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Inside the black box of operational capabilities: an evolution from operational practices

Marcia Regina Santiago Scarpin
Fundação Getulio Vargas - FGV-EAESP
Email: mrs.scarpin@gmail.com

Luiz Artur Ledur Brito
Fundação Getulio Vargas - FGV-EAESP
Email: luiz.lbrito@gmail.com

Barbara Bechler Flynn
Kelley School of Business -Indiana University
Fundação Getulio Vargas - FGV-EAESP
Email: bbflynn@iu.edu

ABSTRACT

We investigated the relationship between operational practices and operational capabilities. We conduct a qualitative research, with case studies in four firms, two multinational American firms operating in Brazil and two local Brazilian firms. We collected data through semi-structured interviews with open-ended questions, based on our theoretical review of operational practices and operational capabilities. The interviews were conducted face-to-face. In total, 73 interviews were performed. Our main results were: First, relate the operational practices as an antecedent of operational capabilities. Second, the creation of a typology divided into two constructs: Across-the-Board Capabilities and Standalone Capabilities.

KEYWORDS: Operational practices, Operational capabilities, and Typology.

INTRODUCTION

The conceptual framework of competitive priorities has been predominantly used to define the concept of operational capabilities. The ability of a firm to compete with its direct competitors in quality, delivery, flexibility and cost, has been used to indicate the firm's operational capabilities (*e.g.* Größler & Grübner, 2006; Rosenzweig & Easton, 2010; Wheelwright, 1984). However, the decision what prioritize precedes the development of an operational capability, but it is not the capability itself. Competitive priorities help the firm to do what it wants without wasting resources in lower-priority pursuits (Wheelwright, 1984). For example, a firm's acceptance of a low rate of growth can reflect a decision to retain a set of priorities in which diversification are more highly valued than growth. If diversification is the firm's strategy, operational capabilities such as flexibility, customization, and innovation should be developed to support this strategy.

We also find articles that conceptualize and measure operational capabilities by the result. This is a problematic situation as it creates confusion with the operational performance construct (*e.g.* Cua, McKone, & Schroeder, 2001; Flynn & Flynn, 2004; Schroeder, Bates, &

Junttila, 2002). When operational capabilities are conceived and measured by performance, we get their effect, not the cause. We tend to ignore the path that leads to the result. Illustratively, it's like runners who want to reduce their time without considering the need to change their workout. We would be evaluating the result and not the ways in which time could be reduced. At the organizational level, it is like measuring the quality of the finished product, without evaluating the processes that caused this performance outcome.

Operational capabilities can exhibit equifinality and can be developed through multiple paths. Operational practices can provide an appropriate basis for its beginning (Wu, Melnyk, & Swink, 2012). Since the 90s, operational practices have underpinned many studies in this area. Considered highly standardized and easily imitable procedures, theoretically, according to the Resource Based Theory (RBT) they cannot be sources of sustained competitive advantage. But, effective implementation of "best practices" (Laugen, Acur, Boer, & Frick, 2005, pp. 131) such as total quality management, just-in-time, lean manufacturing, among others, tends to contribute to better performance.

When practices are operationalized in the internal environment of the firm, they can be incorporated as organizational routines, and through the pre-existing tacit knowledge of production, become operational capabilities, thus creating barriers to imitation. However, even with such a logical relationship, most of the operations literature refers to practices but does not mention the concept of operational capabilities (Ahmad & Schroeder, 2003; Dean & Bowen, 1994; Furlan, Vinelli, & Pont, 2011; Hackman & Wageman, 1995; Montabon, Sroufe, & Narasimhan, 2007; Swink, Narasimhan, & Kim, 2005).

One of the recent studies that brought a new approach to the field is Wu et al. (2012), in which the practices are addressed as background to operational capabilities. But despite the merit of promoting debate, and being the first to use a new taxonomy for operational capability, the theoretical argument used by Wu et al. (2012) for developing each capability is fragile and has limited empirical grounding. It uses as a basis the theoretical proposal of Swink and Hegarty (1998), in which one of the main limitations is precisely the lack of specificity of capabilities for the operations area.

In sum, the literature of operations management provides inadequate constitutive definitions of operational capabilities, does not cover the relativization to different contexts, has limited empirical grounding, and does not adequately explore the more extensive empirical literature on operational practices. This study contributes to the debate addressing the following gaps: the lack of a conceptual uniformity of operational capabilities (Flynn & Flynn, 2004; Wu et al., 2010), the lack of empirical studies about the development of operational capabilities in the firm's internal environment (Peng et al., 2008; Schoenherr, Power, Narasimhan, & Samson, 2012; Swink et al., 2005), and the relationship between operational practices and operational capabilities (Wu et al., 2012). Thus, the questions that we intend to investigate are: *what is the relationship between operational practices and operational capabilities? And, what are types of operational capabilities characterized in the firm's internal environment?*

LITERATURE REVIEW

Operational Practices

The benefits of adopting practices such as TQM, JIT, SCM, among others, applied individually are inconsistent, perhaps due to the fact that for the practices to be effective, they need to be associated with other practices over time, in an enabling environment (Benner & Tushman, 2003). Furthermore, the intensive use of operational practices can be antecedents of operational capabilities, which in turn are more rare and difficult to imitate.

Cua et al. (2001) investigated the relationship among TQM, JIT, TPM and operational performance (cost, quality, delivery and flexibility). The main results were that leadership practices, consumer involvement and emphasis on technology had a positive effect on volume flexibility performance. Lee & Kelley (2008) also found that the practices with a high level of learning and improvisation were one of the aspects that helped to develop the dynamic innovation capability. The term “dynamic capability”, in this case, is merely semantic, since it is clear that the authors are referring to operational capability.

Benner & Tushman (2003) explained it is necessary for researchers to pay attention to the context in which operational practices are implemented. The industry in which the firm operates influences the type of practices used. For example, firms operating in technologically advanced environments need to develop practices related to radical innovation capability. For those that operate in static environments, the focus should be on the practices that lead to the continuous improvement capability. In general, the successful implementation of operational practices depends on individual characteristics of each firm. Firms need to assess which set of best practices fit with their production process and if they are able to implement them (Shah & Ward, 2003). Powell (1995) argued that tacit aspects linked to the environmental context create a culture where practices affect performance.

Operating practices developed over time can be transformed into an operational capability; this will depend on their level of complexity. Figure 1 of Rondeau, Vonderembse, & Ragunathan (2000) identifies the path between a practice and a competitive capability.

