

Relationship between the maturity of supply chain process management and the organisational life cycle

Rodrigo Paiva Souza and Reinaldo Guerreiro

*Department of Controllershship and Accounting,
University of São Paulo, São Paulo, Brazil, and*

Marcos Paulo Valadares Oliveira
*Department of Business Administration,
Universidade Federal do Espírito Santo, Vitória, Brazil*

Abstract

Purpose – The purpose of this paper is to investigate the relationship between the maturity level of supply chain process management (SCPM) and the company's organisational life cycle (OLC).

Design/methodology/approach – Based on a theoretical review, a questionnaire was developed to measure the maturity level of SCPM and the OLC. Data from 228 companies operating in Brazil were collected to assess the association between variables by using correspondence analysis technique.

Findings – Among the key findings, evidences of a relationship between the maturity level of SCPM and the company's OLC could be highlighted. In addition, it was found that the maturity level of SCPM has no significant relationship with the age or size of a company but it is related to the capabilities inherent to the SCPM.

Research limitations/implications – Measurement of SCPM and the OLC was based on the managers' perceptions about the actual configuration of their firms. Accordingly, there is a certain level of subjectivity inherent to those models. The study is valid for companies operating in Brazil and might not be applicable for other countries.

Practical implications – This study increases awareness about the influence of organisational issues, such as the decision model, power hierarchy or governance structure, in the development of SCPM maturity. Such issues must be addressed to develop SCPM.

Social implications – Management and control of organisational issues might help to develop the maturity of SCPM, so the service level of companies, in order to deliver high quality services to society. Still, further research is required in the social area.

Originality/value – The paper tried to analyse the relationship of two well established models where this link was overlooked in the past. It was not found in literature similar investigation.

Keywords Maturity of supply chain process management, Organizational life cycle

Paper type Research paper

Introduction

Almost all human activities are impacted directly and indirectly by supply chain processes (Lambert and Stock, 1993). Supply chain process management (SCPM) refers to this integration of key business processes (Chen *et al.*, 2009).

The concept of SCPM sustains that supply chain processes have a life cycle and become mature as the cycle is explicitly defined, managed, measured and controlled (Lockamy and McCormack, 2004). As supply chain management improves in the ability to handle internal and external issues, the level of SCPM is advanced (McCormack *et al.*, 2009).



The development in maturity of SCPM might be linked to the implementation of a business process reengineering (BPM) and a continuous improvement programme, which is a long-term agenda (Al-Mashari *et al.*, 2001, p. 453). Likewise, organisational management must develop the capability to manage contingencies that arise. Miller and Friesen (1984) argue that certain transitions are expected to occur as young, small and simple organisations become old, large and more complex. These contingencies reach organisations differently and require shifts in priorities as well as changes in strategies, decision models, organisational structures and so on (Miller and Friesen, 1984; Lester *et al.*, 2003). The alignment of the business process and the business model is essential to connect the business strategy and its operations (Solaimani and Bounwman, 2012).

The priorities of a company and the ability to adapt to these contingencies determine its stage of the organisational life cycle (OLC). Thus, organisations have different characteristics depending on their current stage. However, assessing the stage of the OLC is also a challenge. Lester *et al.* (2003) explain that the stage of the life cycle is a collective interpretation of the organisational environment based on the perceptions of managers.

In this sense, theorists are working to develop models to measure the maturity level of SCPM and the stage of the OLC. While the former proposes to measure organisational competencies to coordinate processes in a supply chain, the latter aims to measure the features of a company and the development of organisational competencies to adapt to contingencies.

Accordingly, relevant work has been done to link organisational management features and skills to the stage of OLC (Downs, 1967; Adizes, 1979; Quinn and Cameron, 1983; Miller and Friesen, 1984; Moore and Yuen, 2001; Frezatti *et al.*, 2009). Likewise, much progress has been made to measure the maturity of SCPM (Stevens, 1989; PMG, 2007; Aryee *et al.*, 2008; Lockamy and McCormack, 2004; Sentanin *et al.*, 2008; Oliveira, 2009; Reyes and Giachetti, 2010; Oliveira *et al.*, 2011).

These mentioned studies mainly search for relationship between improvement in the overall performance and the development of maturity levels. Nevertheless, the present study aims to search for the relationship between both theoretical models and proposes to answer the following research question: What is the relationship between the development of the maturity level in SCPM and the stages of the OLC?

To measure the maturity level of SCPM, the model proposed by Oliveira *et al.* (2011) was used because it is the most updated model in this respect and also because the subject of the model is lower compared to previous models. Hence, the authors performed a confirmatory analysis to find the turning point that differentiates one maturity level from another. Previous models, such as those developed by Stevens (1989) and Lockamy and McCormack (2004), classify the maturity level based on subject assumptions (Oliveira, 2009).

