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A MODEL OF ORGANIZATIONAL TRAJECTORIES TO INNOVATION MANAGEMENT

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Abstract

The multiple-case study research in three industrial companies - located in Brazil- about organizational changing, comparing cases of lean production system implementation, revealed a suggested interpretation of the determinants and directions of organizational innovation.

The model tries to account for both continuous changes and discontinuities in organizational innovation. Continuous changes are related to secondary innovation, which doesn't break an organizational paradigm, while discontinuities are associated with a new trajectory, since a primary innovation adopted by the whole organization.

Then, the innovative lean process associated with secondary innovation was inadequate to change the organizational trajectory and it explains the cyclical decisions. On the other hand, the lean production system related to primary innovation, assumes the role as a new trajectory, influencing changes in total organization.

The greatest difference found in the companies for innovative diffusion process, was the aspect of spread the organizational principles or a simple set of management's tools.

Keywords

Organizational innovation, lean production system, changing management, paradigms, organizational trajectories.

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1. INTRODUCTION

Economic theory usually represents technology as a given set of factors' combination, defined in relation to specific outputs. Technical innovation is generally defined in terms of to move productions' possibilities, and /or in terms of the increasing number of producible goods (DOSI, 1982). The definition we worked here is much broader. It's including the organizational aspect, then let us define technology as a set of pieces of knowledge, practical – related to concrete problems and devices and theoretical - but practically applicable although not necessarily already applied – know-how, methods, procedures, experience of successes and

2. PARADIGMS AND ORGANIZATIONAL TRAJECTORIES.

We suggest that, in analogy with scientific paradigms from Kuhn (1970), there are organizational paradigms or management models and programmers (BURREL and MORGAN, 1979). A scientific paradigm could be defined as an outlook which defines the relevant problems, a model and a pattern of inquiry.

In broad analogy with the Kuhn's definition, we define an organizational paradigm as a model and a pattern of solution of selected management problems, based on set principles derived from natural evolution and interaction of practical management in each organization (ULRICH and PROBST, 1984).

Then, we define an organizational trajectory as the pattern of management problem solving activity on the ground of an organizational paradigm and – in a dialectical perspective – it helps to built or to change that paradigm. There is a strong link between paradigm and trajectory, because we consider the process as evolutionary (ULRICH and PROBST, 1984).

In other words an organizational trajectory embodies strong prescriptions on the directions of management change to pursue and those to neglect, influencing the continuous adoption of the paradigm through of secondary innovation or its disruptive process through a primary innovation. Given some generic management tasks such as, for example, that relative to warranty of quality, certain specific organizational technologies can emerge, with combination of 3 possibilities: their own solutions to that problem, the choose of a solution from another paradigm and the exclusion of other possibilities. In our example, warranty of quality, we can resume the possibilities in three main solutions of management considering a bureaucracy model. 1) adoption of a standard quality system as ISO

failures. The achievements in the development of an innovation organizational can be a problem-solving activity or in the soft side as particular expertise, experience of past attempts and past solutions, Organizational innovation, in this view, includes the perception of a limited set of possible alternatives solutions and of notional future developments. One can see that the proposal definition to explain the reason to an organizational technology to limit the thought solutions and the limit of new trajectories to firm.

9001, TS 16949 or VDA 6.1; 2) association with a tool management of other model as Total Quality, but including it in a bureaucracy system of documents; 3) and the exclusion of other solutions as such as creativity or autonomy of workers to give solutions in a routine.

The broad analogy between scientific paradigm and organizational paradigm we have been drawing should not be taken as an identity. In addition to the obvious difference related to the different nature of the problem solving in companies, organizational knowledge is much less well articulated than is science (McKINLEY, MONE, MOON, 1999). Then, this aspect brings a relative dependence between the organizational model and the adopted trajectories. It creates a row of possibilities for one paradigm to give us more trajectories of development of company and the false sense that the company has a truly innovation, while, sometimes the innovation is just an anthropagic movement of a paradigm establishing an ad-hoc articulation with another paradigm.

Much of organizational knowledge is not written down and is implicit in experience, skills, etc. This implies also that the definition of an organizational paradigm is bound to be much looser while the distinction between routine and new problems is likely to be hard to make in practice. The idea of an organizational paradigm shall taken as an approximation, adequate in some cases but less so in others. It depends on to analyze together with the trajectory. If in the evolution of the trajectory the company is in a moment of bifurcation it can be a chance to change the paradigm or simply the moment of to adopt a secondary innovation, derivate from other experience, but it could be absorbed by the once paradigm.

