

**Learning, decision quality, and the evolution of organizational and  
industry architectures  
(tentative)**

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## *Abstract*

*Divided into three distinct yet related topics, this dissertation rests on an overarching theme: the implications of the evolution of organizational and industry architectures on firms and industries. The first study examines how an individual firm's learning varies given the derived feedback conditions provided by different degrees of vertical integration. The second study focuses on how organizational structure mediates the side effects of information aggregation on decision quality. Finally, the third study focuses on how the interaction between the organization and its industry creates an emergent order that has important consequences for division of labor and value creating activities.*

**Keywords:** Industry architecture, derived feedback effects, vertical integration, learning, information aggregation, decision quality, emergence of order.

## **Introduction**

This dissertation rests on an overarching theme: the evolution of organizational and industry architectures. The goal is to contribute to the understanding of industry and corporate change. Three papers with distinct topics will be written, but they are all pieces of the same puzzle. This theme is important because it seems that what goes on inside an organization creates to a certain degree, a ripple effect that influences industrial arrangements, and conversely, evolution at an industrial level seems to have a profound impact on organizational developments.

There is considerable number of studies that coagulate on the same theme. Examples of such research areas are modularity studies (e.g. Baldwin and Clark, 2000; Jacobides and Billinger, 2006), and organizational and industry architecture (e.g. Jacobides, 2008; Jacobides et. al. 2006). The interest and the direction to which these studies point have important implications to organizational studies because as it unfolds, we see the overlooked and yet intricate interaction of organizations and the industries in which they are embedded. By such interaction, I do not refer to the mere dichotomy between firms and industries as alternate modes of organizations, or to the question of whether firms rather than industries create competitive advantage. By such an interaction, I refer to firms and industries as an ecosystem of interrelated stimulations and consequences, where actions at one level may prompt changes at another level, whether deliberately made or not. This topic seems to be fascinating at least to some researchers because the more we ask questions about it, the more its importance seems to be revealed.

In the following sections, I will elaborate on each of my three topics stating their tentative titles. The first one is called the *role of industry architecture on individual firm learning*. In this research, I intend to examine how derived feedback effects arrive at the intended recipient (firm or business unit) considering varying degrees of vertical integration, and more importantly, how this feedback process affects the individual firm's learning. The second study, which is called *the effects of information aggregation and organizational structure on decision quality*, is rather concerned with how the side effects of information aggregation (e.g. information loss or distortion, incorrect information, biases, etc...)

affects the decision quality as information is passed through the organization with a given structure. Finally, the third study is called *the emergence of order in organizations and industries*, which would be a conceptual piece bridging the gap and zooming in on organizational and industrial levels of analyses, and how their interaction creates evolutions internal or external to the firm, but nevertheless has important consequences for division of labor and value creating activities, prompting changes in the system as a whole. The next paragraph explains paper number one.

### **The role of industry architecture on individual firm learning**

Learning is well researched in the organization literature. Some of the most cited studies are those by Argote et. al. (1990), Wright (1936), and Arrow (1962), who all mathematically express learning in the form of the learning curve. Cohen and Levinthal's (1990) study on absorptive capacity also has a considerable influence in the learning literature, and Teece, et. al. (1997) have promoted the concept of dynamic capabilities, which are based on a firm's ability to learn best behavior outcomes.

Despite the abundance of research, there seems to be an aspect to firm-level learning that is not well understood. Specifically, this perspective suggests that the structure of market exchange rewards specialized agents through the division of labor. Learning happens to agents after labor is divided, when agents can focus on their tasks, gaining efficiency in the long run. Intuitively, this implies that learning depends on the market structure—in terms of the number of players organizing production among themselves and their distinct specialization in the value creating stages. This would seem to be a sufficient argument when we talk of the market mechanism. However, what if the organization of labor is not clearly chopped up as it is in the market? That is to say, what kind of learning would take place if production is organized in a vertically integrated structure? This question implies a difference in learning of individual firms situated in heterogeneous structures.

This research contributes to our understanding of organization and industry evolution by specifically illustrating the different learning possibilities for individual firms or business

units operating within different kinds of value creating structures. To state the research question, *how does industry architecture influence firm level learning?*

The first step in addressing this issue is to clarify the meaning of two constructs- namely industry architecture and learning. Industry architecture refers to the division of labor in the value chain-- it can be vertical or horizontal. The focus in this research is the former. Learning, on the other hand, refers to the efficiency of production gained by reducing costs of error against the benefit of quality. The idea is that firms or business units improve their capabilities by receiving derived feedback. Meaning, the firms would be able to ascertain the quality of their output based on the satisfaction of the buying firm. The potential problem with this set up emerges with a firm in an integrated architecture, because activities are not clearly demarcated as it would be in the market. For example, if the buying firm sends feedback (e.g. not buying the product in period two) to a vertically integrated structure, the firm as a whole may not know which business unit to address because of credit assignment issues. Learning therefore, may be equivocal in different vertical structures, and I intend to study the processes involved in these scenarios and how firms cope with it.

