Information Technology Maturity Evaluation in a Large Brazilian Cosmetics Industry

Cintia Nailor Pedrini[1] & Guilherme Francisco Frederico[1]

[1] Federal University of Paran á, Brazil

Correspondence: Guilherme Francisco Frederico, Professor, School of Management, Federal University of Paran á, Brazil.

Received: May 23, 2018 Accepted: June 5, 2018 Online Published: June 15, 2018

doi:10.5430/ijba.v9n4p15 URL: https://doi.org/10.5430/ijba.v9n4p15

Abstract

Maturity evaluation has been one of the most important research topics for many of knowledge management areas. Thus, the purpose of this paper is to present a maturity framework for Information Technology- IT area showing the dimensions to be managed in terms of stages of development for technology management. The literature review was based on the analysis of the technological transformations within the organizations, assessing the importance of the technology and the way in which it is transforming companies, as well as, the maturity for IT determining the potential framework that will serve as object of the research deployment. Following a qualitative and exploratory approach, the research method considered was a case study carried out in a large Brazilian cosmetics industry. A semi-structured questionnaire was applied in samples of professionals from the IT area. The data worked were primary, with a temporal cross-section and the data were evaluated by way of content analysis. The result of the research provided the basis to evaluate the maturity of the IT of this cosmetics industry, with the following objectives: analyze the company's current level of development from the dimensions of people, processes, technology and management. This study brings out important contribution once few articles considering the thematic of IT maturity were found in the literature. The main theoretical contribution is based on the opportunity of deploying a methodology as a reference whereas the practical contribution is linked to the framework presented which can be a reference for practitioners on IT maturity evaluation in other organizations.

Keywords: maturity, information technology, cosmetics industry

1. Introduction

Maturity evaluation is one of the key points, which must be considered by organizations in their process management collaborating to achieve higher level of performance.

Crosby (1979) proposed the first model of maturity, which is relate to the quality enhancement by means of five maturity levels, in a model called Maturity Grid. Many other frameworks have been proposed in literature such as for project management (Kwak & Ibbs, 2002), continuous improvement (Bessant, Caffyn & Gallagher, 2001), virtual organizations (Venkatraman & Henderson, 1998), and product development (Harter, Kishnan & Salughter, 2000), Performance Measurement Systems (Wettstein & Kueng, 2002; Van Aken et al., 2005), Performance Measurement Systems for SCM (Frederico & Martins, 2014), Supply Chain Management (Lockamy & McCormack, 2002; Frederico, 2017)

Considering the need that companies have in adopting an information technology maturity model, this article targets identifying the level of maturity of the information technology area in a cosmetics company and the way this is being managed based on the transformations stemming from the current technology context.

The cosmetics company, object of this research, is acknowledged throughout the market by its consumers. The company offers a wide range of products, working with different channels and brands that possibly meet consumer expectations. The company strives to be seen as innovative and pioneer in the development of cosmetics targeting product quality and end consumer satisfaction. Among its values, the company has respect for customers, suppliers and the environment. Technology management is the key for the success of Cosmetics Company in the current market.

In this sense, the specific objectives of this paper encompass analyzing the IT practices aligned with the business

environment of the company under study and how the company positions itself within this context, as well as identifying the current maturity levels from the standpoint of people, processes, technologies and business management in accordance with the Gartner methodology (2007). This Gartner (2007) framework was adopted considering its most adherence criteria in terms of IT maturity analysis as well as the gap in literature related to IT maturity frameworks proposals.

This issue is relevant and consequently will establish paths for the company to position itself ahead of the market in which it acts, for the achievement of its business objectives and proposing improvements required in this process.

Considering that information technology infrastructure following a pattern in most of companies, this maturity evaluation can provide a framework to be used in other kind of business supporting practitioners on this management area. In addition, future researches can be deployed in order to better understand IT maturity phenomenal for different business situations.

2. Literature Review

The publication mentioned provides a theoretical approach based on two main topics. The first one raises, from the reference point of some authors, the technological transformations in companies and the impact these can generate on the business, driving competitive advantage opportunities for organizations. In addition, the authors mentioned talk about changes stemming from technologies, the level of impact these will be have on the workforce and the way that communication progresses in the Internet age.

The second topic is about a theoretical approach on Information Technology maturity using as a reference a model presented by Gartner (2007) for Infrastructure and Operations Services.

2.1 Companies' Technology Transformation

It is an undeniable fact that technological innovations perform a fundamental role in companies needing to introduce technology novelties in their management approaches.

