DIGITAL CONVERGENCE IN MOBILE TELECOM: A TRAJETORY FOR COMPETITIVE AND INNOVATIVE OPERATIONS

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One element that enables differentiation in telecommunications is digital convergence of information processing, distribution and presentation technologies. This convergent scenario tends to bring up disruptive innovations, to fierce competition and enhance collaboration. Under these circumstances, it is important that innovation and operations should be properly managed, to become a sustainable competitive advantage.

This paper aims to identify implications in operations management to compete and manage innovation under digital convergence. First, the paper presents a synthesis of strategic management and digital convergence theory, in order to establish the foundation for assessing implications of digital convergence in operations management. Secondly, implications and approaches taken by top management are investigated within Brazilian mobile operators. Thirdly, the results are cross-analyzed, in order to identify aspects of the digital convergence, which brings some common implications toward innovation and/or strategy management.

The adopted methodological approach for this exploratory research is case study, based on primary information.

1. Introduction

1.1. Purpose

Digital convergence plays a significant role in telecommunications; it poses fierce competition and collaboration among companies of different industries. On one hand, digital convergence of the following technologies - information processing, distribution and presentation - enables enterprises differentiation. It tends to bring up disruptive innovations, as a result of new attributes proposed to and valued by customers. On the other hand, the business scenario tends to become more competitive and collaborative among telecom, information technology and media companies. In this highly competitive and uncertain context, it is important that both strategy and innovation should be properly managed.

The main aim of this paper is to identify implications in operations management and strategy to compete and manage innovation under digital convergence. In order to achieve this goal, this paper works in three dimensions. First, the paper presents a synthesis of strategic management and digital convergence theory, in order to establish the foundation for assessing implications of digital convergence in operations management. Secondly, implications and approaches taken by top management are investigated within Brazilian mobile operators. Thirdly, the results are cross-analyzed, in order to identify any aspect inherited in the digital convergence, which brings some common implications toward innovation and/or strategic management.

1.2. Applied methodology

This paper intends to answer some questions about implications of digital convergence in operations strategy, specifically related to innovation. Are there implications of digital convergence in innovation management in mobile telecommunications? If so, how should companies strategically manage it, to ensure a competitive advantage? Are there specific characteristics of digital convergence which justify changes in operations management theory and/or practices? Hence, in order to search for the answers for these questions, the adopted methodological approach for this research is case study.

Relevant mobile telecommunications companies operating in Brazil were chosen for this research. Mobile telecommunications faces strong growth and competition in Brazilian market. Moreover, it has just adopted the third generation mobile technology (3G), which is one of the elements that enable digital convergence. Therefore, mobile telecommunications is a relevant and significant segment to assess implications of digital convergent in operations management.

This paper applies basic concepts of strategic management proposed by Porter & Millar (1985), of digital convergence models presented by Fransman (2001) and Crampes & Hollander (2006), of strategies for innovation discussed by neo-Schumpeterian authors, such as Christensen and Overdorff (2000). These concepts are used as theoretical basis for the research, whose analysis were performed by the authors, based on primary data and information gathered by semi-structured interviews with different players in these companies.
1.3. Research findings, limitations and implications

The research indicates that there are specific implications toward strategic and innovation management according to the type of digital convergence faced by a company. Analysis of the value system and core competences proved to be critical to decide about the alternatives to compete. In addition, it seems that exist a common trajectory pursued by telecom operators, regarding collaboration and competition within the value system.

This research presents limitations for generalizing its conclusion toward all types of players in the value system, because it analyses the only perspective of mobile operators. One cannot conclude if the common trajectory is shaped or not by regulatory aspects of the Brazilian market. However, the research indicates useful aspects to be considered by any type of company to take strategic decisions related to service innovation in the digital convergence.

This study presents an advance in the theory of operations management. It combines and correlates existing theories. Furthermore, it brings up some relevant conclusions about digital convergence implications in operations management. Though it assesses only Brazilian mobile telecommunications market, the conclusions are relevant, because this segment is leading the innovation in emergent countries.