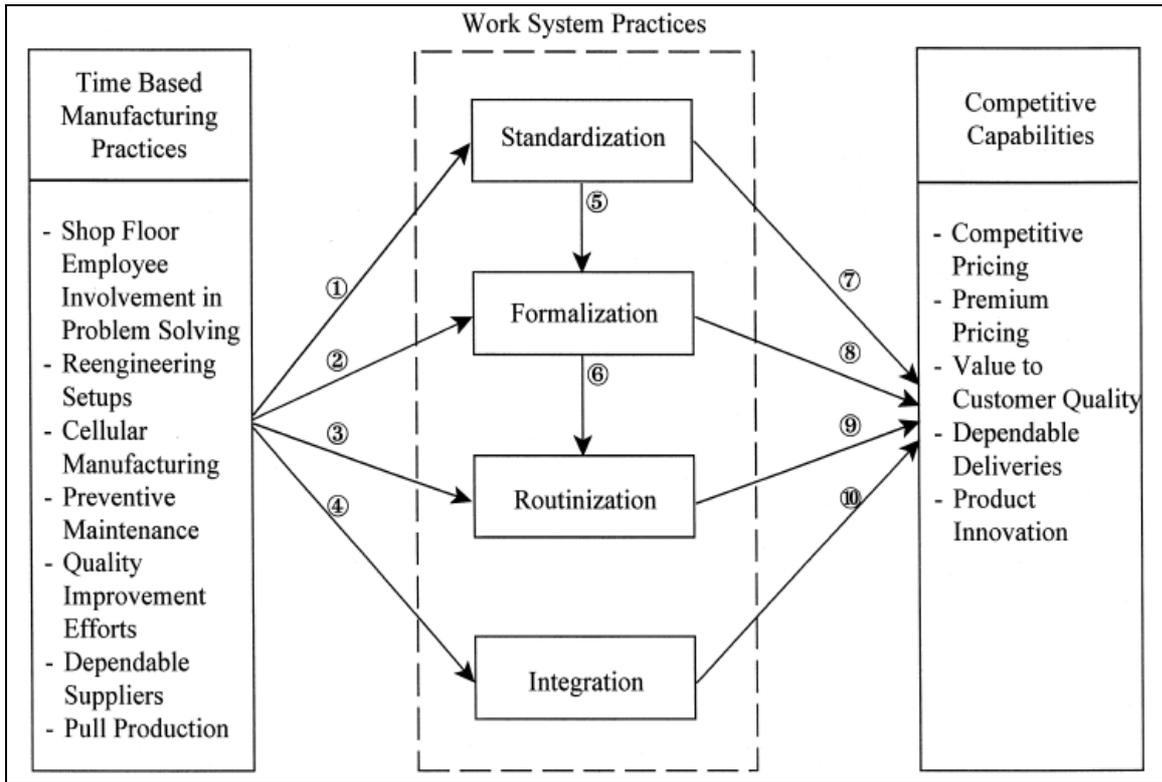


Figure 1 – Work system practices
 Source: Rondeau et al. (2000)

Rondeau et al. (2000) observed that firms with standardized routines and integrated operational practices tend to be able to develop competitive capabilities. The study was conducted with 265 firms in the industries of: (1) Furniture and Fixtures; (2) Metals; (3) Industrial; Machinery and Equipment; (4) Transportation and Equipment; and (5) Instruments and Related Products. Each number presented in Figure 1 represents a hypothesis. With the exception of hypotheses three, eight, and nine, the others were confirmed in the study of Rondeau et al. (2000). The main contribution of their study was to show the mechanisms that connect practices and capabilities. Mechanisms pointed out by the authors as most important were standardization and integration. Standardization helps in the development of products and processes, and encourages employee participation in the creation, development and integration of norms that aim to increase customer satisfaction and improve production capacity. Integration, in turn, provides a way for employees to share knowledge, promote learning, and solve problems with cross-functional teams (Rondeau et al., 2000). Although the authors did not work with operational capabilities, this is one of the few studies that separates practices and capabilities, and at the same time shows their relationship.

The distinction between operational practices and operational capabilities is not clear in the literature. Wu et al. (2010) developed a metaphor related to the kitchen of a restaurant to aid in this understanding. For the authors, in a kitchen, resources are all assets, tangible and intangible, such as the stove, utensils and the ability of individuals, which together define the potential of what may or may not be executed in the kitchen, but that separately cannot achieve the ultimate goal. For example, the stove alone does not prepare a food; the chef needs instructions on how to use it along with other resources to complete the dish. The

instructions in the kitchen represent operational practices, through standardized processes. Recipes and rules indicate how to combine the resources available for preparation of the dish. The problem with this, however, is that a recipe can be easily copied by competitors' restaurants. But differentiation is not the role of operational practices because they cannot capture less tangible aspects, such as the freshness and quality of ingredients or the chef's experience. The ability to develop dishes that reflect the restaurant's unique history, style and customer preference is the role of capabilities. It will be developed from the skill in food preparation and environment characteristics that are difficult to transfer from one environment to the other, since they involve interactions over time, which translates into a unique specificity of each kitchen. This set of interactions is called a capability (Wu et al., 2010). Sousa & Voss (2002) assert that it is these interaction effects that distinguish successful firms from others, creating inimitable capabilities.

Operational Capabilities

Wheelwright (1984) was the first article to bring the variables, quality, delivery, flexibility, and cost as competitive priorities. For the author, as well as Skinner (1969), firms have to choose a competitive priority and invest in it (even at the expense of other priorities) front of their competitors. This is the principle of trade-off. In contrast to the principle of trade-off, Ferdows and Meyer (1990) developed a model called the sand cone model. This model uses the same variables proposed by Wheelwright (1984). Depending on the complexity of the operational capabilities, they can change or even reinforce each other, becoming cumulative. The sequence begins with quality, goes to delivery, flexibility and ends in cost. Some studies using cumulative capabilities were Kathuria (2000), Corbett & Whybark (2001), Rosenzweig & Roth (2004), Größler & Grübne (2006), Hallgren, Olhager & Schroeder (2011), Liu, Roth & Rabinovich (2011), and Schoenherr, Power, Narasimhan & Samson (2012). In addition to studies that tested the original scale of Wheelwright (1984) and sand cone model (Ferdows & Meyer, 1990), there are those that altered it, including or removing variables (see Noble, 1995; Vickery, Dröge & Markland, 1997; Mapes, Szwejczewski & New, 2000; Flynn & Flynn, 2004; Rusjan, 2005; Peng, Schroeder & Shah, 2008; Avella, Vazquez-Bustelo & Fernandez, 2011).

In the literature review we also found some studies that operationalize the operational capabilities individually. These studies address new operational capabilities, expanding their scope. Some researchers emphasize a unique operational capability, analyzing it deeply in order to understand its role in the value chain. In total were found eight operational capabilities: (1) information systems integration; (2) continuous improvement; (3) innovation; (4) flexibility of processes; (5) mass customization; (6) quality management; (7) supply chain management; and (8) learning. These are described below.

Information System is the capacity to manage a set of tangible assets (e.g. information systems hardware, network infrastructure) and intangible (e.g., software patents, strong vendor relationships) formed from the productive use of information technology (Wade & Hulland, 2004). Continuous improvement is the firm's ability to gradually increase its operational performance (Swink & Hegarty, 1998). Radical innovation creates, improves or implements unique processes that radically improve operational performance (Swink & Hegarty, 1998; Wu et al., 2010, 2012). Flexibility is the operational response capacity of the firm to make changes in its inputs and outputs (Swink & Hegarty, 1998; Wu et al., 2010, 2012). Customization reflects the firm's ability to customize its products to meet the specific needs of its market, producing on a large-scale, for the short-term, and at a cost that is comparable to mass production of non-customized products (Zhang et al., 2003). Quality

programs include contextual elements associated with exploratory learning and tacit knowledge and methodological elements related to exploitative learning and explicit knowledge tend to sustain a competitive advantage (Choo, Linderman, & Schroeder, 2007). Supply chain management (SCM) is “defined as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer” (Mentzer et al., 2001). Miller (1996, pp. 486) described organizational learning as the “acquisition of new knowledge by actors who are capable and have willingness to apply it in their decision making or influencing others in the organization.”