Porter (1992) analyzed the technological transformations underway and concluded that these result in sustainable competitive advantages for companies. The analysis states that technology is contained in every value activity and can increase or reduce gains of scale, facilitated by the interrelationships that before were not possible.

Almeida (1998) also realized this and alerts to the changes in the economy that will lead to the disappearance of job positions and of whole production processes within companies. There has been a change in the service offering due to the ease in communication means. Currently, undertaking practically any form of business using the Internet has become possible.

Within this context of changes, "the deployment of new technologies has been considered vital for the survival of organizations, in particular the use of information technology (IT), nowadays present in the day-to-day of organizations", according to Ribeiro Neto (1999).

Gonçalves (1993) surveyed the impact of technologies on organizations. A number of changes were listed, in particular in so far as concerns the execution and nature of tasks, when electronic instruments started to be used instead of the manual ones. Therefore, technologies tend to cause impact on job positions, i.e., with the growing ease in performing tasks, increasingly lower headcounts are required. Another important discussion is in so far as concerns changes in organizational structures that, due to the technologies, often affect the way things are managed as well as the layout of companies.

Ribeiro Neto (1999) points out a number of impacts resulting from moving from the traditional way of performing tasks to the new, automated forms. However, many companies are not yet making, or are unwilling to make, changes since they believe that the changes may generate conflicts and resistance and affect established positions. This means that technologies may lead to even more drastic repercussions throughout organizations.

For Oliveira (1999), businesses are increasingly more looking for organizational efficiency through deployment of technology, for believing that these tools will provide adequate support for organizational reengineering.

These changes are expected to drive new management practices, encompassing the reengineering of business, development of partnerships, processes like Just-in-time, among others (Ribeiro Neto, 1999). Usually, "the basic inputs for production of technology our knowledge and ideas that can stem from three main sources: the market, the practice of production and advances in science" according to Mattos and Guimarães (2005).

According to Barbieri and Álvares (2003), the linear innovation model occurs through the outcome of basic research that enables generation of scientific knowledge about a specific technique or product, facilitating the company's

entire productive process.

In Bateman and Snell's (1998) opinion, the adoption of technologies may represent new business opportunities and increase competitiveness. They make it clear that technological tools may impose risks and costs and believe this is not the best business alternative for companies.

This opinion is not always shared by other theoreticians. Mattos and Guimar ães (2005) reveal that technologies may bring advantages over their competitors and improve relationships with the entrepreneurial environment, comprising a very positive business alternative.

Johnson (1997) admits that technologies are a space to be explored, which allows the understanding and emergence of new management processes as well as work concepts.

Within this context, Morton (1991) reports that information technologies in the production environment, in particular in the management of production and organization of the work tasks has revolutionized the way of living, of communicating and doing business.

Yates (1991) reports one example of these technologies: in the 1980s General Motors invested USD 650 million in the total automation of its Michigan plant and another one located in Massachussets. This affected the organization of the work, the production management methods and resulted in the massive investment in developing people's skill sets and potentials, reinforcing the positive aspects that technologies can provide companies.

In this sense becomes relevant evaluate levels of development in terms of technology infrastructure, considering that from this analyses higher performance in IT management can be achieved. With this purpose, maturity evaluation can adequately support the measurement of dimensions that must be considered for the excellence of infrastructure technology management.

2.2 Information Technology Maturity

In organizations, the errors committed may be natural symptoms of maturing and lead to the development that has brought the organization to its current maturity status.

Maturity models can be used in different areas. They stem from the principle that people, organizational, functional areas and processes evolve by way of a development process to achieve a more advanced stage of maturity, according to do Burn (1994) and King and Teo (1997).

The business management pillar of the company being studied is in connection with the corporate brands and, therefore, the IT area is directed to addressing the business-need of brands that address end consumers.

Greiner (1998) focused on the organization as a whole developing the understanding of the evolution of management practices based on the way in which the organizational growth occurs. He listed five stages of maturity, to wit: creativity, direction, delegation, coordination and collaboration.

According to Becker et. al. (2009): "Continuous improvement requires positioning by the company with respect to its IT capabilities and the quality of its goods and services".

McFarlan et al. (1983) introduced a four-stage model to check how technologies involved in organizations, encompassing processing and lots, online systems, office automation and future technologies.

Maturity models are valuable instruments for IT managers because they enable the assessment of the existing situation and companies, as well as identification of reasonable improvement measures. In recent years, over 100 models of maturities have been developed to support IT management. They approach a wide range of different areas of application and include holistic assessments of IT management, as well as assessment of specific sub areas as Business Process Management, Business Intelligence (Becker, et al., 2009).