To measure the stage of the OLC, the model proposed by Lester *et al.* (2003) was selected because it was not restricted to a specific industry (Lester *et al.*, 2003), and it is one of the most applied models to measure the OLC (Correia *et al.*, 2010).

The primary objective of this research was to empirically test the relationship between the maturity level of SCPM and the stages of the OLC. The characteristics of each relationship found between models were also discussed. The secondary aim was to design some descriptive statistics on SCPM maturity and OLC stages for the sample of Brazilian companies. Accordingly, it was proposed to assess whether the Brazilian companies are developed in terms of SCPM maturity and which competencies and deficiencies are higher.

The contribution of this study to the academic community relies on the validation of the relationship between two theoretical models, enhancing the understanding of the complexity behind the development of SCPM maturity. The present research may also be of interest to practitioners, as it emphasises the importance of alignments between the maturity of SCPM and the OLC. It must become clear that the development of competences in SCPM requires that some organisational issues are addressed, such as the decision model, power distribution and governance structure.

In the next two sections, the theoretical concepts and related models for measuring the maturity of SCPM and the OLC will be presented. Then, the development of the research hypotheses, followed by a description of the methodological process will be developed. The general results will then be presented, and, finally, conclusions and recommendations for future studies will be offered.

The SCPM maturity model – SCPM3

Aryee *et al.* (2008) state that SCPM is related to the level of integration in the supply chain, and according to the authors, it depends on eight factors: resource optimisation, process integration, strategy synchronisation, internal collaboration, external collaboration, continuous learning, technology and performance. Lockamy and McCormack (2004) developed an SCPM model that contains five stages. Accordingly, the model identifies the level of the maturity of SCPM as the processes are formalised, managed, measured and controlled (Lockamy and McCormack, 2004).

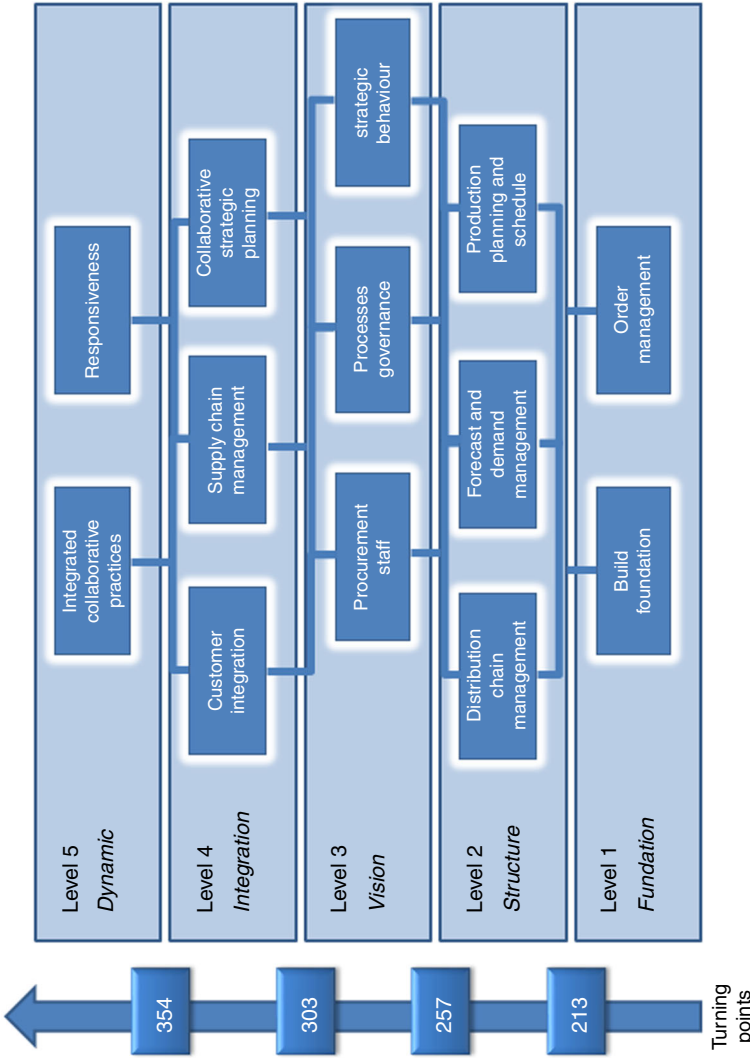
The Lockamy and McCormack (2004) model was developed to measure SCPM skills and was based on supply chain operation reference (SCOR) model. SCOR is a functional guide of best practices in supply chain management and was designed to help organisations become more effective in this field (Stewart, 1997). Netland and Alfnes (2011, p. 72) explain that maturity models are based in literature review and best practice framework.

Lockamy and McCormack (2004) explain that SCOR provides a framework for characterising supply chain management practices and processes that result in better performance. The guide is structured in five decision areas: planning, procurement, production, distribution and return.