Operational Capabilities and Dynamic Capabilities

Operational capabilities are classified as substantives, ordinaries, or zero order capabilities (see Figure 2). These capabilities are a set of abilities and resources that will be used to solve problems, achieve results, or develop new products (Zahra et al., 2006). The term operational capabilities is used by strategy scholars in a different meaning than the one used in this article. It does not focus capabilities related to the Operations Management function, but to all organizational capabilities that are zero order. The Operations Management function can have capabilities of zero and first order.

Dynamic capabilities are first order capabilities. According to Zollo and Winter (2002, pp. 340), they develop “the learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness.” Their induce a learning process, helping the creation and development of zero order capabilities (Collis, 1994; Zahra et al., 2006).

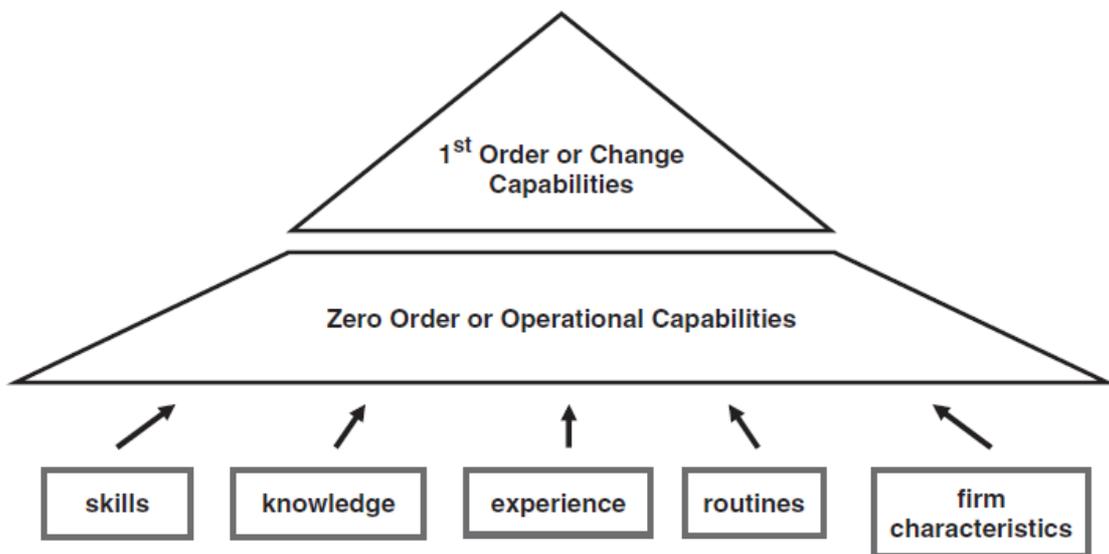


Figure 2 – Winter’s capability hierarchy
 Source: Hoopes and Madsen (2008)

METHODOLOGY

This multiple case study consists of four cases (Eisenhardt & Graebner, 2007). The use of multiple cases allowed us to understand the patterns that emerged from the data of each case. Cases were based on a variety of evidence, to make them theoretically robust. Each case followed the same research protocol. The main method used was semi-structured interviews in different functions, but technical visits, report analyses, and observations were also conducted. These multiple sources of evidence facilitated the triangulation process (Eisenhardt, 1989). They allowed us to examine the relationship between operational practices and operational capabilities and identify the types of operational capabilities within each case and subsequently cross cases.

Cases

We used theoretical sampling of firms that were recognized by the packaging industry as a reference for best practices and which were known as market leaders. Firms were invited based on their individual characteristics and the strategic sampling plan. To ensure variability, their subsector, size, revenue, time of existence, export, and organizational structure were considered. Two of the cases were multinational and two were local. First, firms were contacted by telephone. A letter of invitation was sent containing a description of the purpose of the research and data collection procedures. After the firm accepted, a first visit for the explanation of the research and an interview were scheduled. Each firm provided a room and a secretary to conduct the interviews. Table 1 shows description of cases.

Table 1 – Description of cases

Cases	Label_Case	Flexi_Case	Paper_Case	Metal_Case
Industry	Packaging	Packaging	Packaging	Packaging
Sector	Adhesives, paints, pigments, varnishes	Flexible Plastic	Paper	Steel
Firm's time	> 60 years	> 60 years	> 125 years	> 60 years
Number of employees	500	800	600	1.000
Number of interviewed	21	18	18	16
Headquarters location	São Paulo/Brazil	Paraná/Brazil	São Paulo/Brazil	São Paulo/Brazil
Exports	Yes	Yes	Yes	Yes
Type of Market	Multinational	Multinational	National	National
Size (revenue > R\$300 million)	Large	Large	Large	Large
Criteria for selection of firms	BMP (Best Manufacturing Practices)	BMP (Best Manufacturing Practices)	BMP (Best Manufacturing Practices)	BMP (Best Manufacturing Practices)
Criteria for selection of interviewees	Interface production	Interface production	Interface production	Interface production

Development of interview script

Data collection was conducted through semi-structured interviews with open-ended questions, based on our theoretical review (Miles, Huberman, & Saldaña, 2013). The interview script was developed in two phases. In the first phase, an extensive literature review on operational practices and operational capabilities was performed. In the second phase, we conducted a Q-Sort. The questions were intermingled and placed on a form in which respondents classified the questions as TQM, JIT, or SCM. No questions were removed from the interview script, but some adjustments indicated by the respondents were performed. The interview script consists of four sections. First section was directed toward the characterization of the respondents. Second section dealt with the functions related to production, such as Marketing, Sales, and Customer Service etc. The questions were intended to understand the influence of certain activities in the production process. Third section addressed the production process; the interviewees answered questions about their day-to-day activities, and the questions followed a script, which addressed TQM, JIT, and SCM operational practices. The fourth and last section focused on characterization of the firm. A pre-test was conducted.

Interviewees

The interviews were conducted face-to-face, at each of the firms researched. Each participant received the interview script in advance and a statement informing him or her about the necessary conditions for the research. The firms provided one office and a secretary to help in the process. Schedules were made by the secretary. Respondents received an email in advance with basic information about the research.

In total, 73 interviews (65 hours and 22 minutes) were conducted in four different firms. For the first case, 21 interviews were held. For the second case, 18 interviews were held. For the third case, 18 interviews were conducted, and for the fourth case, 16 interviews were conducted. Each interview was approximately 55 minutes (See Table 2, 3, 4, and 5).