Gartner IT (2007) introduced an IT, infrastructure and operations maturity model (I&O), "establishing a script for rising levels of maturity in the alignment between service and partnership with the business". This script evaluated four dimensions of I&O: people, processes, technology and business management, enabling a script for improvement and supporting company targets. Table 1 shows this model.

Table 1. Gartner's I&O maturity model

People					
Survival	**Awareness**	**Committed**	**Proactive**	**Service/ Aligned**	**Business partners**
No organizational focus on IT infrastructure and operations	Defined, technology centric organization for IT infrastructure and operation.	Technology-centric organization, investment in IT service desk function and staff.	Process- centric organization, defined governance structurie.	Customer-and Business-focused IT service and delivery centric, organization, formal governance	Business optimization and entrepreneurial focused culture.
Process					
No formal IT processes for IT infrastructure and operations.	Ad hoc, but aware that processes are necessary; dependent on tools to implement actual process.	Defined processes for IT service support and project management.	Repeatable and individually automated; focus on IT service delivery-related process.	Integrated, automated and extended beyond I&O; focus on all service and business process management.	Dynamic optimization of IT services, implement processes promoting business innovation.
Technology					
No formal strategy or execution of technology investments.	Basic management tools; no formal infrastructure hardware or software standards.	IT support and project related management tools; desktop hardware/software standards defined; beginning of infrastructure standardization/ rationalization.	Formal infrastructure standards and policies; process and domain-centric management tools; virtualization foundation in place.	Formal IT management process /tools architecture; shared services; added management apability.	Proactively romoting new echnologies nd impact for the business; real time infrastructure.
Business Management					
No form of IT business management functions.	Very little – outside of budgeting.	Project management office.	Financial management, formal key performance indicators.	IT service cost metrics, competitiveness.	Business contribution Metrics.
Levels					
0	1	2	3	4	5

Source: Gartner (2007)

The attributes assessed by Gartner (2007) for establishment of management maturity cover six objectives for each level. Level 0 covers survival, there is little or no focus on IT infrastructure or operations. Level 1, awareness leads to the realization that IT infrastructure and operations are critical for the business, actions begin to be put in place (in people/organization, process and technologies) in order to achieve operational control and visibility. At Level 2, IT supports processes and improves the success of project management making them more economical and upscaling customer satisfaction. At Level 3, proactive, gains in efficiency and service quality through standardization, policies, development, governance structures and implementation of proactive interdepartmental projects and processes, such as changes and launch management. At Level 4, service aligned, managing IT as a business, focused on the customer, recognize supplier of competitive and reliable IT services. In Level 5, commercial partnership, trusted business partner for the company, increasing the value and competitiveness of business processes, as well as of the business as a whole**.**

3. Research Method

The research method considered was a case study. It was carried out in a large Brazilian cosmetics industry. Data were collect through a semi-structured questionnaire with closed questions, targeted at 30 professionals from the technology area, using transcriptions from Gartner's (2007) model, divided into four dimensions: people, processes, technology and business management.

Bryman & Bell (2007) states that case study implicates in a detailed an intensive analysis of a simple case or multiple cases.Case study can be used for the follow purposes: exploratory studies, theory build, theory tests, refining and extension (Voss; Tsikriktsis & Frohlich, 2002).

This is a case study because it attempts to "clarify a decision or a set of decisions, the reasons for which these were made, the way in which they were implemented and establish their outcomes" (Yin, 2003).

This definition covers other topics, such as: "individuals, organizations, processes, programs, institutions, among others" (Yin, 2003). Therefore, it is totally related to the objectives of this study that endeavors to evaluate IT maturity models based on transformations stemming from the technological context.

Despite Becker (2009) having proposed a process-based model for the maturity model projects, in the hope of remediating generalized shortcomings in companies, Gartner's (2007) model was chosen for being broader and encompassing: people, processes, technology and business management. People, processes and technologies are driven and limited by the way in which they are managed. Technology affects maturity and changes in staff may be prerequisites for process improvements. Proactive business management has in financials the formal key for its performance.

Prior to applying the survey, executives from the information technology area were interviewed with a view to achieving our better understanding off the level of importance of each one of these pillars (people, process, technology and business management) for the area, in order to promote a correct distribution of weightings and alignment to the strategy of the area. The final score indicates the level of IT maturity was released through the weighting (weights versus scores) following the theoretical model chosen as reference for this paper. It is worth highlighting that the score considered was the one with the highest stand out within the applied research, with the highest percentage of answers.