Nevertheless, Oliveira *et al.* (2011) argue that although it is based on a well-accepted conceptual framework, the Lockamy and McCormack (2004) model relies primarily on subjective metrics to rank companies by their maturity levels. In an effort to reduce the level of subjectivity, Oliveira *et al.* (2011) developed a new model of SCPM called the SCPM Maturity Model 3 (SCPM3).

Among the primary advantages of SCPM3 is that it enables an understanding of the precedence of the dynamics of SCPM skills as well as an identification of the key turning points that distinguish the maturity levels (Oliveira *et al.*, 2011). The model measures SCPM skills using a questionnaire with 90 questions, which describes competencies that represent best practices according to the SCOR (Oliveira *et al.*, 2011). The set of competencies is actually the constructs of the model. The expected competencies of each maturity level of SCPM3 and corresponding turning points are presented in Figure 1.

The current research selected the SCPM3 to measure the developmental stage of SCPM in a sample of Brazilian companies because it is the most updated model for this purpose at the time of the research; likewise, by using statistical methods and confirmatory analysis, it reduced the level of subjectivity and increased the reliability of the model.



Source: Oliveira *et al.* (2011)

Figure 1. Supply chain process management maturity model 3 – SCPM3

However, since the maturity model is a latent variable, the SCPM3 has some limitations, as it retains a certain level of subjectivity as it is based on managers' perceptions. It should be recommended that researchers verify whether data collected correspond to companies' actual practices (McCormack *et al.*, 2009).

The most important features of the SCPM in each maturity level of the SCPM3 model according to Oliveira *et al.* (2011) is briefly presented below:

- *Foundation*: the primary objective of companies at this level is the documentation of the process flow as well as the identification of critical partners and the formalisation of contracts.
- *Structure*: firms at this level seek to optimise their use of resources through the integration of processes. Production planning and distribution management are implemented.
- *Vision*: at this stage, companies review their functional structure and logistics processes. Managers seek to align their choices with their organisational strategies.
- *Integration*: the objective of the companies at this level is to build a supply chain based on collaborative behaviour and logistical integration between partners.
- *Dynamics*: this stage is characterised by the systemic and strategic integration of the supply chain to allow for dynamic behaviour based on the continuous improvement of processes.

The investigation of Soderberg and Bengtsson (2010) Reyes and Giachetti (2010) provides some evidences of the benefits of maturity of SCPM on the operational and financial performance. In spite of that, Roglinger *et al.* (2012) criticise the use of maturity models arguing that it provides only limited guidance for identifying desirable maturity levels and for implementing improvement measures. Thus, it might be fruitful for companies, control whether the improvement in SCPM maturity improves the overall performance.

OLC model

The OLC of a company is characterised by a configuration of several attributes and the skill of its management board that allows the company to face internal and external contingencies that may arise as the company grows and develops (Miller and Friesen, 1984). It is expected that changes that occur in any organisational environment will follow a predictable pattern that determines the stage of the OLC (Quinn and Cameron, 1983).

Past organisational and management literature has offered several models that aim to detect the current stage of the OLC (Downs, 1967; Quinn and Cameron, 1972; Adizes, 1979; Miller and Friesen, 1984; Lester *et al.*, 2003). Although the taxonomy and number of stages of each model may vary, the theoretical essence remains the same (Lester *et al.*, 2003). The OLC is a latent variable; thus, the cycle is usually measured based on the perception of a company's managers about the characteristics of a company and the ability to manage several different issues.

The OLC model selected for this research was that of Lester *et al.* (2003). This model was chosen because it can be applied to any industry (Lester *et al.*, 2003) and is one of the most applied models to measure the OLC (Correia *et al.*, 2010). In addition, the instrument to collect data in this model involved a form with only 20 questions, which simplifies the empirical research process.

The model is based on five constructs: first, organisational environment, related to the organisation's size compared to competitors; second, the decision model, which is concerned with how decisions are made; third, organisational structure, related to the governance mechanisms; fourth, information processing, which is concerned with the complexity and usefulness of the information system; and fifth, power distribution, related to the hierarchy in the influence of groups related to the company. The configuration of these constructs defines the current OLC stage.

The model of Lester *et al.* (2003) also consists of five stages of the OLC, four of which are characterised by improvements in management: existence; survival; success; and renewal. The fifth stage is decline, which may lead to the failure of the company. A decline in the OLC may occur at any stage; there is no specific age or size at which the company enters the stage of decline (Miller and Friesen, 1984).