Table 2 – Interviews_Label_Case

Case 1					
Date	Duration in minutes	Start time	Job Title	Equivalent departments	
10/13/2014	80:41	1:00 PM	1	Manager PTI Brazil	R&D and Continuous Improvement
10/13/2014	79:24	3:00 PM	2	Manager EHS / ELS AS.	R&D and Continuous Improvement
10/14/2014	82:29	8:30 AM	3	Brazil Operations Manager	Production
10/14/2014	51:28	2:00 PM	4	Operations Coordinator	Production
10/14/2014	48:49	1:00 PM	5	Operations Coordinator	Production
10/14/2014	50:19	3:00 AM	6	Project / Processes / Machines Manager	R&D and Continuous Improvement
10/15/2014	75:36	8:30 AM	7	SCM Manager	SCM
10/15/2014	47:50	10:30 PM	8	Finishing Manager	Production
10/15/2014	79:48	1:00 PM	9	HR Manager / Training and Development	Production
10/15/2014	73:38	3:00 PM	10	Quality Manager	Quality
10/29/2014	34:55	8:30 AM	11	Maintenance Coordinator	Maintenance
10/29/2014	50:56	9:30 AM	12	Health and Safety Coordinator	Health and Occupational Safety
10/29/2014	69:22	10:30 AM	13	Purchasing Manager	SCM
10/29/2014	51:17	1:00 PM	14	Sales Coordinator	Marketing and Sales
10/29/2014	34:07	2:00 PM	15	Process Engineer	R&D and Continuous Improvement
10/29/2014	55:44	3:00 PM	16	Logistics Coordinator	SCM
10/30/2014	35:14	8:00 AM	17	Maintenance Supervisor	Maintenance
10/30/2014	48:20	10:00 AM	18	President	Board of Directors
10/30/2014	30:12	11:00 AM	19	Maintenance Planner	Maintenance
10/30/2014	24:45	1:00 PM	20	Communications Coordinator	Marketing and Sales
10/30/2014	48:24	2:00 PM	21	Technical Support	Marketing and Sales
Totally	19 hours, 37 minutes and 05 seconds, with 21 interviewees.				

Table 3 – Interviews_Flexi_Case

Case 2					
Date	Duration in minutes	Start time	Job Title		Equivalent departments
11/25/2015	35:19	8:00 AM	1	Production Supervisor	Production
11/25/2015	35:00	9:45 AM	2	Production Supervisor	Production
11/25/2015	44:39	10:15 AM	3	Production Supervisor 2	Production
11/25/2015	28:14	11:15 AM	4	Production Supervisor	Production
11/25/2015	56:18	1:00 PM	5	Logistics Manager	SCM
11/25/2015	60:00	2:00 PM	6	Production Planning Control	Production
11/25/2015	46:27	3:00 PM	7	S &OP Manager - Logistics	SCM
11/25/2015	48:21	4:00 PM	8	Logistics Supervisor	SCM
11/26/2015	36:30	8:00 AM	9	Industrial Manager	Production
11/26/2015	56:40	9:00 AM	10	Continued Improvement Coordinator	R&D and Continuous Improvement
11/26/2015	55:14	10:00 AM	11	Latin American Coordinator WCOM	R&D and Continuous Improvement
11/26/2015	27:49	11:00 AM	12	Business Manager - Supplies	SCM
11/26/2015	28:04	12:00 AM	13	Paint Production Manager	Production
11/26/2015	57:15	1:00 PM	14	Quality Supervisor	Quality
11/26/2015	40:23	2:00 PM	15	Quality Assurance Manager	Quality
11/26/2015	49:26	3:00 PM	16	Engineering Manager - Maintenance	Maintenance
11/26/2015	45:56	4:00 PM	17	Work Safety Supervisor	Health and Occupational Safety
11/26/2015	35:12	17:35 PM	18	Corporative Director	Board of Directors
Totally	13 hours 47 minutes 53 seconds, with 18 interviewees.				

Table 4 – Interviews_Metal_Case

Case 3					
Date	Duration in minutes	Start time	Job Title		Equivalent departments
10/07/2015	75:22	2:30 PM	1	Production Planning Control I	Production
10/07/2015	76:26	4:00 PM	2	Production Planning Control II	Production
10/08/2015	42:23	8:10 AM	3	Production Coordinator	Production
10/08/2015	74:24	9:00 AM	4	Quality Coordinator	Quality
10/08/2015	84:39	10:30 AM	5	Production Engineer	Production
10/08/2015	54:08	12:10 PM	6	Maintenance Coordinator	Maintenance
10/08/2015	60:55	2:00 PM	7	Financial Coordinator	SCM
10/08/2015	61:06	3:20 PM	8	Purchasing Manager	SCM
10/08/2015	46:00	4:20 PM	9	Electrical Maintenance Engineer	Maintenance
10/08/2015	59:10	5:20 PM	10	Quality Assistant Manager	Quality
10/20/2015	52:25	10:00 AM	11	Corporate Director	Board of Directors
10/20/2015	66:09	11:15 AM	12	Lithography Manager	Production
10/20/2015	55:24	1:00 PM	13	Logistics Supply Manager	SCM
10/20/2015	61:59	2:00 PM	14	R & D Manager	R&D and Continuous Improvement
10/21/2015	49:54	08:30 AM	15	Assistant Administrative	R&D and Continuous Improvement
10/21/2015	89:25	10:00 AM	16	Coordinator Quality	Quality
10/21/2015	55:14	2:30 PM	17	Sales Manager	Marketing and Sales
10/21/2015	55:49	3:30 PM	18	Commercial Director	Board of Directors
Totally	18 hours, 49 minutes and 54 seconds, with 18 interviewees.				

Table 5 – Interviews_Paper_Case

Case 4					
Date	Duration in minutes	Start time	Job Title		Equivalent departments
11/03/2015	90:22	9:30 AM	1	Production Supervisor	Production
11/03/2015	52:33	2:00 PM	2	Maintenance Manager	Maintenance
11/03/2015	87:28	3:00 PM	3	Technology and Development Manager	R&D and Continuous Improvement
11/04/2015	54:01	9:00 AM	4	Purchasing Manager	SCM
11/04/2015	37:12	10:00 AM	5	Production Supervisor	Production
11/04/2015	33:01	11:00 AM	6	Industrial Director	Board of Directors
11/04/2015	59:47	2:00 PM	7	Production Manager	Production
11/04/2015	34:19	3:00 PM	8	Export Manager	Marketing and Sales
11/04/2015	30:00	3:30 PM	9	Marketing Analyst	Marketing and Sales
11/04/2015	22:45	4:00 PM	10	Work Safety Coordinator	Health and Occupational Safety
11/05/2015	34:28	4:30 PM	11	Production Planning Control	Production
11/05/2015	43:44	9:00 AM	12	Customer Service	Marketing and Sales
11/05/2015	58:47	10:00 AM	13	Quality Coordinator	Quality
11/05/2015	58:28	11:00 AM	14	Finishing Coordinator	Production
11/05/2015	58:46	2:00 PM	15	Quality Manager	Quality
11/05/2015	32:16	4:00 PM	16	Logistic Coordinator	SCM
Totally	13 hours, 07 minutes and 57 seconds, with 16 interviewees.				

In Brazil, a firm is responsible for providing the name of its function and following legal criteria. Each firm has different names for similar functions. To facilitate comparison between cases, we designated the functions by department, as shown in Table 6.

