoretical analysis of the firm, nor in the theoretical analysis of entrepreneurs.

In this paper, “product design” describes decisions about what product to produce and how to produce it. These decisions must be made before the physical modelling of a product is done and before the product is exchanged in the market. The design of a product is part of the transaction costs and a question is how these costs can be reduced. Cheung and McNulty see this function as the reason for firms in a market economy. But is it evident that design is a function that should be performed by a specialized agent? A comparative institutional analysis has to consider alternative solutions to the problem of design.

In principle, product design can be decided in three ways. The customer, being the receiver of the good, can decide on the design and communicate it to a producer/input owner. Alternatively, a producer/input owner, being the supplier of the good, can decide on the design, produce the
product, and then offer it to the customer. Or, a specialized agent – a disintegrated brand-name firm – can act as an intermediary and make the decision.

All three alternatives are possible, but we lack a theoretical explanation of the choice between them. Below follows an attempt to sketch a comparative institutional analysis. Information asymmetries provide a start for the analysis. Customers have information advantages when it comes to knowing their own personal preferences and budget restraints. On the other hand, producers have the best information about their own available resources, production possibilities and costs. If the demand-side of this information problem is more complex (difficult for another party to comprehend), the customer has relative information advantages in performing the design function and vice versa. However, product design requires more than information about customer preferences and production possibilities and designing a product can benefit many customers and input owners. Therefore, product design is an activity in which an actor can gain advantages by specializing and making investments and then sharing the costs among many customers and producers.

However, using a specialized firm to solve the design problem comes at a cost. Individual customers and producers have the best knowledge of their own preferences and possibilities, knowledge that the firm needs to develop. This implies that an actor will specialize in performing the design function when it requires specific skills and substantial efforts, especially when these efforts can be shared among several customers and/or several producers. The efficiency of this activity can be explained by two kinds of advantages: the possibility to pool demand and the possibility to obtain combinational positive externalities among integrated producers.

First, the advantages of pooling demand: scale advantages are often associated with large physical investments, but they are important for efficiency in all activities where fixed costs are substantial. To the extent that design requires large investments and satisfy many customers, a specialized agent can specialize in the activity and spread the cost among all users, to their mutual benefit. Hypothetically, a customer who demands a new product can decide on the design himself/herself. But this might entail an enormous effort and require specialized knowledge about existing and future production possibilities and input prices and the skills needed to combine and develop these possibilities. If a product is complex (many quality dimensions and difficult to comprehend) and composite (the result of many different inputs), high transaction costs will prevent customers from performing this function. In this case, it is more efficient to introduce an actor who specializes in deciding on the design.

Product design is a semi-public good. There is no direct rivalry in consumption; the same design can be used in infinite products, but potential users can be excluded by the protection of the design (keeping it a secret, asserting intellectual property rights and other measures). Here, a specialized actor can invest in a design and then offer it to many customers in a controlled way, dividing the cost among them and making an additional profit. This way, the customer benefits from being offered a new product design at a fraction of its total cost.

A disadvantage of having a specialized agent designing for many users is that it may not fit individual customer needs as well as a tailor-made design would. This possible deviation cost of mass consumption is a disadvantage to be weighed against the benefits of a specialized function. Similar advantages and disadvantages occur if the perspective shifts and an actor who specializes in design is compared to an individual producer. Assume that each of several producers can produce the same new product and sell it in the market. Each producer can invest in the design and then produce the product, or have someone else specialize in the function acting as a proxy for all producers. The advantage of the latter solution is that a specialized actor can offer the same design to all producers, share the cost among them, and make a profit. If the costs of design are large and if there is sufficient demand, each participant can gain from such a solution. One disadvantage for the individual producer is deviation costs that occur if the design does not fit the individual producer’s production possibilities.
Another explanation to the efficiency of a specialized firm is the possibility to obtain positive externalities among integrated producers: the argument above assumes that every producer produces the same product, but many products are the composite result of different inputs from many producers. Here another kind of advantage motivates a specialized agent. For composite goods to be offered in the market, the product value has to be higher than the sum of the value of the individual inputs; the value of a component increases in combination with other components. Hence, the design of a composite product brings external combinational benefits to the participating producers. Each participant has an incentive to join with others to design such a composite product, but it requires investments in new knowledge about customer preferences, different producer’s production possibilities, and the combinatorial possibilities among them. If one participating producer holds a production capability that is more critical and more difficult for an outsider to understand, that producer might have a comparative advantage with regard to performing the task. Otherwise a specialized agent can develop specific skills and perform the design function. Such an actor has a disadvantage compared with individual producers when it comes to knowing the details of the individual production possibilities, but can develop unique knowledge about combinatorial possibilities and about potential matches to preferences among groups of customers, knowledge that the individual producer lacks.