The assessment was based on the four dimensions defined by Gartner (2007), with the respective weightings established in Table 2.

Table 2. Definition of the weightings per pillar

Pillars	***Weighting***
People	0.2
Processes	0.2
Technology	0.3
Business Management	0.3

The range of the maturity scale defined by Gartner (2007) is between 0 and 5:

- Level 0-also known as the survival level, where there is no focus and/or structure targeted at Information Technology.
- Level 1, or the level of awareness, the area is seen here as fundamental for the business, moving with respect to the pillars of the model, with a view to achieving better operational control and higher visibility.
- Level 2, in connection with a committed environment, considered managed, with project management put in place to improve the level of end customer satisfaction.
- Level 3, or proactive, the area displays gains in efficiency and service quality, through standardizing, policies, governance put in place, in addition to interdepartmental proactive processes.
- Level 4, line service, where the area is managed as a business, focusing on the customer and providing reliable and competitive services.
- Level 5, or business partnership, the area becomes a business partner capable of adding value and competitiveness to the business processes.

4. Results and Data Analysis

Table 3 shows the overall result of the survey, based on Gartner's (2007) maturity bottle and applied to the context of a Cosmetics company in Paran á.

Calculation of results shows that the Organization is between levels three and four of maturity, with a score of 3.7 in the weighting. This means that, from the standpoint of maturity, the company has opportunities to achieve the level of excellence.

In Gartner's (2007) methodology, level 4 means in IT aligned by services, i.e., managed as a business, focusing on the customer, as a service provider and already competitive and reliable, whereas at level 3, it is considered a proactive area, i.e., area with efficiency and quality in service delivery, acting through the standardization of policies, with a governance structure in charge of managing. This way, the current structure meets fully level 3 and peak performances are already at the level 4 of development (Table 3).

Table 3. Calculation of overall results

Pillars	***Weighting***	***Score***	***Results***
People	0.2	4	0.8
Processes	0.2	4	0.8
Technology	0.3	4	1.2
Business Management	0.3	3	0.9
		Total	3.7

By filtering the results of the questionnaire applied, for the variable people, Figure 1 shows the opinions of interviewees in terms of their perception of the organization's IT. 60% were perceived to talk to customers and business servicing; service and organization centered in formal delivery to the organization. Another 26.67% see the organization as focused on processes and with a defined IT governance structure. 13.33% see the organization as centered on technology, investing in the function and on the IT service team.

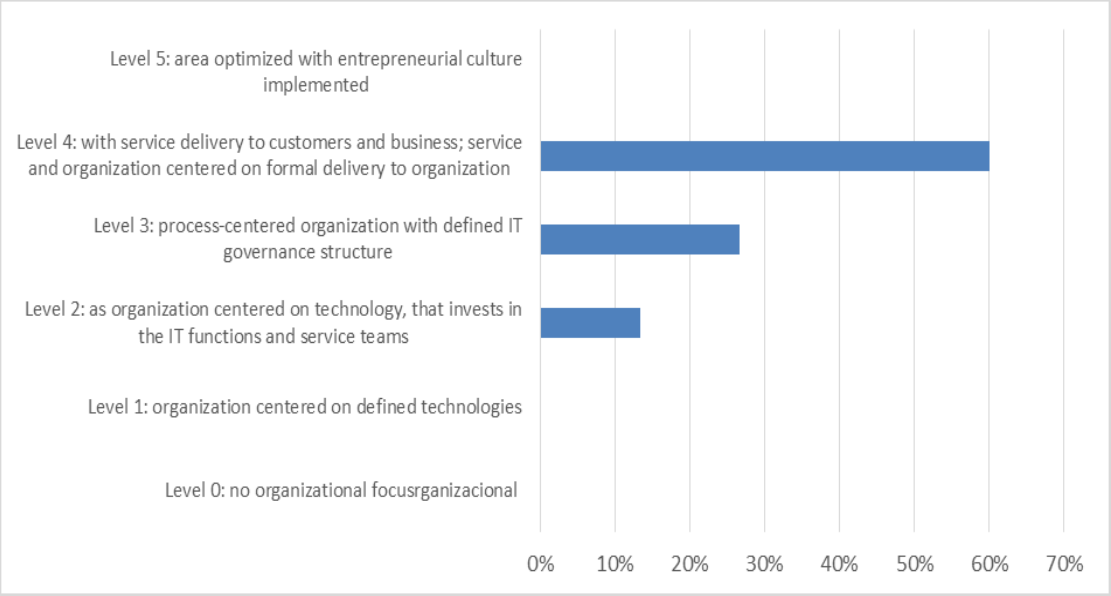

Figure 1. Perception of the IT organization by people

Figure 2 display the results for item processes. For 37% of the people surveyed, processes are integrated and automated, with business and service management. For 30%, the company has clearly defined process and project management. Of the total, 20% answered that there are optimize, dynamic processes and that these promote innovation. For 13.33%, there are defined and automated processes focused on the area's deliveries/needs.