Table 6 – Equivalence of functions by department

Department:	Functions:
Board of Directors	President, corporate director, commercial director, director industrial.
Health and Occupational Safety	Health and safety coordinator, work safety supervisor, work safety coordinator.
Maintenance	Maintenance coordinator, supervisor maintenance, planner maintenance, engineering manager – maintenance, electrical maintenance engineer, maintenance manager.
Marketing and Sales	Sales coordinator, communications coordinator, technical support, sales manager, export manager, marketing analyst, customer service.
Production	Brazil operations manager, coordinated operations, finishing manager, HR manager / training and development, production supervisor, production planning control, industrial manager, paint production manager, production coordinator, production engineer, lithography manager, finishing coordinator.
Quality	Quality manager, quality supervisor, quality assurance manager, quality coordinator, quality assistant manager.
R&D and Continuous improvement	Manager PTI Brazil, manager EHS / ELS AS., project / processes / machines manager, processes engineer, continued improvement coordinator, Latin American coordinator WCOM, R&D manager, assistant administrative, technology and development manager.
SCM	SCM manager, purchasing manager, logistics coordinator, logistics manager, S&OP manager – logistics, logistics supervisor, business manager – supplies, financial coordinator, logistics supply manager.

The interviews were conducted in the manufacturing and related departments (see Table 6). Different hierarchical levels were investigated. We conducted interviews with directors, managers, and supervisors, in different departments. All interviews were recorded and transcribed literally, without modifying or removing words. Data analysis was conducted using content analysis (Krippendorff, 2013). Interviews were consolidated in the Table 7.

Table 7 – Consolidated interviews

Departments	Label_Case	Flexi_Case	Metal_Case	Paper_Case	Totally
Board of Directors	1	1	2	1	5
Health and O. Safety	1	1	0	1	3
Maintenance	3	1	2	1	7
Marketing and Sales	3	0	1	3	7
Production	5	7	5	5	22
Quality	1	2	3	2	8
R&D and Continuous Improvement	4	2	2	1	9
SCM	3	4	3	2	12
Total - interviewees	21	18	18	16	73
Total - hours	19h, 37m, and 5s	13h, 47m, and 53s	18h, 49m, and 54s	13 h, 07m, and 57s,	65h and 22m

Validate

To validate the constructs, we followed steps suggested by Yin (2010): extensive review of the literature; used multiple sources of evidence in the four cases studied; and use chain of evidence between operational practices and operational capability. To internal validity, we used three techniques: logical model, pattern matching, and rival theories (Miles et al., 2013; Yin, 2010). To external validity, we used multiple cases with different characteristics. Furthermore, to assure reliability, we took into account three steps, stability, replicability, and accuracy. To ensure stability we used the accounting log data. We prepared a spreadsheet with information about interviewees and firms. Replicability was established through the use of the case study protocol, a data base, and an evidence table. To assure accuracy, we conducted a pre-test phase, triangulation of the data coding and, analysis of codes by different researchers. The triangulation of the data coding was done through multiple researchers coding same data.

RESULTS

Within-Case analysis: Label_Case

Label_Case is an American multinational company that uses different types of operational practices exceptionally well. The main operational practices observed in the company were Total Quality Management (TQM), Just in Time (JIT), Supply Chain Management (SCM), Total Productive Maintenance (TPM), Human Resources Management (HRM), Enterprise Lean Manufacturing (ELS), and Environment, Health and Safety (EHS). In general, its practices are integrated. According to the production manager, "practices are not individual; they integrated with each other." This was evident when the firm solved a problem.

Resolution of a problem usually occurs through a plan of action involving several departments and multiple operational practices. According to the manager of the supply chain, "If we have a supply problem, we put everyone in the room and open a joint action plan." Over time, the integration of operational practices not only assists in solving problems; it promotes the development of operational capabilities.

The operational capabilities found in the firm constitute two groups. The first group is called Across-the-Board Capabilities and includes Information Management Capability, Continuous Improvement Capability, and Learning Capability. The term across indicates that the operational capabilities found in this group provide support in developing other operational capabilities belonging to the second group, Standalone Capabilities. The second group is divided into three sub-groups: upstream, operational, and downstream. Upstream refers to Supplier Management Capability. Operational represents the capabilities that are directly related to production, including Operational Efficiency Capability, Innovation Capability, and Flexibility Capability. And finally, downstream we have Customer Support Capability. These capabilities are considered Standalone because they are developed from market demand, with the purpose of adding value for the customer.

Within-Case analysis: Flexi_Case

Flexi_Case is an American multinational firm that produces flexible packaging and uses Best Manufacturing Practices (BMP) in its operations. The main operational practices used by the company are Total Quality Management (TQM), Just in Time (JIT), Supply Chain Management (SCM), Total Productive Maintenance (TPM), Human Resource Management

(HRM), and Environmental, Health, and Safety (EHS). All these practices are integrated into the management system used by Flexi_Case, called World Class Operations Management (WCOM).

WCOM is a set of practices which aims at the continuous improvement of production. It involves the following areas: Autonomous Management; Focused Improvement; Environmental, Health, and Safety; Progressive Quality; Logistics; Planned Maintenance; Product Anticipated Management; and Education and Training. WCOM serves to support production efficiency and develop cost reduction projects.

Cost reduction projects are implemented every four months and involve a set of operational practices. These projects are based on the results of the Flexi_Case's indicators. According to the industrial manager, "We launched the end of 2013 [...] five groups to reduce shears and scraps, [...] that brought an amount of around R\$3.000.000.00 cost reduction for 2014." The intensive use of different practices over time can lead to the development of an operational capability.

Operational capabilities found in Flexi_Case constitute two groups, Across-the-Board Capabilities and Standalone Capabilities. Across-the-Board Capabilities constitute: Information Management Capability, Continuous Improvement Capability, and Learning Capability. Standalone Capabilities include: Supplier Capability Management, Operational Efficiency Capability, Innovation Capability, Flexibility Capability, Customization, and Customer Support Capability.

Within-Case analysis: Paper_Case

Paper_Case is a Brazilian firm that produces paper packaging and uses Best Manufacturing Practices (BMP) in their operations. The main operational practices used by the company are Total Quality Management (TQM), Housekeeping (cleaning and organization of the firm), Just in Time (JIT), Supply Chain Management (SCM), and Total Productive Maintenance (TPM). The firm also works with certifications of ISO 9000, ISO 26000, Forest Stewardship Council (FSC), and is beginning to implement Food Safety Management System (FSSC 22000).

Operational practices and certifications are intended to meet customer requests. The food industry is one of the customers with greater requirements. Paper_Case provides packaging for the food industry, and therefore must follow the same standards used in food production. Thus, operational practices are monitored by the firm and audited by external companies and in some cases for audit by customers as well. As the production manager to serve the food industry "you have to have the same level cleaning, organization, and aseptic factories that produce food for children." Although it is clear that Paper_Case has a reactive response to requests from its customers, the implementation of these operational practices favors the development of operational capabilities.

Operational capabilities found in the Paper_Case constitute Across-the-Board Capabilities with Information Management Capability, Continuous Improvement Capability, and Learning Capability, and Standalone Capabilities with Supplier Capability Management, Operational Efficiency Capability, Innovation Capability, Flexibility Capability, Customization Capability, and Customer Support Capability.