Complementarities among choice variables have been discussed by Roberts [26], who analyses firm-internal organizations and the existence of complementarities among choice variables. Two variables are complementary if doing more of one increase the returns of doing more of the other. Obviously, such combinational positive externalities can also exist if a product design uses inputs from different producers, or incorporates development efforts and new products from different suppliers. Thus, a specialized agent who invests in the design of a composite product can create positive values for all participating producers, which will make them willing to pay their fraction of the cost and more.

A conclusion is that a specialized agent performing the design function can create value for both customers and producers. Rather than being explained as a unit of production (neoclassical economics) or an institution for hierarchical coordination (institutional economics), the firm can act as a proxy for many customers and producers, invest in design and decide on quality dimensions of products, which involves developing knowledge about customer preferences and resource opportunities. This reduces transaction costs compared to alternative solutions. Designing the concept of products is a function performed by disintegrated brand-name firms, as illustrated by Nike:

Since the launch of their own branded shoes in 1971, Nike has designed all of their products in-house. Nike's headquarters in Beaverton, Oregon, is the centre for design and development and in 1997, 400 people worked with design and development of new products in footwear, apparel and sports equipment. /.../

[38, p. 7]

Then why is a firm that specializes in design also often the brand-name holder? A first answer has to do with design as a semi-public good. Competitors have incentives to imitate the design, risking an uncontrolled diffusion and a reduced value. Other inputs of production are often private goods, characterized by rivalry in consumption as well as possibilities to exclude other users. If a product is the result of the input of many producers, the contributors of the most “public” good of the value-creating process will have a strong incentive to protect its contribution. Therefore, the one who specializes in design also has a strong incentive to be the holder of the product brand-name. This explains why disintegrated firms, such as Nike, provide design and keep the brand within the control of their firms. But why do these firms often also orchestrate the value chains in which they operate? This issue is elaborated upon in the next passage.
5. Value Web Orchestration

In economics, the concept of value chains describes how upstream producers sell their goods to downstream producers, sequentially adding value to the final product. Coordination is conducted by the invisible hand of market prices. The comparative institutional analysis nuances this view and explains why certain activities, vertically and horizontally, are internalized into hierarchical structures.

However, the chain metaphor is misleading in industries dominated by a disintegrated brand-name firm. In these industries products are often created by inputs from different industries and the value-creating process is better described as a value web with a central hub and components from separate value chains streaming up to a final product that is distributed by various channels around the globe. Coordinating these webs is another function performed by disintegrated brand-name firms. This phenomenon, as previously discussed in Part 3, has been observed by Roberts [26], who states that disintegrated firms, such as Nike and Benetton, have adopted the role of “vertical architect” or “value chain organizer” [26, p. 191]. But Roberts neither analyses this role nor explain why someone sometimes has to play it in the market economy.

In this paper, the role of creating and coordinating value webs is named orchestration. This function – like the design function – is important in our economy. Traditionally, economics is preoccupied with relative prices as the overarching mechanism for coordinating value chains. The alternative is a planned economy and the central command and control of a governmental authority. The comparative institutional analysis identifies other alternatives to market exchanges. Visible private hands can coordinate integrated parts of value chains, like a row of islands in the sea of market relations, but we lack a theory for firms that coordinate whole archipelagos. Private firms orchestrating systems of value-creating processes, such as Nike, are anomalies in such an analysis.

How can the efficiency of an orchestrating visible hand be explained using a comparative institutional approach? The reasons for an orchestration function are similar to the reasons of the design function. Again, for a newly designed composite product the components normally do not exist a priori and coordination by price signals is, therefore, insufficient. The design of these inputs has to be communicated to the different producers, exchange conditions have to be negotiated, contracts have to be written and outcomes have to be controlled. Also, in this case the orchestrating function can be performed by a specialized firm.