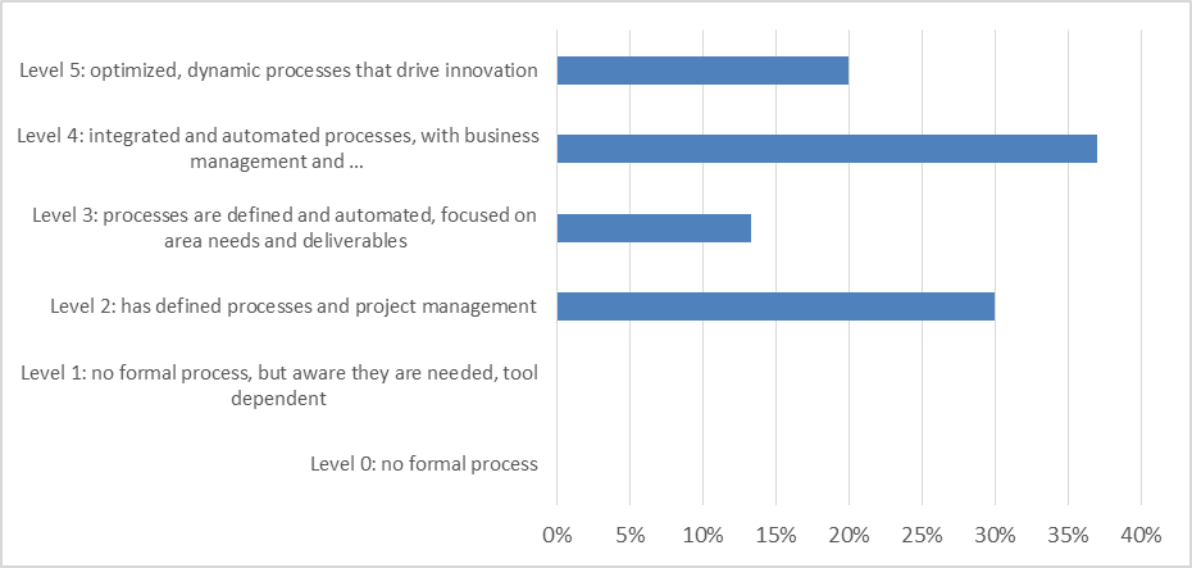

Figure 2. Company position with respect to IT processes

For item technology (Figure 3), 40% answered that there is a formal management process, tool architecture, shared services, capability management. 26.67% feel that there are management tools with established support, hardware and software standards, but the company still has needs in technology standardization and rationalization. 20% of the interviewees state that there are established standards and policies, as well as process management tools. 7% answered that there is the proactive promotion of new technologies generating impact for the business in real time.