Within-Case analysis: Metal_Case

Metal_Case is a Brazilian company that produces metal packaging and uses Best Manufacturing Practices (BMP) in their operations. The main operational practices used by the company are Total Quality Management (TQM), Just in Time (JIT), Supply Chain Management (SCM), Total Productive Maintenance (TPM), Environmental, Health, and Safety (EHS), Development and Implementation of New Machinery and Equipment, and Development of New Processes.

Since 1980, Metal_Case has been investing in operational practices. They are essential for the firm to remain competitive in the market in which it operates the paint industry. The paint market in Brazil is concentrated in three multinationals. This situation creates an aggressive competition from packaging firms that want to sell to these multinationals. Another aspect that affects competition for Metal_Case is its raw material, steel. Steel represents 70% to 80% of the production of metallic packaging, and in Brazil, it is monopolized by Companhia Siderúrgica Nacional (CSN). If Metal_Case is not able to negotiate for better prices, then it needs to invest in its internal resources and its capabilities to generate competitive advantage.

Operational capabilities found in Metal_Case were Across-the-Board Capabilities and Standalone Capabilities. Across-the-Board Capabilities are: Information Management Capability, Continuous Improvement Capability, and Learning Capability. Standalone Capabilities include: Supplier Management Capability, Operational Efficiency Capability, Innovation Capability, Flexibility Capability, and Customer Support Capability.

CROSS-CASE ANALYSIS AND PROPOSITIONS

Theoretical framework has shown that operational practices are not operational capabilities. Operational practices are "standardized procedures that are easy to articulate and well-defined" (Wu et al., 2012, pp. 123). On the other hand, operational capabilities are "firm-specific sets of skills, processes, and routines, developed within the operations management system that are regularly used in solving its problems through configuring its operational resources" (Wu et al., 2010, pp. 726). Embedded in routines and operational processes, operational capabilities need time, management attention, and continuity in the use of operational practices. Differently from operational practices, the operational capabilities cannot be implemented, they emerge gradually over time, based on the experience, unique history of the firm, and problems that decision makers have had to face. The time spent for the development of a capability will depend on just how it is heterogeneous, and the firm's learning ability. Table 8 summarizes the differences between operational practices and operational capabilities.

Table 8 – Differences between operational practices and operational capabilities.

Operational Practices	Operational Capabilities
Generic	Unique
Ready for use	Path dependent development
Standardized	Idiosyncratic
Explicit	Tacit
It involves knowledge	It involves learning
Simple	Complexity

Practices can be important drivers of high performance in today’s manufacturing environment, but investments in practices, per se, do not constitute capabilities. The development of a capability consists of practices-performance inter-linked to specific performance gains (Narasimhan et al., 2005). When an operational practice is implemented, over time, this practice ceases to be generic and explicit; it acquires tacit aspects, and becomes unique. Table 9 shows the transition between some operational practices and operational capabilities.

Table 9 – Relationship between operational practices and operational capabilities

Operational Practices:	Evidence (interviewed)	Operational Capabilities
● ----->		
Kaizen	ELS manager, "In the beginning with 80 employees, we produced 4 million per square meters. After the application of Kaizen, our capacity doubled with the same number of employees." [Label_Case]	Continuous Improvement Capability
Training & Development Plan	R&D manager, "You will always be trained in practice daily, you will receive guidance from someone with a superior position to him. [...]" [Paper_Case]	Learning Capability
Key Performance Indicator (KPI)	Production manager, "from the numbers we can see what happened, look at the report and take actions to combat the problem." [Metal_Case]	Information Management Capability
Supplier Evaluation	Purchasing manager, "by the standard of ISO 9000, we are required to have an evaluation system of our suppliers with active items." [Label_Case]	Supplier Management Capability
Total Quality Management (TQM), Environmental, Health, and Safety (EHS)	Safety manager, "if we have standards for safety as well as TQM [...] we begin to have predictability [...]. It is difficult to measure but it helps in our productivity, low variability, less returns, less claims, and more satisfied customers." [Label_Case]	Operational Efficiency Capability
Development of New Processes	Industrial manager "The guys are four or five years ahead of the market So, we have a center for engineers in the United States just doing it, just helping us, just for us proposing new structures, new projects, and new processes." [Flexi_Case]	Innovation Capability
Flexibility of Delivery	Purchasing manager, "We have flexibility and speed to meet the specific needs of our customers while maintaining a good quality." [Paper_Case]	Flexibility Capability
Process Modularity and Product Modularity	Production manager "Chocolate cookie, you know? Yeah ... The guy sells a cement unit; [...] it will be able to have accuracy, like, 95%. It does not exist in the packaging market The guy will have accuracy in it of 50%, 70%. Normally, the volume is correct." [Flexi_Case]	Customization Capability

Customer Relationship	ELS manager, "We went to a customer to work with them on the setup. Before, the setup was 1 hour and 10 minutes, but after our work, it was down to 30 minutes. We increased their productivity by 30%." [Label_Case]	Customer Support Capability
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Kaizen practice is an example of interaction between operational practice and operational capability (see Table 9). Kaizen is a set of practices that allows continuous improvement of manufacturing processes. Employees are trained to lead their own projects. In the case Label_Case, one of the projects involving Kaizen was Quick-Change Tool, also called Single Minute Exchange of Die (SEMED). After the realization of the Kaizen, the firm has reduced setup time, increased the speed of the machines, and implemented best maintenance practices. Implementation of these operational practices, over time, has enabled improvements in the production process, impacting positively on Label_Case's performance. ELS manager said, "Our capacity doubled with the same number of employees."

Operational practices take time to be effective and achieve its final shape. When an operational practice is in fact implemented and is in use, it goes through a process that is path dependent, which caused evolution in it. An operational practice, five years later is not the same practice when it was implemented; several other elements are incorporated into it over time, such as tacit aspects, idiosyncratic decisions, and learning, among others. Its complexity increases as a result of combination of different operational practices interacting with each other.

The same applies to the development of an operational capability. "One swallow does not make a summer". A single operational practice will not be enough to develop an operational capability. Individually they are inconsistent (Benner & Tushman, 2003), but in conjunction with other operational practices, such as Lead Time, JIT, TQM, TPM, among others, they may facilitate the development of operational capabilities. Thus we present the first proposition:

Proposition 1 – Different sets of inter-linked operational practices over time can develop into different operational capabilities in each firm.

However, not all operational capabilities are equal. From the coding of the four cases examined in this study, our results showed that operational capabilities have different functions. Some have the role of increasing the performance of the firm, while others reinforce, modify or reconfigure these first. We summarize them in two major categories: Standalone Capabilities and Across-the-Board Capabilities (see Figure 3).