The significant features of each level of the OLC are briefly presented below:

- *Existence*: the primary objective of companies at this level is to gain enough customers to justify the companies' existence. Decision-making power is limited to the business owners.
- *Survival*: in this stage, the aim is to guarantee revenues and profits to ensure the survival and growth of the organisation. The external environment becomes more analysable.
- *Success*: the objective of companies that reach this level is to defend what has been achieved; therefore, the focus is on designing bureaucratic processes and organisational structures.
- *Renewal*: the focus of companies at this level returns to growth, which can be achieved through innovation and creativity. Matrix organisation and process management are common.
- *Decline*: this level can lead to the death of the company. Processes become inefficient, and there is an underutilisation of resources. Decision-making becomes centralised and slow.

Hypothesis formulation

After the presentation of the theoretical background and relevant concepts of both models, research hypotheses were formulated based on similarities found in the literature. The maturity of SCPM as well as the OLC requires the development of management skills to face an increase in complexity. Based on this assumption, the first hypothesis suggests the relationship between theoretical constructs:

H1. There is a non-random association between the levels of SCPM3 and the OLC.

Assuming that the first hypothesis will not be falsified, four related hypotheses regarding associations among the maturity levels of SCPM and the stages of the OLC were formulated based on the proximity of their literature descriptions.

Considering that in the early stages of both models, the company is expected to have low complexity even in the SCPM or in organisational management, a relationship between the first maturity level of SCPM and the first stage of the OLC was expected:

H1a. Firms classified as foundation in the SCPM3 model will be classified as Existence in the OLC model.

The second maturity level of SCPM3 is characterised by the effort of a company to optimise its resources and increase its integration. Accordingly, in the second stage of the OLC, companies are concerned with becoming profitable and controlling their external environments; thus, our second specific hypothesis was designed as:

H1b. Firms classified as structure in the SCPM3 model will be classified as survival in the OLC model.

Levels 3 and 4 of SCPM3 have as main characteristics the increase of internal organisation bureaucracy and the consolidation of partnerships in the supply chain. In the third stage of OLC, the characteristics are also bureaucracy and the consolidation of the progress that has been made up to this point; thus, the third specific hypothesis was raised:

H1c. Firms classified as vision and integration in the SCPM3 model will be classified as success in the OLC model.

Finally, the most developed maturity level of SCPM presumes the increase of integration of firms on a supply chain level and the enhancement of competitiveness. Meanwhile, the most advanced stage of the OLC presumes the existence of a matrix of organisation and process management; accordingly, the fourth specific hypothesis was defined as:

H1d. Firms classified as dynamic in the SCPM3 model will be classified as renewal in the OLC model.

No specific hypothesis was formulated to contemplate the stage of decline of the OLC due to the lack of literature to ground it. The next section explains the methodological procedures to construct a questionnaire and analyses the data collected.

Methodological procedures

Data required to measure corporations' attributes and classify them into one of the five levels of SCPM3 and the OLC were obtained by an electronic survey form. The population was composed of 1,349 supply chain managers and related fields, who performed MBA in logistics and/or supply chain processes management. The research instrument was designed to gather their perceptions on SCPM and the general organisational issues in their firms.

Lester *et al.* (2003) states that the OLC model is based on the managers' perception, as is the SCPM3 model (Oliveira *et al.*, 2011). The final sample contained 228 valid responses (16.90 per cent of return rate), and the data obtained in the research process was considered statistically valid for support hypothesis tests. The reliability of the form, based on Cronbach's α (0.938), showed that there was internal consistency in the scales. The main variables of this study were obtained from the models of Oliveira *et al.* (2011) and Lester *et al.* (2003) and are represented by the capabilities of SCPM and attributes of OLC.

Six questions on the identification of the participants and the companies' profiles were designed to check the size and age of the company as well as the position and main area of the respondents. Based on the year of foundation, the companies were classified into four age categories: less than ten years old, between ten and 20 years old, between 20 and 30 years old and more than 30 years old. The reason for this age criterion was based on Miller and Friesen's (1984) research on the OLC. Accordingly, these authors suggest that each organisation on average takes approximately ten years to reach a superior life cycle stage.

To assess the companies' size, respondents asked about the number of employees. According to the Brazilian Service to Support Micro and Small Enterprises (SEBRAE, 2011), a large company has more than 500 employees, a medium-sized company has between 100 and 500 employees, a small company has between 20 and 99 employees, and a micro-enterprise has fewer than 20 employees. These categories of a company's age and size were used to statistically test whether the levels of SCPM and the OLC are related to those characteristics of the companies.

The original questionnaire of the SCPM3 model contains 90 questions on SCPM3. Seeking parsimony during the data collection process and based on a literature review, we reduced the number of questions to 25. However, after collecting the data with the 25-question form, a group of participants was asked to respond to the original 90-question form. In all, 35 new answers were gathered, and the SCPM3 classifications of the companies were compared by both questionnaires using the Mann-Whitney test. It was not possible to find a significant difference between the results obtained from the original SCPM3 questionnaire and the 25-question one, therefore validating the proposed reduction.