2. Theoretical base of reference

2.1. Business competition and innovation

Schumpeter (1942) states that capitalism core engine is based on economical evolution and innovation related to new products and services, new production and transportation methods, new markets, and organizational structures and processes. It is part of a continuous creative destruction endogenous process. This process is part of entrepreneurship, which combines new production arrangements which differentiate a company offering from others. Therefore, creative destruction or disruptive innovation is not mandatory based on technology, but can emerge from changes of an organizational structure and/or processes.

The neo-schumpeterian school, according to Heertje (2006), poses a different perspective on the neo-classic theory. Opposed to a static equilibrium between demand and supply enabled by the maximization of production variables; an industry and business evolution depends on a dynamic process based on disruptive changes. In a macro-economic scenario, Dosi (1982) indicates that there is a cause-effect relationship between innovation and economic growth. Nelson (2005) suggests that one of the elements that enable this relationship is the ability of a learning organization to establish core competences and critical capabilities which enables it to compete in a competitive dynamic environment.

Porter (1985) states that competition intensity in an industry can be analyzed based on a framework of five competitive forces: new entrants, customers’ and/or suppliers’ bargaining power, substitute products threats and rivalry among competitors. Industry profitability can be measured by ROI (Return of Investment capital) and by the competition intensity. The more intensive is the competition, the lower is the return on investments, which tends to zero in a perfect market.

Sources of competitive advantage, based on differentiation, relates to a superior value proposition of an offering or service, under customer perspective. According to Porter (1985),
differentiation can be achieved by doing things in a different way, which are difficult to be copied; or by taking the lead in innovating ahead of competitors.

In a microeconomic scenario, Prahalad and Hamel (1990) introduce an additional perspective about sources of competitive advantage, which enables a company to enter new business, to deliver new values, to adapt fast to competition and to survive in a dynamic and competitive environment. Core competence of an organization is a knowledge basis or a collective ability which enables a company to coordinate an integrate multiple functional capabilities areas without borders, which enables differentiation.

There are plenty of different innovation classifications. Regarding value attribute delivered to customers, Christensen and Overdorf (2000) define two kinds of innovation. One is named as continuous innovation or incremental innovation, which focus on performance improvement of current products and services attributes. Another is named disruptive innovation, which focus on new attributes of customer values that enable new business or even new markets. As stated by O’Reilly and Tushman (2004), on the topic of an organizational approach adopted, there are three types of innovation. Incremental innovation, when efficiency and productivity on current organizational capabilities are pursued. Discontinuous innovation, when opportunities arise from changes in competitive advantages. Architectural innovation, when a company changes the way it produces and/or delivers its offering.

Concerning to a value system integration among elements and agents, Chesbrough and Teece (1996), define two types of innovation. Autonomous innovation, which does not depend on other elements or components; systemic innovation, which depends on innovation of complementary assets. Under autonomous innovation, agents use structured and simple information; meanwhile under systemic innovation agents rely on coordination, information exchange and technological standards. Regarding the vertical integration of a value system, Chesbrough (2003) classifies innovation in closed or open. Closed innovation happens when a company owns the entire process, from R&D till sales. Open innovation considers that to extract value of an innovation, it does not depends on a company owning or in-housing all competences and/or capabilities, just the ones relevant for its business model.

The digital convergence between information processing (information technology), information communication (telecommunication) and information presentation (media) tends to bring up disruptive innovation. In mobile telecommunication, for instance, the digital convergence between IT and telecommunications enables a new stream of services oriented toward real-time dispersed information (e.g. sales force automation, support to dispersed logistics), which combines mobility to data processing.

2.2. Digital convergence of telecommunications

From a technological perspective, digital convergence was firstly enabled by TCP/IP protocol, on the sixties. The foundations of digital convergence rely on packet switching research developed by MIT (Massachusetts Institute of Technology) and the ARPANET (a military network). On the nineties, new business models emerge from telecommunications, media and information technology. By 1995, a new business model based on voice over internet (radio broadcasting and telecommunications) appeared in the US maker, which pushed telecom operators to ask the American Congress to bane the emergent service (DERTOUZOS, 1997; YOFFIE, 1997).
In the 2000s, a variety of technologies, products, and services which deliver information in multiple points of the planet. Not necessarily the digital convergence results in an ubiquitous telecommunication service to transport voice, data, and images; inevitably the coexistence of multiple means and services will happen, which overlays, complements or even substitutes others. Given that, business competitiveness and the innovative environment surpass different industries, particularly among telecommunications and information technology which are analyzed in this work (FRANSMAN, 2001).