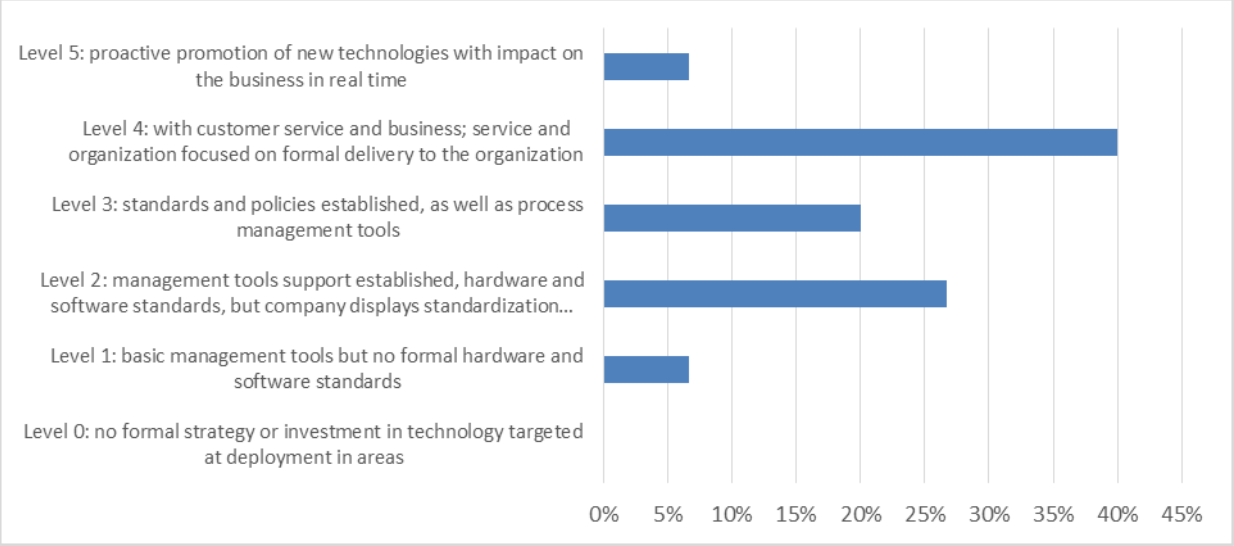

Figure 3. Company status with respect to technology

Figure 4, shows that 53.33% of the people interviewed claimed that there are established practices in financial management, assessment and tracking of performance indicators for IT action/projects put in place. 7% answered that the company has defined cost metrics for IT services. 6.67% answered that the company has an internal project management structure and/or project office.

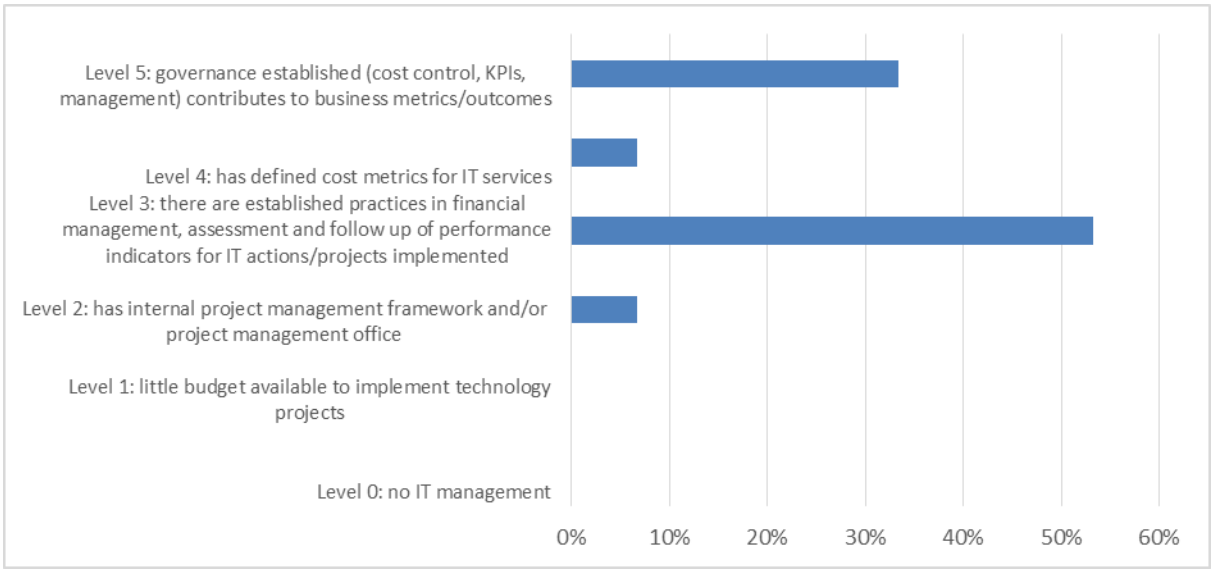

Figure 4. Technology management level applied in the organization

The results obtained through the semi-structured questionnaire applied are represented graphically based on the assessment perspectives in Figure 5. This Figure shows that the Information Technology area displays a level 4 of maturity considering the pillars of people, processes and technology. However it must strive for evolution from the standpoint of business management that scored 3 on the assessment scale