Therefore, in each of the 25 questions, the respondents were asked to answer on a five-point Likert scale (1 corresponded to "completely disagree" and 5 to "completely agree"), according to their perceptions of their company's SCPM capabilities. Thus, the classifications of the companies into one of the levels of SCPM3 followed a turning-point pattern adapted from the Oliveira *et al.* (2011) based on proportional scores, as shown in Table I.

Accordingly, the minimum score of a company would be 25 (if the manager answered 1 for each of the 25 questions of the SCPM3 capabilities); consequently, the maximum score would be 125. As an illustration, if the final score of a company was 90, it would be classified in the fourth level of SCPM3 (integration), and so forth.

To classify the companies into one of the five stages of the OLC, the original form used by Lester *et al.* (2003) was applied. The questionnaire is composed of 20 questions about the five constructs of the model (organisational environment; decision model; organisational structure; information processing; and power distribution); each contains three to five questions. The questions were converted into statements, which, in turn, correspond to the characteristics of a specific stage of the OLC. Managers were asked to select the statement that best fit the actual conditions of their company. As an illustration, if the manager stated that the company's Information processing is very complex and structured to fill customer demands, then it would be an indication that company in stage 4 of the OLC (renewal).

However, it would be possible that managers provided answers that indicated different OLC stages according to the competence judged. For example, the company might have a developed information system, but the power distribution is still concentrated to the founder, which characterises companies in the early life cycle stages. In such a situation, it would be difficult to categorise the OLC stage.

Levels	Foundation		Structure		Turning points Vision		Integration		Dynamics	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
OLIVEIRA	90	203	204	257	258	303	304	354	355	450
Adapted	25	56	57	71	72	84	85	98	99	125

Table I.
Adapted turning
points to classify
SCPM3 levels

Then, information on the age and size of the firm was used to assist in making such classification. According to Lester *et al.* (2003), firms in the existence stage are under ten years of age. Miller and Friesen (1984) agree, and add that normally, the survival, success and renewal cycles tend to take approximately ten years each. Lester *et al.* (2003) also explain that firms in the existence stage are small, those in survival are middle-sized, those in success are large, and those in the renewal stage are very large.

To examine the relationship between SCPM3 and OLC levels/stages, a correspondence analysis was used. This technique was selected because, according to Hair *et al.* (2005), it is appropriate for non-metric variables and also because it demonstrates the proximity of each category of SCPM3 and the OLC in a graphical output, called a perceptual map, which visually illustrates the relationship of each stage of both models.

Presentation and discussion of results

First, the profiles of the companies and the respondents were analysed. It was found that most participants worked in large firms and in companies older than 30 years of age, as shown in Table II. According to this profile, it was expected that there would be a greater concentration of companies in the advanced levels of the OLC (Miller and Friesen, 1984; Lester *et al.*, 2003).

Regarding the respondents' profile, most of the respondents were managers or directors of their companies, and the majority worked in fields directly related to supply chain-related activities, as shown in Table III. This profile of respondents was found to be satisfactory because the SCPM3 requires some knowledge about the SCPM, while the OLC model requires some level of knowledge about organisational issues, of which the manager and directors are expected to be more conscious.

The distribution of top-marked competencies (C-*n*) in SCPM were then analysed in accordance with the SCPM3 model. It was found that the C-09 and C-11, which correspond to customer integration and collaborative strategic planning, were considered by managers to be the least developed competencies in SCPM. Customer integration, in turn, which received 57 per cent of the total maximum score,

Table II.
Company profiles

Category	Age		Size	
		%		%
More than 30 years old		66	Large	57
Between 20 and 30 years old		1	Middle	20
Between 10 and 20 years old		17	Small	13
Less than 10 years old		15	Micro-enterprise	10
n/i		1		

Table III.
Profile of
respondents

Position	Area		
	%	%	
Manager	44	Logistics management	35
Director	17	Production or distribution	21
CEO	2	Procurement	13
Other	37	Others	31

requires relationship grounded on trust and collaboration and the customer forecast being integrated to the company forecast. On the other hand, competencies such as order management (C-02) and the built foundation (C-01), which are the basic competencies, were considered to be the greatest strengths of SCPM, as shown in Table IV.

According to this pattern of responses, companies were classified into one of the five maturity levels of SCPM3. Of the 228 companies surveyed, 29 per cent were classified as dynamic (level 5), 26 per cent as integration (level 4), 20 per cent as vision (level 3), 15 per cent as structure (level 2), and 9 per cent as foundation (level 1).

Through a statistical analysis of each company's profile (age and size) and the maturity levels of SCPM3, it was found that there is no significant difference between a company's maturity level of SCPM3 and its age (χ^2 sig. 0.055) or size (χ^2 sig. 0.078). Accordingly, this study found that the maturity level of SCPM3 is not related to the companies' ages or sizes but strictly to their capabilities in SCPM. Consequently, one company might be small and young but still have a high maturity level of SCPM3, and the contrary is also true.