3. ORGANIZATIONAL TRAJECTORIES AS AN EVOLUTIONARY PHENOMENON

The organizational trajectory is linked to a complex process of interaction similar to an evolutionary phenomenon. In this way the organizational innovation emerges. It's not a complete deliberate process.

Mintzberg (1987) explains a similar process to a strategy when he shows us the imbricate mode between formulation and implementation. As a craftsman, the managers built a strategy idea by idea. One idea leads to another, until a new pattern forms. Action has driven thinking and the strategy has emerged.

Then as an emerged strategy, an organizational innovation can emerge in response to an evolving situation, to a selection environment, so the implementer is the formulator and innovations can be incorporated into trajectory as a face of strategy.

This perspective is an evolutionary approach that can be verified in management, sociology, economy and social science in general. Several authors have made similar statements. Merton (1978) studied the unintended consequences of social practices as well as the study of anticipated consequences. Nelson and Winter (1982) established the elements of choice of technologies in the market as a selection environment. Giddens (1984) notes that human history is created by intentional activities but is not an intended project established under conscious direction.

In particular, an evolutionary framework is useful when the system was created during a trajectory, emerging, more than a product of deliberate decision. Then in an organizational context, be it a decision process or manufacturing practice, continuous or disruptive innovations in a competitive environment, we can analyze such a dynamic phenomenon in evolutionary terms.

In particular to our research, Fujimoto (1999) studied how the history of Toyota's manufacturing system fit this evolutionary view very well. Although the system turned out to be quite competitive, its elements were not always intended at the start as competitive weapons.

In the story about rivalry between the two greatest Japanese companies, Toyota and Nissan, most important is the fact these companies adopted different trajectories for manufacturing automobiles. Nissan traditionally looked to USA and Europe for guidance in product and technology, concentrated on the use of mass-production paradigm and

tended to emphasize high-speed, single-function machine tools, automated equipment, and intensive use of computers. In contrast, Toyota evolved more independently, innovating and creating over Western firms and with greater emphasis on to create production management techniques to solve its domestic problems (CUSUMANO, 1985).

There's a consensus that the Toyota Production System (TPS) is known as one of the world's best organizational innovation in both manufacturing quality and productivity in the past few decades (WOMACK and JONES, 1996).

Toyota has many versions of its success, but they explain the company's history in terms of a series of deliberate, well-thought-out steps (FUJIMOTO, 1999), rather than as a result of natural interactions in an organizational trajectory. Then, the traditional research considers Toyota as a set of resources and routines – organizational capabilities – that bring about high competitive performance. However, a focus on an organizational capability leads us to further questions about how an organizational innovation evolves. How a certain capability creates high organizational performance is the central question. The organizational trajectory into an evolutionary perspective with a succession of the paradigms is our theoretical framework to try answering this question.

The evolutionists in economics and management clearly have wide-ranging ideas, but they all seem to share at least one notion: the formation of a business system can not be explained solely by foresight and deliberate planning. As Charles Fine (1998), in his *Clockspeed*, says each economic sector or business evolves in a different rhythm, it depends on of rates of evolution in products, process and organizations. We added the notion of chosen organizational trajectory. Then, a certain capability is linked a certain trajectory, if the company tries to change the capabilities but doesn't change the trajectory or vice-versa, the truly organizational innovation is not achieved, just a temporally bifurcation, with lost of time, energy and money. We show some cases in a multiple case research of Brazilian market.

4. METHOD

We used the multiple-case study as a research strategy. In general, "case studies are the preferred strategy when 'how' or 'why' questions are being posed, when the investigator has a little control over events, and when the focus is a contemporary phenomenon within some real-life context" (YIN, 1989, p.13).

The organizational innovation chosen was the lean implementation, mainly because of lean paradigm to have at Toyota a well-investigated case to comparison and to keep the replication logic.

In fact, the multiple-case study shall be designed following the principle of replication logic, not a sampling logic. Then, if similar results are obtained from all cases, replication is said to have taken place. This replication logic is the same when a critical experiment shall be repeated. It's limited to a few cases due to be expensive or difficulty to find the cases.

The each case was carefully selected to produces a similar result between they self – literal replication – and a contrary result when they are compared to paradigmatical case of Toyota. The theoretical framework about trajectories and evolution becomes the vehicle to state the conditions under which the organizational innovation as a phenomenon is found or not found.

The case study was designed for an exploratory investigation (HAIR et al., 2005) with focus mainly on questions about “what” and “how” the lean production system was or was been implemented in each organization. The central question was “What are the ways in which a lean model is operated as innovation in the companies?” The purpose is the question to be a guide, conducting the exploratory study with the goal being to develop a pertinent proposition or model to understand the problem of organizational innovation.