The layer model proposed by Fransman (2001) (Exhibit 1), analyzes telecommunication industry within the digital convergence, and is grounded by the OSI model for networks, which is based on the TCP/IP protocol. Each layer deals with a subsystem, which dominates a relevant economical activity or requires a set of competencies to apply a technology and extract its value bases. Companies organize themselves based on similar or complementary competencies required to perform their activities. Fransman’s model (2001) enables to identify different industries, possible specialization, core competencies and/or capabilities, as well as, vertical and horizontal integration opportunities.

Traditionally, layers 1 and 2 are related to the telecommunication sector, but the internet and its TCP/IP standards enables new standards for voice, data, and image transport and distribution. Thus, new service platforms had emerged, which attended new player attributes of value and introduces new players in the market. Looking at the layer model and the value chain of telecommunication sector, one can deduce the correspondence between layers 1-2 and parts & components manufacturing industry; layer 3 and system integration industry, finally, layers 4-5 and telecommunication operators and service providers, embedded in the telecommunication industry as well as the information technology industry.

Cramples and Hollander (2006), categorize digital convergence in three types. Type 1 happens among electronic devices and it is related to layer 1 of Fransman’s model (2001). Convergence is materialized throughout different and complementary functionalities enabled by one physical device; e.g. a mobile phone which further than a voice device, it is a mp3 player, a camera, and a personal digital assistance which connects to internet with email and TCP/IP.
browser capabilities. Type 2 happens among layers 2 and 3 of Fransman’s model, that is transport and access layers, enabling fixed, mobile and internet (broadband) complementary accesses (triple player), and even TV (quadri player). Finally, type 3 treats layers 4 and 5 of Fransman’s model, delivering multimedia contents or service components, related to telecommunications, media and information services, such as search engines, portals, application service providers, etc. See Exhibit 1.


Greenstein and Khaana (1997) characterize digital convergence according to industry frontiers between telecom, IT and media. So, there would be two types of digital convergence: substitute or complementary convergence. Substitute happens when customers or end-user considers the services delivered interchangeable, because functionalities are similar though based on different objectives. Complementary happens when components or subsystems work better together than in a separate basis, bringing gains of scope.

According to Porter and Millar (1985), a value chain represents a group of distinguished activities practiced by a company, that each one aggregates a different value. The value system is the extended concept of a value chain, which considers participants’ value chains of an industry. Analyzing Fransman’s model and the telecom value system drafted by Davies et al (2001), there is a association between each layer and participants of a convergent industry, that is: layers 1 and 2 relates to telecom equipment and devices vendors, layers 3 with system integrators, layers 4 and 5 with telecom operators and service providers related to telecom, information systems and media (Exhibit 2).
3. Case study – methodology, cases presentation and individual analysis

3.1. Research Problem, methodology and framework

The research problem is stated in the following research questions: Are there implications of digital convergence in innovation management in mobile telecommunications? If so, how should companies strategically manage it, to ensure a competitive advantage? Are there specific characteristics of digital convergence which justify changes in operations management theory and/or practices?

The methodology approach chosen is multiple case study to ensure external validity. The cases are explanatory and retrospective. Three out of four cases are selected from Brazilian mobile telecom operators (Exhibit 3), with different characteristics and strategic positioning toward digital convergence (YIN, 2003).