Then, the descriptive statistics for the OLC of companies were studied. Based on the pattern of responses in each of the five organisational issues of the model, the stage was assessed. It was found that organisational environment and decision models, with 46 and 41 per cent of the respondents, respectively, assigned a statement that corresponded to the renewal level (most advanced), which is logical due to the profile of the majority of companies (large size and older age). In contrast, it was also found that information processing is the most critical issue for the companies. Hence, 31 per cent of respondents assigned a statement that corresponds to the decline stage of the OLC, according to managers' perceptions. Table V shows the complete analysis.

Given the pattern of managers' responses with regard to the five organisational issues, firms were classified into the following OLC stages: 25 per cent of the companies were classified as existence, survival (17 per cent), success (11 per cent), renewal (35 per cent) and decline (13 per cent).

Contrary to what was found for SCPM3 maturity, the statistical analysis revealed that there was a significant association between the current stage of the companies'

Competence	Description	% of maximum score
C-01	Build foundation	76
C-02	Order management	80
C-03	Distribution chain management	69
C-04	Forecast and demand management	67
C-05	Production planning and schedule	73
C-06	Procurement staff	73
C-07	Process governance	71
C-08	Strategic behaviour	74
C-09	Customer integration	57
C-10	Supply chain management	64
C-11	Collaborative strategic planning	63
C-12	Integrated collaborative practices	68
C-13	Responsiveness	64

Table IV.
Profile of SCPM
competences

OLC and their age (χ^2 sig. 0,003) and size (χ^2 sig. 0,000). This finding corroborates Miller and Friesen's (1984) findings that there is a relationship between a company's profile and its stage of the OLC.

After the analysis and classification of SCPM3 maturity and the OLC, an investigation of the relationship between maturity levels of SCPM3 and OLC was conducted. For this purpose, a correspondence analysis technique was used. Hair *et al.* (2005) argue that correspondence analysis consists of two basic steps: first, the construction of the contingency table to access the χ^2 test and determine whether there was a non-random relationship between categorical variables, and second, the construction of the perceptual map to analyse the pattern of associations.

The χ^2 test (0.000) revealed that there is a conditional association between the level of maturity of SCPM and the OLC. Based on this finding, the first research hypothesis (the association between the maturity level of SCPM and the OLC) was not falsified, suggesting that there is a relationship between the development of SCPM3 levels and the stages of the OLC.

To determine the specific nature of this relationship, the second step of the correspondence analysis was conducted: the perceptual map. Hair *et al.* (2005) explain that the perceptual map is based on the amount of observations for each variable (mass) and the singular values and inertia extracted from each cell of the contingency table. It then represents the correlation between the scores in the row and the column. Following these procedures, and using the Statistics Package for Social Science (SPSS) software, the perceptual map was built, and it is shown in Figure 2. The red circles indicate the proximity between the maturity levels of SCPM3 and OLC. The numbers represent the associations that we will explore further.

Based on the perceptual map, we continue with the analysis of specific hypotheses. Accordingly, *H1a*, which calls for an association between foundation (SCPM3) and existence (OLC), was falsified. As can be observed in Figure 2, association 1, the foundation maturity level, is associated with the decline in the OLC.

Oliveira *et al.* (2011) explains that the foundation maturity level is characterised by the construction of a basic structure of SCPM3. Lester *et al.* (2003) comment that the decline stage of the OLC is characterised by an inability to meet external demands. This association is very important, as it suggests that companies must quickly develop skills in SCPM to overcome the foundation maturity level; otherwise, they risk entering the stage of decline of the OLC. Therefore, to overcome the foundation level, companies must quickly develop capabilities such as distribution management, forecast

Organisational issue	Question	Levels of OLC				
		Existence (%)	Survival (%)	Success (%)	Renewal (%)	Decline (%)
Organisational environment	Q-01	20	–	33	47	–
Decision model	Q-02	–	23	–	41	36
Organisational structure	Q-03	25	21	18	21	15
Information processing	Q-04	17	18	13	21	31
Power distribution	Q-05	39	36	25	–	–