The multiple-case study follows an embedded design, involving more than one unit of analysis, because it included several outcomes from each company, qualitative and quantitative analyses of a large number of aspects: roles, relationships, power, decisions making. The data for the study was collected from different sources in each company, starting by semi-structured interviews with professional people and participant-observation in internal process management. The strategy was mapping the units of analysis in that begin and after it to achieve other sources of evidence and to repeat some interviews and participant-observations. Others sources of evidence were documentation, direct observations and files. The interviews were focused in managers and people of operational departments in several jobs, including blue-collars workers.

The study was made in a longitudinal period, the enough period to understand the implementation.

5. RESEARCH

The theoretical model here presented had its predictions verified in some longitudinal observations of implementation of Lean production System in Brazilian market.

The warranty of replication logic was the guide to choose. The all companies are western multinationals with a relevant market share in Brazilian market. They have a predominant manufacturing system as production way and in the last ten years they are implementing a similar production system to Toyota. All companies have called this implementation as a Production System and given a signal that remembers the TPS. They contracted during the implementation some kind of consultant using as guide or reference the TPS.

5.1- A plant of automotive industry with bureaucracy paradigm.

The first case presented was studied in a plant of global player that produces commercial vehicles in Brazil. The research was made analyzing the period from 1995 to 2005, when the board of company has conduced to some changes becoming the company from a bureaucracy paradigm to a lean paradigm.

The history starts in 1995. The economic liberalism applied by Brazilian government brings the increase of competitiveness and the traditional bureaucracy used in the company didn't working more. Then, as a response, the board decided to contract an international consultant and to begin the implementation of lean production system. The changing process can be shared in 2 moments.

In the first phase, from 1995 to 2002, the Brazilian board had a relative autonomy to make decisions about actions to rescue the profitability of unit. Then, in 1995 was contracted a famous consultant – ex-manager from Toyota – who started a Kaizen program to introduce the principles of lean production and to replace the mass production embedded in bureaucracy paradigm.

The great wastes were detected and eliminated in approximately 3500 kaizens done in this period involving all company. The great success was recognized and the plant received many visits from managers of other units of the world. The lean was the main project of the company and other aspects were linked with this paradigm. The consultant, like at Toyota, conduced changes in Development, Facilities, Technology, Strategy departments and was been possible to consider the lean as a new paradigm beginning in the company. In the documents and interviews was possible to identify a language dedicated to

this changing in organizational culture. The lean was a primary innovation and the tools were considered a mean to learn the principles.

Therefore in 2000 began an intervention of headquarter in Brazilian board. The autonomy was reduced systematically. First, the sponsor of consultant in Brazil was retired and his substitute was not indicated by him, but by CEO. It was a first substitution of a sequence and didn't have more sponsors of lean in key position or first level of managers. The new managers knew the lean as a set of tools and several actions to take the lean paradigm as a set of tools were done:

- the contract with the consultant was canceled,
- the kaizen management office and its internal specialists were dispersed,
- the managers not more consider the lean as central question. It's considering just a simple tool.

After it, follows a succession of changes justified as a standardization of management in global market. The new products were launched with a bureaucratic perspective; departments were exchanged and merged with correspondent reduction of jobs. Cost reduction is the expression of the day. Now the lean production system is restricted in production and standardized in all units of the world together with a bureaucracy perspective. The audit was created and a set of 69 tools are verified in periodic audits. The Brazilian unit won annual awards of production system despite the auditor to want documents and registers proving the system. Instead of Toyota, in this company if the worker can show the application of principles, but doesn't have a registration, then he doesn't receive the compliance.

In resume, the trajectory of the lean paradigm was interrupted and the bureaucracy model got strong again, because the head quarter didn't understood the lean as a paradigm or a primary innovation, but as a set of tools. Now each unit in the world is lean if presents a compliance with 69 tools. Would be Toyota's workers know to exist all tools?

5.2- A plant of cosmetic industry with bureaucracy paradigm.

This study was conducted with an evaluation of an organization trajectory of a cosmetic company in Brazil.

This company is among the three major players in the Brazilian cosmetic market, with international participation as well.

With a growing competition in the cosmetic business, the Supply chain operation efficiency becomes a competitive edge in this business. In order to reach such efficiency a new organization model is under implementation. The bureaucracy paradigm have been faced, but alternative solutions developed in order to follow the best practices of lean Systems based on Toyota success didn't break the current paradigm.