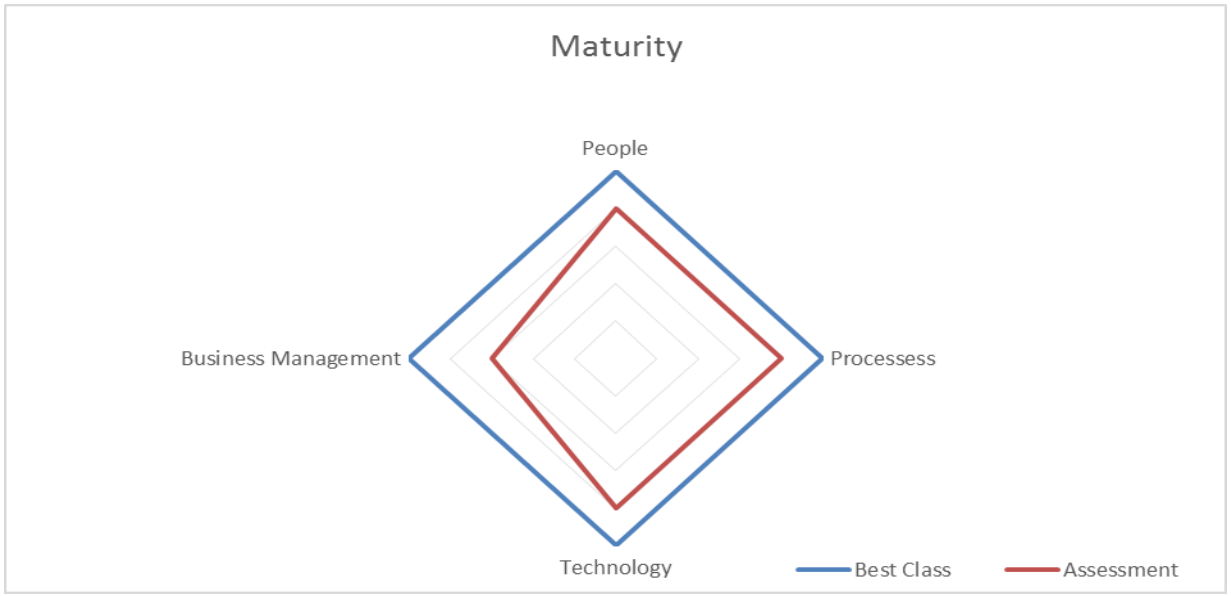

Figure 5. Maturity levels by pillar

This configuration is aligned to the way in which the company currently structures its operations. Within the pillar of people, efforts are concentrated to qualify the team through technical training, participating in seminars offered by institutions of reknown, and reconfiguration of profiles by contracting professionals from the market with broader systemic amplitude. In processes, the company evolves through reconfiguring and directing activities to the Governance area, responsible for establishing effective policies and processes, leveling the level of information. Within the pillar of technology, the area directs efforts and resources responsible for the architecture and planning of the implementation of software in the short and medium terms, with a view to optimizing activities and promoting improvements for the workforce. Finally, in business management (directly connected to corporate brands/business,

the area feels that it can evolve from the strategic standpoint of adding value and participating proactively in the business results.

5. Conclusions and Final Remarks

The objective of this paper was to identify how the area of IT in a cosmetics company is being managed, based on transformations stemming from the current technology context.

After surveying the results, it was observed that: in item people, the company is focused on addressing customers and business and with a defined IT governance structure. Processes are integrated and automated and focused on the area deliverables/needs. In the item technology, attention is drawn to the existence of a formal management process, tool architecture, shared services and capability management, together with support tools, standards and policies put in place. There are practices in IT financial management, assessment and tracking of action key performance indicators.

The organization scored 3.7 in level of maturity. This made it clear that the current structure has reached the level 3 and already has peak performance aspects at level 4 underway. In general terms, the company already has a governance structure but it must progress with IT tools that will certainly drive better performance and higher efficiency.

Finally, the theoretical model shown proved to be feasible for implementation in organizations, capable of contributing to the identification of the current level of maturity, as well as identifying the level of excellence. This view will enable companies to have a diagnostic and be able to work on action plans targeted at evolving their IT with practices considered to be of excellence. Theoretical contribution is given considering the maturity framework presented which is relevant for the information technology theory, providing insights related to the maturity evaluation for this field of knowledge.

References

Almeida, M.de.S. (1998). *Cultura organizacional e atitudes contra mudanças, Revista de Ciências da Administração*. Florianópolis: Universidade Federal de Santa Catarina.

Barbieri, J.C., & Álvares, A.C.T. (2003). *Inovações nas Organizações Empresariais*. FGV Editora, Rio de Janeiro.

Bateman, T.S., & Snell, S.A. (1998). *Administração: construindo vantagem competitiva.* Atlas, São Paulo.

Becker, J., Knacstedt, R., & Poppelbub, J. (2009). DevelopingMaturityModels for IT Management-A Procedure Mode land its Application. *Business & Information Systems Engineering*, (3). https://doi.org/10.1007/s12599-009-0044-5

Bessant, J., Caffyn, S., & Gallagher, M. (2001). An evolutionary model of continuous improvement behavior. *Technovation, 21*(2), 66-67. https://doi.org/10.1016/S0166-4972(00)00023-7

Bryman, A., & Bell, E. (2007). *Business Research Methods* (2nd ed.). Oxford: Oxford University Express.