The contribution would be to create a modeling platform explaining the effects of industry structure on individual firm learning. Simulations using the NK model will be used to examine different scenarios, i.e. structures and how the individual business unit's learning reflect these structures.

### **The effects of information aggregation and organizational structure on decision quality**

This study intends to call attention to the role of organizational structure as a mediator between the process of aggregation of information and management's decision quality.

Information aggregation as a topic in and of itself is studied by researchers focusing on organizational communication. Jablin, et. al.'s (1987) works focus specifically on organizational communication research. Organizational structure and decision making is also quite well researched (Mintzberg, et. al. 1976; Nutt 2008, 1976, 1984). However, the interaction among aggregation of information as a concept, organizational structure as another concept, and quality of decisions again as a concept is missing in the research literature. Drawing inspiration from Jacobides (2007), I will address the question *how does organizational structure influence the quality of aggregate decision?*

Using the example of the Greco-Turkish conflict in 1996 over territorial claims, Jacobides (2007) described the advantages and limitations of organizational structures in relation to search behavior and problem-solving. The research provided a detailed description of actions and sequence of events which nearly led to war, in the process illustrating that different organizational sub-units work within their respective frames of reference when searching for solutions to certain problems. Sometimes, these frames of reference do not resonate quite well with each other, and the potential risk of such dissonance becomes more pronounced when a single, collective action is required. The article concludes that the division of labor (organizational structure) has a three-fold role of routing and reframing information, and finally implementing a collective action based on the aggregate information.

Based on the above work, I suggest that division of labor can contribute to the ease or difficulty of decision making by facilitating the flow of information. However, there needs to be a unit that controls and synchronizes the flow of information in order to have an aggregate outcome. This is the role of management- to filter, enrich, or deprave information as a basis for collective action. However, the quality of decisions made by management interacts with certain parameters such as conflicting information, lack of information, ignorance of intra-unit interdependence, disinformation and misinformation, biases. This study would extend the article by examining how the quality of decisions, examined from the organizational structure perspective, is influenced by the above-mentioned parameters.

The contribution of this paper would be to examine different organizational structures and how they affect the quality of decisions made at an aggregate level.

Like the first study, an NK model will be used to explain the phenomenon of aggregate decision-making and the role of organizational structure on decision quality. Tentatively, the elements that would be found in the model are (1) aggregate decision- the result of management's processing of information dispersed within the organization, held by sub-units (2) management- as the synchronization unit which filters or controls pieces of information to produce an aggregate outcome (3) managerial perception- management's inclination or insight on specific issues they face (4) organizational sub-units- parts of the organization tuned in to watch different aspects of the same environment (5) information- produced by the environment as a result of their framing of the environment and (6) upward movement of information to management.

### **The emergence of organizational and industry architectures**

Unlike the first two papers, this topic is in a highly formative stage. The intuition is to examine how organizational and industry architectures emerge by looking at the dynamics of derived feedback conditions. The goal is to investigate how a firm or a group of firms condition their learning ecosystems by either transforming themselves as an organization, or by transforming the structure of the industry in which they are embedded.

There may be two ways by which organizations and industries emerge. One is deliberate design, in which there exists an "architect," or a planner or designer which manipulates the flow of resources and value creation process among a group of agents. The agents may be sub parts of the organization, if we are looking at an organizational level, or they may be entire organizations if we look at the industrial perspective.

The organization literature is well-equipped with studies that imply the presence of an architect to manipulate resources or structures. Such examples would be research done by

Baldwin and Clark (2000), who argued that organizations should create a modular structure to benefit themselves with flexibility; Jacobides et. al. (2006) who argued for the creation of a bottleneck structures in the industry to direct resources to a core firm; and Billinger and Jacobides (2006) who suggested to create a permeable organizational structure ready to address different partners in a value chain. Virtually all studies on organization design imply the deliberate formation of organizations. As John Child (1972) once asserted, the role of managerial choice should be recognized in organization and strategy research.

The second way by which learning structures are formed is inspired by theories coming from physics and chemistry. In this field, the order of atoms in an object are emergent, meaning, there is no architect, planner, or designer which prompts objects to be situated in one place rather than another in a given time period. The idea is that the random interaction of atoms creates an order which enables a particular system to function quite well. Applying the concept to organizational studies, it would be of interest to the field if we examined just how much of the current state of affairs in organizations and industries are structured by deliberate or by emergent means. Although the second means seems like a far fetched idea for organization studies, there seems to be a certain degree of emergence in an organizational or industrial system.

The fundamental idea I wish to promote in this study is how the organization's search behavior alters the landscape (industry) by altering elements within itself. Perhaps the alteration of the industry is not always the intention, but the organization as an entity indirectly impacts the industry. The element of time may also be of use, to examine the selection process of one type of structure transformed into another through a given period.

As this study is in a highly developmental stage, I am not in a position to state yet which methodology would be most appropriate. However, I would prefer to formalize the study using simulation to demonstrate scenarios and processes. In any case, the outcome of the

paper would seem to be a conceptual piece inviting the community to investigate further on such question of order.

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