Table V.
Distribution of OLC
answers

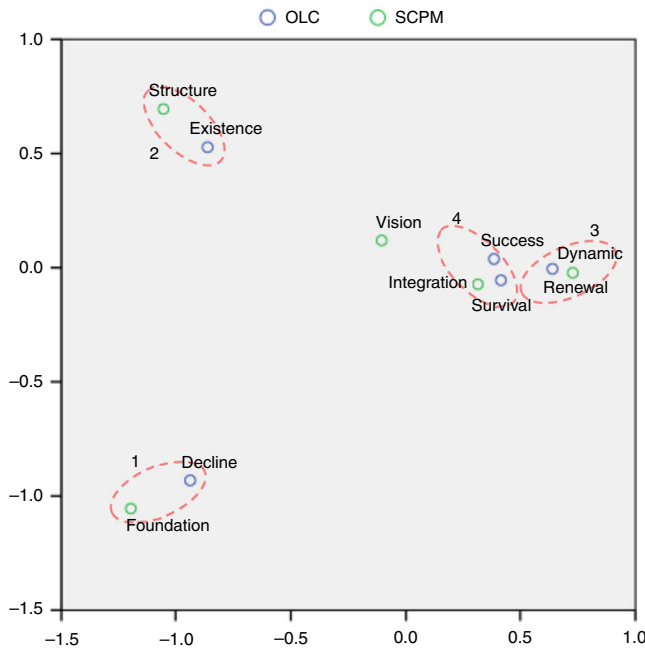


Figure 2.
Correspondence
analysis-perceptual
map

and demand management and production planning, as can be observed in the SCPM3 model in Figure 1 above.

Furthermore, *H1b*, which predicted an association between structure (SCPM3) and survival (OLC), was also falsified. As can be observed in Figure 2, association 2, the structure maturity level of SCPM3 is associated with the existence stage of the OLC.

According to Oliveira *et al.* (2011), on the structure maturity level, business processes are organised to be further internally integrated. Lester *et al.* (2003) explain that the existence stage of the OLC marks the beginning of the organisational development and viability of the company. This association suggests that in order for the company to remain in the first stage of the OLC, it must possess enough skills to be classified in the second level of SCPM3 maturity (structure).

Regarding *H1c*, which expected the association between vision and integration (SCPM3) and success (OLV), was only partially falsified. As can be observed in Figure 2, association 4, although the level vision is closest to success than any other stage, it seems to not have a clear association with any other stage. However, the maturity level integration is associated with the survival and success stages of OLC.

Oliveira *et al.* (2011) explain that companies that are at the integration maturity level are expected to forecast with greater accuracy, and the strategic planning team must evaluate the profitability of each customer and product. In turn, Lester *et al.* (2003) explain that in the success stage of OLC, firms are characterised by a more formal organisational structure and greater bureaucratic control, while in the survival stage, firms can analyse the external environment, but the primary goal at this stage is to generate sufficient revenues to continue operations

and financial growth. Consequently, the capabilities expected in the integration maturity level are crucial even for the objectives of the survival or success stages of the OLC. Therefore, there is support for theories to explain the association between the integration (SCPM3) and survival and success (OLC) stages. There is a strong emphasis on generating revenue and profits to ensure survival and increase controllability and competitiveness.

Finally, *H1d*, which predicted an association between dynamic (SCPM3) and renewal (OLC) stages, could not be scientifically falsified. As can be observed in Figure 2, association 3, the dynamic maturity level of SCPM3 is strongly associated with the renewal stage of the OLC.

According to Oliveira *et al.* (2011), companies that are at the dynamic maturity level of SCPM3 exhibit systemic integration and strategic supply chain behaviour. Similarly, Lester *et al.* (2003) explain that companies in the renewal stage of the OLC generally place customers' needs above the needs of the members of the organisation. This finding suggests that to adopt a customer-focused strategy, firms need to develop capabilities in SCPM that are compatible with the dynamic maturity level of study demonstrated that the maturity level of the SCPM of a company and the development of its OLC are closely associated. Accordingly, it is proposed that developments in the capabilities of the SCPM must address some organisational-level issues that extrapolate the area of SCPM, such as the definition of the decision model of a company or the level of the decentralisation of power. This proposition supports Sundberg's (2013) concerns about the necessity of the alignment of different departments of the business organisation and it is in line with the results of Robinson *et al.* (2006) which reveals that the maturity of supply chain activities must be linked to corporate sustainability and changes in strategic emphasis of a company.

Therefore, to develop its skills and competencies as stated in the SCPM3 model, the organisation must also control its organisational environment (competitors) and analyse and adjust its organisational structure (functional, divisional or matrix organisation), its decision-making model (concentrated/participative) and its distribution of power (centralised/decentralised) while continuing to develop systems for information processing.

Considering that managers often fail to realise that solutions to one problem can cause other immediate or future problems for the organisation (Greiner, 1972), the implementation of a project to increase the maturity level of SCPM should involve all areas of the company, especially the top management board, to ensure that all managers are involved and, more importantly, that the organisation is able to start a new phase of its OLC.

According to the findings, information processing in particular was found to be the critical organisational issue to be addressed. Lester *et al.* (2003) explain that information processing is a very important issue to be addressed for OLC advancement and might affect all organisational development.