Just as a specialized design function, a specialized orchestration function can be a necessary condition for realizing certain products and making value webs possible. A customer who demands a new product can hypothetically go to a firm and buy the specifications to all components that are needed. Then he/she can approach possible producers, ask them to develop the components and contract with those who make competitive offers. He/she can contract with a firm that assembles the final product and with a distributor who brings the product to him. However, the transaction costs for these activities can be high, maybe too high for the transactions to be realized. Another solution is for the customer to turn to an intermediate firm that specializes in orchestrating the whole thing, from specifying what each participant should do, to distributing the product to the customer. As with design, an actor that specializes in orchestration can gain advantages compared to individual customers who do it themselves, advantages due to possibilities to pooling demand and to obtain combinational positive externalities among suppliers.

By pooling demand the various fixed costs of communication, negotiation, contracting and controlling input owners are shared among customers. These advantages increase the more customers there are to share the costs, the more components that are involved and the more new developments and adjustments that have to be made. As with design, a disadvantage to the alternative of having the customer being responsible for the orchestration is the costs of deviation when one product is produced for many customers with varying preferences; the product will not perfectly fit individual customer preferences.
Furthermore, a firm specializing in orchestration will have information advantages compared to customers which give rise to various problems. A first problem is costs of market communication since the orchestrator has to inform customers about new products and customers have to inform themselves about opportunities. Second, the orchestrator’s information advantages can potentially give rise to opportunistic behaviour (moral hazard). The orchestrator can be dishonest about the qualities of the product and customers may be reluctant to pay for quality they cannot verify beforehand [48]. This problem can be solved by signalling or screening activities, where costs must be weighed against the benefits of the orchestrating function. Signalling activities enable the orchestrator to communicate the quality, for example, by labelling the product with a brand. Screening, on the other hand, covers methods that customers use to sort out variations in quality. Brands are important here too. Without them, customers would have difficulties evaluating different products. A satisfied customer will connect a positive experience to the brand and communicate it to other customers. Likewise, dissatisfied customers will erode the brand’s reputation. Thus, information asymmetries motivate signalling and screening efforts, which is another reason why disintegrated brand-name firms are the holders of brand-name rights.

Now turn to the supply side. An individual producer can contract with other input owners, including a firm that makes the design and produce a composite product without involving any intermediate specialized actor. However, this means the producer will have transaction costs for identifying other potential input owners as well as customers. Again, especially for composite products, the costs for searching partners and negotiating contracts will be substantial, as will costs for controlling and enforcing agreements. An intermediate orchestrator can share fixed transaction costs among input owners and create gains for all. But again, a possible disadvantage for individual producers is the potential costs due to deviations from individual production possibilities.

In a world with imperfect information, the coordination of dispersed producers and customers is a risky venture. How can the risk be allocated between customers, producers and the orchestrator? One solution is to offer customers an open contract where they pay whatever is required to cover the costs for inputs. The contract could include information on an estimated price, but also state that if deviations occur the customer has to pay more or less depending on the final costs. Another solution is to let producers carry the risk, specifying their contributions but allowing rewards to be adjustable, depending on the revenues created when selling the product. A final solution, analysed by Fama [19] and Fama and Jensen [20, 49] is to let an intermediate be the risk taker. This is in line with the argument of this paper: a firm specializing in orchestrating a value web can be an efficient solution. The orchestrator can create contracts that in advance specify payments to customers and producers. The orchestrator then receives the residual income. The orchestrator acts as a buffer and absorbs deviations before they hit producers and customers. An argument for this is that the orchestrator is the one participant with the best information of the whole exchange process and, as the brand-name holder; it has a strong incentive to make the process efficient. Hence, by being the primary residual claimant, the orchestrator reduces risks for all other participants and realizes exchanges that otherwise would not have been realized.