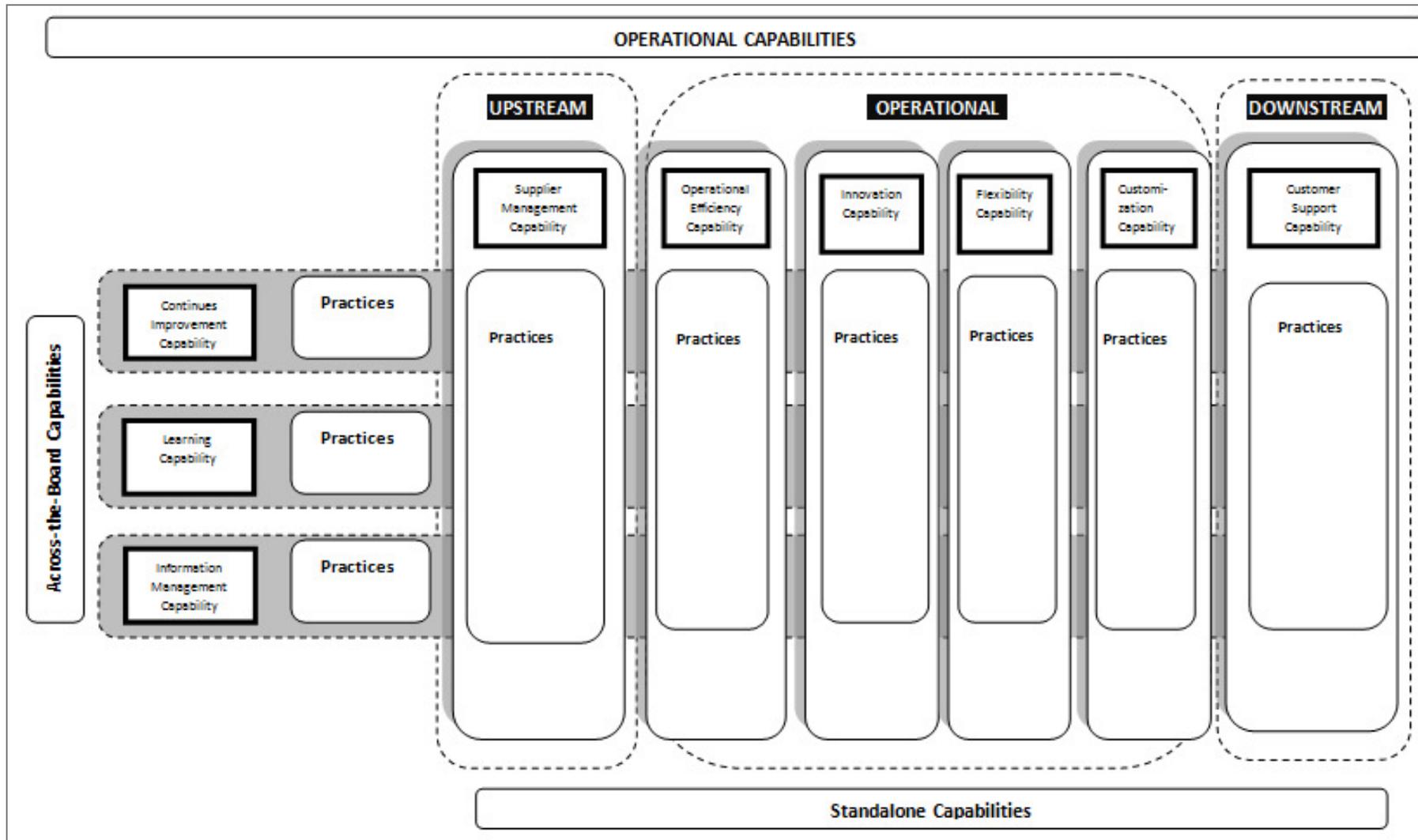


Figure 3 – Operational Management Capabilities Model

Standalone Capabilities are also called, zero order, substantives, ordinaries, or zero order capabilities (Schilke, 2013; Zahra et al., 2006; Zollo & Winter, 2002). All these names, however, are merely semantic; since they have the same meaning with same goal, improve the performance of the firm. They are operational capabilities that reconfigure the organizational resource base (Collis, 1994; Schilke, 2013; Zollo & Winter, 2002). Standalone Capabilities have as purpose to solve problems, achieve results, and develop new products through configuring its operational resources (Wu et al., 2010; Zahra et al., 2006). They are established from the operational function of the firm representing “how you earn your living” (Cepeda & Vera, 2007, pp. 426).

In the four cases analyzed, Label_Case, Flexi_Case, Paper_Case, and Metal Case, we have identified: Supply Management Capability, Operational Efficiency Capability, Innovation Capability, Flexibility Capability, and Customer Support Capability. Customization Capability was found only with Flexi_Case and Paper_Case. Standalone Capabilities may differ among firms; its development depends on the industry in which it operates and the customers they serve. For instance, Paper_Case and Flexi_Case operate in a dynamic market, with constant requests of their clients, in the great majority multinationals. They need to adapt their production process and develop specific capabilities such as flexibility and customization to be able to meet the needs of their customers. On the other hand, Label_Case and Metal_Case operate in a more traditional market, and if on one side, their production processes are more predictable, on the other, they need to focus on Innovation Capabilities and Operational Efficiency Capability to continue as market leaders. However, independent of the type of Standalone Capabilities that the firm presents, its basic characteristic is to achieve specific results of operations; therefore, they have a direct relationship with performance. Considering the context, we formulate the second and third propositions:

Proposition 2 – Standalone Capabilities are operational capabilities adapted to the firm's operational needs and focused on performance.

Proposition 3 – Standalone Capabilities include of Supply Management Capability, Operational Efficiency Capability, Innovation Capability, Flexibility Capability, Customization, and Customer Support Capability.

Across-the-Board Capabilities are first order capabilities; they have direct and indirect influence on the development of new capabilities (Schilke, 2013; Zollo & Winter, 2002). Across-the-Board Capabilities are capability combinations able to reconfigure current operational capabilities, and at the same time to help the development of others (Collis, 1994; Eisenhardt & Martin, 2000; Teece et al., 1997; Zahra et al., 2006). They represent “how you change your operational routines” (Cepeda & Vera, 2007, pp. 426).

When we analyze the interviews for this study, we noticed that some operational capabilities encompassed other capabilities supporting their development. They were called Across-the-Board Capabilities. In total, three of them were found: Continuous Improvement Capability, Learning Capability, and Information Management Capability (see Figure 3).

Across-the-Board Capabilities contribute to the development of Standalone Capabilities. For instance, when the KPIs were classified as belonging to the Information Management Capability, we observe their presence in different Standalone Capabilities. According to the

Flexi_Case production manager "Each department has their own indicators. [...] in the meetings each department talks about their indicators. If the department is with some poor indicator, it needs to open an action plan. The department needs to create a strategy to achieve its target." Decision makers use information to direct or redirect their decisions, and this will affect the shape of other operational capabilities. For example, if the level of service's KPI is below the target, and one of the problems is the lack of flexibility in product delivery, managers will have to find solutions to meet this demand. By measuring the customer service level, indirectly Information Management Capability will influence Flexibility Capability.

Across-the-Board Capabilities are present in different Standalone Capabilities. They have the role of helping develop the Standalone Capabilities. This classification into two different groups allows us to combine variables such that the effects of the interactions between them can be analyzed (Bailey, 1994).

Proposition 4 – Across-the-Board Capabilities influence the development of Standalone Capabilities.

Proposition 5 – Across-the-Board Capabilities include Continuous Improvement Capability, Learning Capability, and Information Management Capability.