In order to investigate each case and to ensure consistency, internal, constructive and interpretative validation; a preliminary framework (table 1) is built in order to treat three aspects: Operator competitive positioning in the digital convergence, type of digital convergence and strategic innovation exploited by Operator, and strategic integration movements faced due to digital convergence. The framework supports interviews with Strategic & Planning, Marketing, IT and network managers of each operator, which are the source of primary information grabbed for this case study research (YIN, 2003).
### Positioning in Digital Convergence

<table>
<thead>
<tr>
<th>Case A</th>
<th>Case B</th>
<th>Case C</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide services to customers in application / access</td>
<td>• Provide access to customers through any kind of medium</td>
<td>• Embrace and disseminate digital convergence</td>
</tr>
<tr>
<td>• Leadership, credibility and quality in services</td>
<td>• Leadership in innovation, which includes digital convergence</td>
<td>• Get into business which there is a proven value to customers, and act as a technological follower</td>
</tr>
<tr>
<td>• Increase and sustain ARPU, by enhancing IT offering</td>
<td>• Capture current expenditures in telecom / IT</td>
<td>• Enhance customer relationship to reduce churn, increase share of wallet in telecom/IT expenditures</td>
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Exhibit 3 – Selected Operators for case study; elaborated by authors

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Company characteristics related to digital convergence</th>
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</thead>
<tbody>
<tr>
<td>Purpose</td>
<td>Identify specific characteristics of company’s digital convergence, which causes implications in strategic technology management</td>
</tr>
<tr>
<td>Proposition</td>
<td>According to a Co positioning in digital convergence, regarding Fransman’s layer model and Porter and Millar value system, there are specific characteristics</td>
</tr>
<tr>
<td></td>
<td>• Digital convergence Model. (FRANSMAN, 2001).</td>
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<td></td>
<td>• Digital convergence types (CRAMPLES &amp; HOLLANDER, 2006).</td>
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<th>Step 2</th>
<th>Innovation characteristics</th>
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<tr>
<td>Purpose</td>
<td>Identify if there is any specific characteristics in digital convergence innovation, which implies adjustments in strategic management oriented to innovation</td>
</tr>
<tr>
<td>Proposition</td>
<td>Innovations are disruptive, open and systemic, which impacts innovation management models</td>
</tr>
<tr>
<td></td>
<td>Innovation characteristics depend on the type of digital convergence, regarding offering (CRAMPLES &amp; HOLLANDER, 2006).</td>
</tr>
<tr>
<td>Tools for analysis</td>
<td>• Types of innovation (CHRISTENSEN &amp; OVERDORF, 2000; CHESBROUGH &amp; TEECE, 1996; CHESBROUGH, 2003; O’REILLY &amp; TUSHMAN, 2004).</td>
</tr>
<tr>
<td></td>
<td>• Digital convergence types (CRAMPLES &amp; HOLLANDER, 2006).</td>
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<th>Step 3</th>
<th>Integration movement analysis</th>
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<tbody>
<tr>
<td>Purpose</td>
<td>Identify specific characteristics of company’s digital convergence, which causes implications in strategic management oriented to innovation</td>
</tr>
<tr>
<td>Proposition</td>
<td>Integration movements depends on Company’s positioning toward digital convergence, regarding Fransman’s layer model and Porter and Millar value system</td>
</tr>
<tr>
<td></td>
<td>• Core competences which a Company has and/or targets, guide integration movements;</td>
</tr>
<tr>
<td></td>
<td>• There are significant vertical and horizontal integrations in the value system due to digital convergence, which implies adjustments in operations management models</td>
</tr>
<tr>
<td>Tools for analysis</td>
<td>• Core Competences (PRAHALAD &amp; HAMEL, 1990)</td>
</tr>
<tr>
<td></td>
<td>• Vertical/Horizontal Integration. (PORTER &amp; MILLAR, 1985).</td>
</tr>
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Source: elaborated by authors

Table 1 – Framework to access digital convergence implications in operations management
3.2. Case A – presentation and individual analysis

Case A is one of the leading mobile operators of Brazilian market has a brand positioning aligned with credibility and quality of its operation. Digital convergence type 1, 2 and 3 stated by Cramples and Hollander (2006) is exploited by operator A. In convergence type 1 (multifunctional devices), the company aims to enable and materialize its convergent services and to avoid that handset providers get in this part of the market by themselves. In convergence 2 (transmission and access) and 3 (content, applications, services), the operator A intends to lead the disruptive innovation creating new services and business models and delivering new value propositions to the market. On one hand, in convergence type 3, there is a complementary offering in terms of services and applications. On the other hand, in convergence type 2, there is an imperfect substitution between fixed, mobile and broadband accesses (GREENSTEIN & KHAANA, 1997).