Around 5 years ago, supply chain became an important player in the business, in terms of cost savings to support product innovation. In this way, new organizations, philosophies, tools or principles started to be evaluated to speed this transformation process.

Some local and foreign consultants were evaluated in order to analyze the supply chain process and to propose improvement solutions to management. Although supply chain was facing many challenges, the total business organization model was still based on individual functions and stocks.

After evaluations and benchmarking, a consultant company proposes to start a transformation process inside manufacturing using lean principles and kaizen tool to bring quick wins in terms of set up time and material flow inside the factory. All of the kaizen weeks were successful during the implementation, but the results did not last long. The factors of bureaucracy paradigm were not break and they produced conflicts with lean system, for example:

- lack of ownership, technical knowledge in the shop floor
- centralized decision in the manufacturing organization
- roles and responsibilities inside supply chain were not clear.
- planning and production departments had conflicts about material management.

There was no longer effective participation of top management on this effort after few months of start up. As the manufacturing organization saw the benefits in the methodology, it continues the kaizen weeks to improve manufacturing process. However, it was an isolated decision.

One of the major critical factors to lean implementation was the high number of new product launching in one year and the consequent management of product demand forecast affecting dramatically the pull system and kanban practices to manage product raw material and packaging delivery to the plant. Although this practice is a challenge, a frequent review of material mix needs to be carried in order to use the pull system for high volume items and continue to use

MRP for low volume items. Then, instead of consider reducing overproduction as a principle, the managers have seen the application of kanban as a tool, benchmarking automotive industry, when they should to make an adaptation of all routines to reduction of inventory – set up, flexibility, leveling – not just the kanban.

One aspect of supply chain efficiency in bureaucratic model is the reduction of overheads as a general practice in all business to bring competitive costs. A cosmetic plant normally is labor intensive, due to considerable semi manual operations required by short life cycle products. Due to GMP (Good Manufacturing Practices) and documentation practices required by Brazilian Federal Regulatory Agencies and Quality System Management, the company has taken a high focus on the individual job role training and individual responsibility. In the interviews, the managers said it brings a conflict with a semi autonomous group work model in order to increase the group empowerment and reduction of supervision. This is an evidence about the company didn't understand the principles of lean paradigm, wanting just to reach the use of tools. The manager has concerning with the individual quality and responsibility – aspects of bureaucratic paradigm – when the teamwork and autonomy of workers are means to achieve decisions about quality more closed in moment of production. The reduction of overhead by use of less supervision is a secondary consequence in lean paradigm but is understood by managers of bureaucracy company as a main objective.

In 2006 a business multifunctional manager's team successfully implemented a pilot test, using now a second lean consulting company. The new approach for lean system implementation reinforced business value stream mapping followed by kaizens to implement pull systems and kanban tools to reduce company inventories and speed supply chain transformation. Unfortunately, the pull system developed was abandoned after a year of implementation

Several other continuous improvement tools, including kaizens were successfully implemented in manufacturing in this meantime. However, lean system as a long-term culture change journey could not succeed yet.

Among all issues and difficulties, after 4 years of trying and error for lean system implementation the key major difficult was related to people stability in top management. Although now is well know lean system can be implemented, frequent supply chain and business top and medium management reorganizations can not bring identity to such big company change as lean system implementation.

5.3- A plant of autoparts with mass production paradigm

The case presented in this section was conducted in a plant of a global company that produces driveline and chassis components to automotive and agricultural markets and that is the first our second player in its segments.

In the beginning of the 2000s the Brazilian site has decided to pursue the conversion from a highly departmental to a process oriented organization. As it follows, the conversion still on way and can be represented in four different moments

The first phase was started when a business unit that had its profitability hurt due to a volume decreasing in its market. As stated by Womack & Jones (1996), this crisis established the need for changing the paradigm from mass to lean.

In 2001 the Worldwide Headquarter transferred a new production manager to Brazil objectifying to restore the business' health. From 2001 to 2003 significant waste elimination occurred based on the application of shop floor kaizen events led by the foreign manager with punctual support of external lean consultants.

A relevant characteristic that must be accomplished is leadership style of this manager. He acted more like a dictator than a sensei, trying to speed up the process and putting the rest of the leadership in co adjuvant functions during the kaizens. The "my way or go away" style, based on the authority brought quick wins to the plant related mainly wit flow creation through manufacturing cell design and changeover time reduction.

In another hand, it is not possible to identify any effort to develop mechanisms to sustain the lean transformation. Therefore, a solid foundation to a new lean paradigm still not built.