However, the orchestrator function creates new information asymmetries. The orchestrator is a customer in the factor market and has information disadvantages when it comes to knowing the qualities of the specific input supplied by a certain producer. However, the orchestrator also has information advantages about the composite product and its use. Again, signalling and screening are possible solutions to the problem. As a brand-name holder, the orchestrator has incentives for developing specific skills in quality control of suppliers. Again, the cost of these signalling and screening activities has to be weighed against the benefits of introducing the orchestrating function. The orchestrator can reduce these problems by internalizing production into the scopes of their hierarchies, or as in the case with disintegrated brand-name firms, by developing specific skills in
screening suppliers and securing quality among them. The case of Nike illustrates this function of contract and control in disintegrated firms:

Nike has a large staff working to support their manufacturing partners. To oversee production in the 45 footwear factories, Nike has an expatriate staff of 180 people (US, Korean, Taiwanese and Japanese nationals) who are stationed at the contract factories. In the liaison offices in the countries where Nike's manufacturing partners are active another 1100 national staff work to support the manufacturing process.

Quality assurance is also done in cooperation with factory staff. A product integrity group is responsible for enforcing Nike quality standards throughout the production process. The product integrity group at the liaison office communicates daily with Beaverton headquarters and there are quality assurance personnel present in the factories every day.

[38, p. 10]

6. Both Design and Orchestration?
Disintegrated brand-name firms perform functions of design and orchestration, but that does not imply that all disintegrated firms do both. Some might specialize in design and others in orchestration. When will the design and orchestration functions be kept within the same firm? A reason is that design – being a semi-public good – is difficult to protect from imitators and that the rewards to the agent who orchestrates the activity can be highly dependent on being the exclusive user of a design. If design can be protected by holding it within the walls of a firm, the orchestrator will have incentives to do so, as is the case of Nike.

Another reason for keeping design and orchestration close together is time to market (speed economies). In some large, highly changeable markets time efficiency is an extremely important feature of competition and keeping design and orchestration close together can speed up the process, as illustrated by Nike:

Every link in the supply chain was being constantly challenged to deliver higher product volumes and more frequent product introductions. The life circle of a typical Nike shoe was only six months and Nike’s designers were turning out new models at a rapid rate. The designers in Beaverton, Oregon, worked closely with Nike’s manufacturing partners around the world to ensure a smooth transition from the design to the production environment. Nike’s manufacturing partners had grown into some of the largest footwear manufacturers in the world and churned out millions of pairs of athletic shoes every month.

[38, p. 1]
7. Conclusion
Disintegrated brand-name firms do not produce goods as firms do in neoclassical theory. They are also not institutions for hierarchical coordination, as proposed in the comparative institutional analysis. Then what can disintegrated brand-name firms teach us about the economic functions performed by firms? This paper explains the functions performed by disintegrated brand-name firms. The analysis builds on early contributions by McNulty, Cheung and others, who observed early on that the impersonal price system can coordinate transactions. However, decisions regarding qualitative dimensions of a product, which are based on relevant relative prices, require personal decision making. The design function – deciding on the quality dimensions of a product – provides a first explanation applicable to many disintegrated brand-name firms. Second, economic theory assumes that the market system is sufficient for coordinating value chains. However, important industries today are better described as value webs centred around an orchestrator. The orchestrator realizes the production of composite goods that integrate components from different value chains, with combinatorial benefits to the participants. Hence, design and orchestration are two economic functions which can be efficiently performed by specialized firms. These functions are crucial in modern economies, but have been neglected in the comparative institutional analysis of the firm.

From a perspective of a comparative institutional analysis, new theory is needed to explain why specialized firms, rather than individual customers or producers, perform these functions. This paper suggest that a specialized intermediate can reduce transaction costs and reap advantages of skill and scale by pooling demand and realizing complementary positive externalities among suppliers. These advantages increase with larger markets, larger costs for design and orchestration, more complex and composite goods and more complementarities among producers. Therefore, it is not surprising that today’s most advanced industries have firms specializing in the design and orchestration functions.

To the extent that design and orchestration are based on the same knowledge and skills, or are complimentary, the two functions will be integrated in the same firm. A specialized firm that performs the design and orchestration functions will provide a semi-public good and have information advantages, motivating it to be the brand-name holder and the main residual claimant, therefore, also guaranteeing the quality of the final product.

The analysis uses disintegrated brand-name firms to identify functions of the firm that are neglected in economic theory and the comparative institutional analysis. Of course, claiming that disintegrated firms perform functions of design and orchestration doesn’t imply that more integrated firms do not do the same. Many integrated firms design products and orchestrate value webs beyond the scope of their hierarchies. What the analysis of disintegrated firms reveals is that these functions exist and are important. A theory of the firm needs to acknowledge this.

References