In the digital convergence type 3, Operator A primarily exploits the innovative VAS (Value Added Services), such as mobile payment, mobile advertising, location based services, etc, therefore delivering new value propositions (disruptive innovation) and enhance the offering to end-customers. In the digital convergence type 2, operator A focuses on bundling different types of connections and access, ensuring high performance in the available parameters valued by customers (continuous innovation). According to Operator A management team, the challenge is to understand a convergent customer, that act as individuals when accessing a mobile connection, and as a group when accessing a fixed connection (CHRISTENSEN & OVERDORF, 2000; CRAMPLES & HOLLANDER, 2006).

In operator A, digital convergence innovation is disruptive, open and systemic for convergent types 1, 2, and 3. In type 2, innovation is even sustainable, due to the fact it enhances existent parameters of performance. On purpose, operator A governs the innovation environment by establishing partnerships, and by enabling a platform based on open standards, which facilitates systems integration. The key role of operator A is to understand and identify market opportunities, define and execute successful business models, coordinate innovative actions with partners and adjust internal capabilities and process to serve customers properly (architectural innovation) (CHESBROUGH & TEECE, 1996; CHRISTENSEN & OVERDORF, 2000; CHESBROUGH, 2003).

Vertical and horizontal integrations pursued by operator A are in accordance with its positioning in the digital convergence, with its current and target core competencies, that are, retain customers’ relationship and continue to be a leader in serving its clients, with high quality service levels and credibility, as can be seen in Exhibit 4 (PORTER & MILLAR, 1985; PRAHALAD & HAMEL, 1990).

1st integration movement focuses on vertical integration into services activities (convergence type 3) in order to have access to other markets and keep customer relationship by offering innovative VAS for consumer and corporate segment. In this movement, current competences leveraged are testing innovative business and services, balance between technology availability/level of service and value to customers. The critical core competencies focused are to understand the digital customer, design appealing solutions and successful business models.

The 2nd movement is a horizontal integration to provide a triple/quadri player offering
(convergence type 2 – transport and access), and to increase its customer’s share of wallet, by exploiting current and new expenditures with telecommunications and IT services (convergence type 3). The core competence extended in this movement is to manage the quality of services and operations under customer perception, either in dominant or in emergent technologies. The pursued competences are to establish winning partnerships with big companies, and to stimulate the open innovative environment.

Finally, 3rd movement, still under consideration, is a vertical integration toward system integration, in order to enhance and enrich its offering to end customers, for instance, customized support and solutions to business segments. The critical competence to enable this offering is to ensure IT and business alignment with a focus in innovative services.

Exhibit 4 – Value System integration in Brazilian mobile telecommunication; elaborated by authors

3.3. Case B – presentation and individual analysis

Case B is one of the leaders of Brazilian mobile operators, based on customer base and/or revenues. Its brand is strongly related to innovation. Operator B intends to focus on convergence type 2 (transport and access) and 3 (content and applications), and has no motivation to focus on part and equipment layers – type 1. In convergence type 2 Operator B considers that there is not only an imperfect substitution between fixed and mobile access but also an opportunity to complement its offering with some IT capabilities, such as support and solution design. In convergence type 3, operator B intends to aggregate new services to customer mobility, therefore to widen the value proposition of current offering with different critical services (CRAMPLES & HOLLANDER, 2006; GREENSTEIN & KHAANA, 1997).
Consistent with operator’s plans, innovation in digital convergence type 2 and 3 are disruptive, open and systemic. In order to establish an open innovative environment, Operator B intends to enable a technological platform, based on open IT and network standards, which facilitates contributions of entrepreneurs’ initiatives. Furthermore, Operator B incites relationships with technological parks and/or incubators. Particularly, in convergence type 2, Operator B affirms that innovation is also architectural, because it requires changes in the capabilities to operate and deliver triple player services (CRAMPLES & HOLLANDER, 2006; CHESBROUGH & TEECE, 1996; CHRISTENSEN & OVERDORF, 2000; CHESBROUGH, 2003).