Across-the-Board Capabilities are composed of best practice bundles. They are developed over time, using learning mechanism as path dependence (Anand, Ward, Tatikonda, & Schilling, 2009; Eisenhardt & Martin, 2000) and are influenced by the dynamism of the market (Teece et al., 1997). This means that, as well as the Dynamic Capabilities, Across-the-Board Capabilities are capability combinations, able to exploit current operational capabilities, and at the same time support the development of other operational capabilities (Collis, 1994; Eisenhardt & Martin, 2000; Teece et al., 1997; Zahra et al., 2006).

Continuous Improvement Capability in Label Case, Flexi Case, and Metal Case is based on systematic programs of continuous improvement, such as Kaisen, WCOM, and Simplification Project. Employees are instructed on the procedures and steps of each project related to continuous improvement. All projects have similar characteristics; they are focused on problem solving and reduce operational costs. Although Paper_Case does not have a structured program for continuous improvement, it develops actions to improve operational efficiency. Continuous improvement process is related to the firm's learning ability. It is a first order capability that operates on the firm's zero order capabilities, improving them continuously (Collis, 1994; Zollo & Winter, 2002). It is defined as a systematic effort which seeks to find new ways that improve operational process, creating and modifying routines that increase efficiency of the firm (Anand et al., 2009; Zollo & Winter, 2002). When properly implemented, it helps to integrate, adapt, or change its operational processes.

Learning Capability was observed in all four cases, Label Case, Flexi_Case, Paper_Case, and Metal_Case. These firms have operated a long time in the market for at least 60 years or more. They have old and experienced employees that constantly promote both formally and informally learning. Informal learning occurs through the exchange of information between employees, considering firms to have workers together for a long time. Formal learning occurs through meetings, training, action plans for solving the problems, and

management tools. The leadership has also been observed as an important mechanism for learning. It allows the exchange of information among employees, promoting learning among them. Learning Capability is a first order capability that helps to develop on the firm's zero order capabilities. It constitutes the firm's systematic methods for modifying operational practices and routines, and can be thought of as 'learning-to-learn' (Collis, 1994; Zollo & Winter, 2002). It is developed over time through the employees' knowledge accumulation. Knowledge happens through cross-functional interaction between areas (Paiva et al., 2008). It needs to be generated, transferred, and learned by employees. According to Eisenhardt & Martin (2000, pp. 1114), "Learning mechanisms guide the evolution of dynamic capabilities." Therefore, coevolution of learning mechanism leads to the dynamic capability (Teece et al., 1997; Winter, 2003; Zollo & Winter, 2002)

Information Management Capability has great influence on the development of Standalone Capabilities. Performance indicators help managers monitor their processes and identify bottlenecks in production. Label_Case and Flexi_Case use a structured methodology to present their indicators. They have panels in different parts of the firm, including the production, with updated data of the indicators and targets. Metal_Case and Paper_Case also have indicators, but they are not presented in a systematic way. Information Management Capability is also a first order capability that supports the changes in the firm's zero order capabilities (Collis, 1994; Zollo & Winter, 2002). The system of information is part of the intricate chain of assets and capabilities (Wade & Hulland, 2004). It generates information that can be transformed into knowledge, benefiting Learning Capability and Continuous Improvement Capability. Dynamic Capabilities as well as the Information Management Capability uses real-time information, such as inventory, sales, and production schedules to reconfigure the resources of the firm. This information helps managers in decision making, in rapid problem solving, and to better understand the production process, adapting it to market changes (Eisenhardt & Martin, 2000).

Proposition 6– Across-the-Board Capabilities are Dynamic Capabilities.

DISCUSSION AND CONCLUSIONS

In this study, we proposed to answer two main questions: 1) what is the relationship between operational practices and operational capabilities? And 2) what are types of operational capabilities characterized in the firm's internal environment?

First, what is the relationship between operational practices and operational capabilities?

Operational capabilities are developed over time through the interaction of operational practices. Operational practices are operational capabilities' antecedents. However, though we know that the development of a capability involves different paths, it is equifinal. We do not ignore the need to use different resources in this process, tangible and intangible, such as leadership and organizational culture. Yet, we believe that operational practices can be a key resource for the development of operational capabilities.

Like Wu et al. (2012), we believe that operational practices are additive. When an operational practice is implemented, other practices can be included to complement it. Over

time, they are embedded in the social context of the firm; they develop idiosyncratic aspects and a capability may emerge. We can say that operational capabilities are *idiosyncratic resources developed over time, from inter-linked operational practices, based on the unique history and experiences of the firm, and problems that decision makers have had to face in the day-to-day operations.*

Next, another question to be answered is: 2) what are the types of operational capabilities characterized in the firm's internal environment?

Nine operational capabilities were observed, creating our typology. However, they have been classified into two different constructs. We called the first construct "Standalone Capabilities". They consist of zero order capabilities, and serve to achieve operational results (Wu et al., 2010; Zahra et al., 2006). It is composed of: 1) Customer Support; 2) Innovation; 3) Operational Efficiency; 4) Flexibility; 5) Customization; and 6) Supply Management. The second construct is "called Across-the-Board Capabilities" and provide support in developing other operational capabilities. They can build, change and/or reconfigure Standalone Capabilities (Teece et al., 1997). Across-the-Board Capabilities are considered first order capabilities, and are composed of: Learning, Continuous Improvement, and Information Management (Collis, 1994; Zollo & Winter, 2002). Figure 3 shows the complete typology.

In addition to typology, we have noticed that not all firms have the same operational capabilities. The market in which the firm operates will define the type of operational capabilities necessary for it to compete with its competitors. Even within the firm, operational capabilities can be at different stages of development. Capabilities are not finished resources - they are developed according to the needs of the firm and, therefore, they can be at various levels of maturity. A capability does not last forever; it may cease to exist or be replaced by another that best meets the firm's needs.

The primary theoretical contribution of this study is the creation of an operational capabilities typology based on firms' internal environments. We found two groups of operational capabilities - Standalone Capabilities and Across-the-Board Capabilities. A second contribution is that operational capabilities are not an off-the-shelf resource. They are developed over time through the implementation of operational practices. The relationship between practices and operational capabilities puts forward the idea of operational practices as antecedents of operational capabilities. Moreover, we further differentiated between the constructs of operational practices and operational capabilities and showed the origin of operational capabilities from the internal environment of the firm.

Our model provides a simple but informative tool for managers to gauge progress and determine the impact of improvement efforts on performance. Operational capabilities can be sources of competitive advantage, but the question is how managers can build them in a firm's internal environment. In this study, we have identified operational practices as antecedents of operational capabilities, and we have shown the path that leads to the development of operational capabilities.

This study has some limitations. The first is that we have identified and selected operational practices that were more evident in the interviews, but we know that other practices were left out because they were not mentioned by interviewees or they had not been observed by

researchers. The second limitation is that we found evidence, both in literature and case studies, that operational practices are inter-linked; hence when we separate them into categories, we simplify a reality that is actually complex and dynamic. Third, the typology presented here is restricted to the packaging industry located in Brazil. We cannot guarantee that all operational capabilities of this study are found in other industries. However, we do indeed believe that our model of Across-the-Board Capabilities and Standalone Capabilities can be applied in different industries.

For future studies, we suggest that other researchers explore how organizational culture affects the development of operational capabilities. The social context is an important aspect to be considered because it permits a process of mutual learning between the organization and the individuals in it. We also suggest that future research be performed in other industries so that the findings can be compared.

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