Concurrently, the Business Units Heads decided to establish Lean Promotion Offices in its plants starting a second moment in trial for adopting the lean paradigm. Different approaches were defined by each Business Unit. The Brazilian plant selected the approach defined by the main business unit located in the country that was focused on the application of 16 lean tools.

After bringing back profitability to the business unit, the manager was invited in 2003 to become the Lean Promotion Office Manager increasing his scope to the whole plant and all the business units.

For the following two years under its supervision, the Lean Office organized many workshops spreading the knowledge on the lean tools as defined by the corporate model. The tools that were applied in the second phase were kanban, poka-yoke devices and 5S.

The fragile transformation was characterized by the adoption of a bureaucracy paradigm of tools instead of principles. In addition to this issue, the aggressive follow up done by the Lean Manager sustained the improvements, but only for a while.

When the Lean Manager was promoted to Industrial Director in another plant abroad, the third moment of trial began.

Without the internalization of the principles, a weak application of lean tools and a reduction of the pressure, the current state status began to perish, going back to the initial mass production state.

In a very short term, the sense that the lean transformation stalled began to grow. Some frequent quotes from the middle leadership at this time were “Lean moved abroad” or “The manager put lean on his pocket and went off”. White collars registered a different impression when you tried to discuss improvement. The quote “I tried it before and I can assure you: it won’t work!” became usual. It was common to see improvements suggestions really based on the lean principles, but the collaborators started to mistrust the lean paradigm.

After about 5-6 years of trial and error, understanding that adopting the lean paradigm was a secondary innovation, the company is just restarting the journey now in 2007. The planned changes that characterize this fourth phase are:

- New corporate model moving from 16 tools to 6 lean principles;
- New policy deployment process to create the link among the strategic planning process and the strategic projects;
- Inclusion of the application of lean principles as a requirement to career progress;
- New structure to Order Fulfillment Process organized by value stream.

By those pillars the company is trying really to set the environment to effective paradigm conversion through a primary innovation process.

6. CONCLUSION

A critical aspect relates to how new trajectories emerged in the organizational context and how it was preferred to other possibilities.

The cases here presented suggesting some interacting mechanisms between cultural factors and economic factors (BURT, 1995). It considers a broader set of aspects because of our study to be exploratory and qualitative. From the stress between these categories emerging primary or secondary organizational innovations. As cultural factors we identified the decision process, the degree of centralization, the structure of power and the fight between groups of interesting. As economic factors, we identified the structure of capital, the profitability, the position in value stream or supply chain. In resume if the kind of culture is enough to involve all material aspects of organization, as a foaming, the diffusion of innovation follow the progress. Therefore, if the aspects of culture break this foaming view, then the innovation is a point and stop in superficial aspects.

Then, the organizational trajectories are different of technological trajectories because the technology is well defined by a certain pattern (NELSON and WINTER, 1982), but the organizational paradigms are built by routine of the company and it emerges during the evolution. It can to be a source of a bifurcation of trajectory, when there is a stress between different paradigms. It’s the moment when the company tries to change and the inertial forces and changing forces of both trajectories are interacting.

In the presented cases, the implementation’s phases revealed us bifurcations of trajectories, therefore they emerged as a technical innovation or a secondary innovation into a continuous changing, and, in particular, was “the market” as the prime mover. The management didn’t have worry with power relationships, groups of interesting, alliances and a net of sponsors and future successors. Then, the Lean management was treated as a tool under the paradigm and in the evolution of implementation, the bifurcation falls and a primary innovation did not happen.

Our suggestion is to treat the implementation of management changes as an organizational innovation, in fact, considering the interaction between cultural and economic aspects. Then, the bifurcation will have conditions to grow up, to achieve maturity and to give another paradigm. This interaction must lead the cultural aspects of power and socialization, to achieve in first moment the principles and not management tools.

These aspects about principles and paradigms can to clarify because at Toyota the workers can’t to explain the TPS as a set of tools. In Toyota the principles of a certain paradigm are the prime mover and the set of management tools are the emerged trajectory in responses to specific cultural and

economic forces of environment. In another hand, Microsoft, as an example to contrast, has another principles that don't achieving the lean paradigm, but that company and others achieved the success because take care of its trajectory with certain principles according to other environment, following coherency and focus, and not a management by tools.

If the company belongs to an economic or business sector and this activity evolves in a specific rate of evolution, including products, process and whole organization, then, we added the responsibility to managers to choose an organizational trajectory. To a chosen trajectory, it relates a set of principles and capabilities to be practiced in whole company.

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