Operator’s horizontal and vertical integration trajectories are defined by the target position in the value system and in the digital convergence layers, as well as, required core competences (exhibit 4). Operator B aims to become the operator chosen by customers to use convergent services, independently of the technology applied. Given that, Operator B leverages its core competences of an ability to acquire high value customers, and of network engineering, which enables convergent access based on existent technology (PORTER & MILLAR, 1985; PRAHALAD & HAMEL, 1990).

Therefore, 1\textsuperscript{st} integration movement chased by Operator B is toward new convergent services, beyond VAS, to narrow its relationship with customer base and to increase its share in customer’s wallet. The new capability focused is to enable user content generation, and establish convergent applications or portals.

The 2\textsuperscript{nd} movement is horizontal integration in operations activities, in order to act as triple player, independently of the technology applied to provide fixed, mobile and broadband access. In this case the competence of network engineer is extended to the ability of operate and engineer integrated system. In order to complement its services with IT and network on site support, Operator B seeks to complement its capabilities with the ones of other IT players.

Finally, 3\textsuperscript{rd} movement relates to vertical integration toward system integration activities of the value system, related to network access, IT processing and support and IT applications, in order to widen its offering into specific chosen segments. Additional capabilities are critical for this movement, such as IT and network system integration, which can be achieved by leveraging current network engineering and massive operations competences.

3.4. Case C – presentation and individual analysis

Case C is a leading operator in digital convergence within Brazilian market. Its brand is strongly related to pioneering market innovation, applying simple concepts and convenient services. The company considers itself as a marketing company instead of a telecommunications company.

From Operator C perspective, convergence type 3 is enabled by type 2, therefore, Convergence type 2 (transport and access) and 3 (content and applications) both are the goals of Operator C. It means that the multimedia components and applications are strengthened by the availability of multiple types of access (fixed, mobile, broadband, etc). According to Operator C, the differentiated value is not related to exclusive content or application, but to ubiquitous complementary services. In addition, it states that in convergence type 2 there are
two clear imperfect substitutions: fixed access by mobile access and fixed broadband by cable TV broadband. On purpose, Operator C avoids playing in the handset arena, hence in convergence type 1 (handset) (CRAMPLES & HOLLANDER, 2006; GREENSTEIN & KHAANA, 1997).

Innovation delivered by digital convergence 2 and 3 differs among each other. In convergence type 2 (transport and access) operator C focuses on enhancing current available performance attributes (continuous innovation); in type 3 challenges relies on new successful business models by establishing partnerships based on open and effective /efficient proven technologies (open and systemic innovation). Operator C remarks, that its digital convergence leadership, for type 2 or 3, focuses on adjusting the organizational structure, processes and capabilities, in order to simplify and change the way services are delivered to end customers, that is, architectural innovation (CRAMPLES & HOLLANDER, 2006; CHRISTENSEN & OVERDORF, 2000; CHESBROUGH & TEECE, 1996; CHESBROUGH, 2003).

There is a clear trajectory in the vertical and horizontal integration movements pursue by operator C (exhibit 4). This evolving pattern is a consequence of its target position in digital convergence, its current core competencies and target required critical capabilities. The core competence of Operator C relies on: deeply understand and identify latent customer’s demand, pioneer innovation aggressively, operate and approach the market in a convergent way and perspective (PORTER & MILLAR, 1985; PRAHALAD & HAMEL, 1990).

Given its strategic position of offering simple and compelling telecommunications services, throughout a clear understanding of customers and their needs, the 1st movement seek by operator C is to deepening its relationship with the market (corporate and consumer segments), by horizontally integrating fixed, mobile, internet and media operations, market and sales organization.

The 2nd movement is a horizontal integration in providing complementary services to customer base, by enabling multimedia components and applications. The core competencies pursued are to prospect and chase new business models, and to create alternative options to test convergent services between telecom, IT and media.