Burn, J. (1994). A revolutionary staged growth model of inromation systems planning, In *Proceedins of the Fifteenth International Conference on Information Systems* (pp.394-406). Vancourver, Brithsh Columbia, Canada.

Crosby, P.B. (1979). *Quality is Free.* McGraw-Hill New York.

Frederico, G.F. (2017). Supply Chain Management Maturity: A Comprehensive Framework Proposal from Literature Review and Case Studies. *International Business Research, 10*(1), 68-76. https://doi.org/10.5539/ibr.v10n1p68

Frederico, G.F., & Martins, R.A. (2014). Performance Measurement Systems for Supply Chain Management: How to manage its maturity. *International Journal of Supply Chain Management, 3*(2), 24-30.

Gartner, I.T. (2007). *Introducing the Gartner IT Infrastructure and Operations Maturity Model*. Retrieved from https://www.gartner.com/doc/527814/introducing-gartner-it-infrastructure-operations

Gonçalves, J.E.L. (1993). A tecnologia e a realização do trabalho. *Revista de Administração de Empresas, 1*(33), 106-121. https://doi.org/10.1590/S0034-75901993000100010

Greiner, L. (1998). Revolution is still inevitable. *Harvard Business Review, 3*, 62-63.

Harter, D., Krishnan, M., & Slaughter. (2000). Effects of Process Maturity on Quality, Cycle time, and Effort in Software Product Development. *Management Science, 46*(4), 451-466. http://dx.doi.org/10.1287/mnsc .46.4.451.12056

Johnson, S. (1997). *Interface Culture: how new technology transforms the way we create and communicate*. Harper,

New York.

King, W., & Teo, T. (1997). Integration between Business Planning and Information Systems Planning: Validating a Stage Hypothesis. *Decision Sciences, 28*(2), 279-308. https://doi.org/10.1111/ j.1540-5915.1997.tb01312.x

Kwak, Y., & Ibbs, W. (2002). Project Management Process Maturity Model. *Journal of Management in Engineering, 18*(3), 150-155. https://doi.org/10.1061/(ASCE)0742-597X(2002)18:3(150)

Lockamy III, A., & McCormack, K. (2004). The development of a supply chain management process maturity model using the concepts of business process orientation. *Supply Chain Management: An International Journal, 9*(4), 272-278. https://doi.org/10.1108/13598540410550019

Mattos, J.R.L., & Guimarães, L.S. (2005). *Gestão da tecnologia e inovação: uma abordagem prática.* Saraiva, São Paulo.

McFarlan, F., & McKenney, J. (1983). The information archipelago-plotting a course. *Harvard Business Review, 61*(5), 109-119.

Morton, M.S.S. (1991). *The corporation of the 1990s-Information technology and organizational transformation*. Oxford University Press, New York.

Oliveira, J.F. (1999). *Uma Reflexão dos Impactos da Tecnologia da Informação no Brasil.* Atlas, São Paulo.

Porter, M.E. (1992). *Vantagem Competitiva: criando e sustentando um desempenho superior*(7th ed.). Campus, Rio de Janeiro.

Ribeiro, N., & Luiz, G. (1999). Os impactos da tecnologia de informação nas organizações: uma visão política. *Revista Universidade de Alfenas, Alfenas, 5*, 95-101.

Van Aken, E., Lettens, G., Coleman, G., Farris, J., & Van Goubergen, D. (2005). Assessing Maturity and Effectiveness of Enterprise Performance Measurement Systems. *International Journal of Productivity and Performance Management, 54*(5/6), 400-418. https://doi.org/10.1108/17410400510604557

Venkatraman, N., & Hederson, J. (1998). Real Strategies for Virtual Organizing. *Sloan Management Review, 40*(1), 33-48.

Voss, C., Tsikriktsis, N., & Fronhlich, M. (2002). Case research in operations management. *International Journal of Operations and Production Management, 22*(2), 195-219. https:// doi.org/10.1108/ 01443570210414329

Wettstein, T., & Kueng, P. (2002). A Maturity Model for Performance Measurement Systems. *Management Information Systems,* 113-122.

Yates, J., & Robert, B.I. (1991). *The pastandpresent as a windowonthe future.* Oxford University Press, New York.

Yin, R. (2003). *Case study research: design and methods* (3rd ed.). Sage Publications, London.