Finally, the 3rd movement planned by operator C is to vertically integrate operations and system integration activities of the value system, with a network and IT focus to corporate segment. In this case capabilities on designing and operating integrated systems and complement services to network are considered critical (PORTER & MILLAR, 1985, FRANSMAN, 2001; PRAHALAD & HAMEL, 1990).

4. Conclusions

Coming back to the research questions, and cross analyzing Brazilian mobile telecommunications operators, some conclusions can be stated, as follows:

Are there specific characteristics of digital convergence which justify changes in operations management theory and/or practices?

Innovation in digital convergence is disruptive, open and systemic for convergence types 2 and 3, also it is sustainable for type 2. In addition, operators perceive convergence type 2 and 3. These are determinants factors into innovation strategic management. Specially regarding
the complementary and substitution aspects of the offering to end customers and regarding the way to produce and deliver these services / offerings.

Operators focus on understanding and on identifying latent demand, as well as, on perceiving sustainable business models. Uncertainties do not rely on technology but on market adoption. The way to produce and deliver new services is based on creating an innovative ecosystem, which operators take the lead in coordinating it and designing the market offering.

Horizontal and vertical integration are critical to compete under a digital convergence scenario. In digital convergence type 2 (transport and access) the imperfect substitution aspect dominates, therefore increases competition among operators, which avoid any horizontal integration with competitors. Particularly, horizontal integration for type 2 focuses on complementary services, such as on-site support, help-desk, etc. In digital convergence type 3 (contents and applications) the complementary aspect dominates, therefore mobile operators strive to govern and coordinate an open innovation environment, sustaining and deepening the relationship with its customer and with the market.

Are there implications of digital convergence in innovation management in mobile telecommunications If so, how should companies strategically manage it, to ensure a competitive advantage?

The broad variety of core competencies involved in digital convergence (represented by Fransman’s layer model and its applicability along the telecom convergent system value) pose wide implications to strategic management. The implications mostly are in assessing opportunities and threats, identifying a sustainable competitive position and in acquiring or developing critical capabilities, in order to compete under a convergent scenario (PORTER e MILLAR, 1985; PRAHALAD e HAMEL, 1990)

Cross analyzing the studied cases, it was possible to identify a common evolution trajectory of Brazilian mobile operators, regarding digital convergence (Exhibit 5). However, it is not possible to conclude whether it is a consequence of the digital convergence itself or of the regulatory aspects of Brazilian market and its system chain governance structure.

− ① Vertical Integration - convergence type 3: aims to deepen customer relationship, increase ARPU throughout Value Added Services (VAS) offering and basic services;
− ② Horizontal integration - convergence type 2: strive for a triple player offering (mobile, fixed and broadband access) in order to increase customers’ share of wallet and capture customers’ existent expenditures with telecom/ IT/media;
− ③ Horizontal integration - convergence type 3: broaden services to customers, beyond VAS offering, combining multi-media content and applications in order to increase customers revenues and retain customers against fierce competition promoted by digital convergence;
− ④ Vertical integration - convergence type 2: get into Network and IT integration, operations and maintenance services in corporate segments, strengthen the supply chain relationship to ensure service level agreements;
− ⑤ Horizontal integration - convergence type 2: expand IT solutions offering toward IT system integration, taken advantage of IT competences developed to support previous strategic movement.
Hence, one may conclude that existent strategic frameworks should be adapted, in order to depict relevant strategic movements related to digital convergence. The proposed adjustment is to combine Porter & Millar’s Value System (1985) and Fransman’s layer (2001) models, in order to indicate Cramples & Hollander (2006) types of convergence, core competences and critical capabilities required, vertical / horizontal integration, collaboration and competition among players of convergent industries (telecom, media, IT).

5. Final considerations

Some further studies could complement this research at least with two different goals.

In order to generalize the evolutionary trajectory of mobile operators in Brazilian market, a complementary field research could be done from the perspective of information technology companies or media companies. This investigation aims to validate the causes and implications of digital convergence in strategic management toward innovation. In order to verify if the evolutionary trajectory is inherited from digital convergence and not from Brazilian regulation, an additional research could be done, analyzing the pattern pursue in emerging markets similar to Brazil, for instance, South Korea or United Kingdom.

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