With regard to capabilities in the SCPM as perceived by managers, the greatest deficiencies were found for customer integration and strategic behaviour. Oliveira *et al.* (2011) explain that customer integration is important for monitoring demand; consequently, customer integration contributes to strategic behaviour. Both capabilities should be supported by an effective information processing system, which is precisely the greatest issue, as indicated by managers surveyed. These results show the coherence of the findings.

The contribution of this study for supply chain management practitioners is the increase in awareness about some organisational issues that must be addressed to develop supply chain capabilities, particularly because it was found that the maturity of SCPM was not related to the size or age of a company but with its capabilities in managing the supply chain process. To academia, the present study contributes to enhancing the understanding of the relationship between two theoretical models.

The primary limitation of the research is that the classification of companies in both models is based on the perceptions of managers because the maturity of SCPM and OLC are latent variables. In addition, the results should be considered with caution, as the correspondence analysis is an exploratory statistical technique, and we cannot precisely determine the causality flow, that is, if the maturity of SCPM depends on the stage of the OLC, or vice versa. It should be also emphasised the research was performed with companies operating in Brazil. Finally, all kind of generalisations should be done with care.

For further research and to confirm the findings, we suggest the use of other collection techniques, such as a case study, in which the classification of a company in the stages of the SCPM3 and OLC models takes into account the perceptions of managers across different areas of the same firm. As for the treatment of the collected data, we suggest the use of confirmatory statistical techniques, such as structural equation modelling.

References

- Adizes, L. (1979), "Organizational passages: diagnosing and treating life cycle problems in organizations", *Organizational Dynamics*, Vol. 8 No. 1, pp. 3-25.
- Al-Mashari, M., Irani, Z. and Zairi, M. (2001), "Business process reengineering: a survey of international experience", *Business Process Management Journal*, Vol. 7 No. 5, pp. 437-455.
- Aryee, G., Naim, M.M. and Lalwani, C. (2008), "Supply chain integration using a maturity scale", *Journal of Manufacturing Technology Management, Birmingham*, Vol. 19 No. 5, pp. 559-575.
- Chen, H., Daugherty, P.J. and Landry, T.D. (2009), "Supply chain process integration: a theoretical framework", *Journal of Business Logistics*, Vol. 30 No. 2, pp. 27-46.
- Correia, R.B., da Silva Gomes, S.M., Cordeiro Filho, J.B. and de Sozua Albuquerque, K.S.L. (2010), "Análise dos modelos de ciclo de vida organizacional aplicados em pesquisas empíricas", In XVII Congresso Brasileiro de Custos, Belo Horizonte.
- Downs, A. (1967), "The life cycle of bureaus", in Downs, A. (Ed.), *Inside Bureaucracy*, Little, Brown, & Co. and Rand Corporation, San Francisco, CA, pp. 296-309.
- Frezatti, F., Relvas, T.R.S., Junqueira, E.R. and do Nascimento, A.R. (2009), "Análise do perfil de planejamento associado ao ciclo de vida organizacional nas empresas brasileiras", Congresso USP de Controladoria e Contabilidade, São Paulo.
- Greiner, L.E. (1972), "Evolution and revolution as organization grow: a company's past has clue for management that are critical to future success", *Family Business Review*, Vol. 10 No. 4, pp. 397-409.
- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (2005), *Análise Multivariada de Dados*, Artmed, Porto Alegre.

- Lambert, D.M. and Stock, J.R. (1993), *Strategic Logistic Management*, 3rd ed., McGraw-Hill, New York, NY.
- Lester, D.L., Parnell, J.A. and Carraer, S. (2003), "Organizational life cycle: a five stage empirical scale", *The International Journal of Organizational Analysis*, Vol. 11 No. 4, pp. 339-354.
- Lockamy, A. and 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*, Vol. 9 No. 4, pp. 272-278.
- McCormack, K., Willems, J., Van den Bergh, J., Deschoolmeester, D., Willaert, P., Indihar Štemberger, M. and Vlahovic, N. (2009), "A global investigation of key turning points in business process maturity", *Business Process Management Journal*, Vol. 15 No. 5, pp. 792-815.
- Miller, D. and Friesen, P.H. (1984), "A longitudinal study of the corporate life cycle", *Management Science*, Vol. 30 No. 10, pp. 1161-1183.
- Netland, T.H. and Alfnes, E. (2011), "Proposing a quick best practice maturity test for supply chain operations", *Measuring Business Excellence*, Vol. 15 No. 1, pp. 66-76.
- Oliveira, M.P.V., Ladeira, M.B. and McCormack, K. (2011), "The supply chain process management maturity model-SCPM3", *Supply Chain Management-Pathways for Research and Practice*, InTech, Rijeka, pp. 201-218.
- PMG – Performance Measurement Group (2007), "Supply chain performance: competitive advantages of best-in-class supply chains", *Presented at Supply Chain World, North American Conference, Philadelphia, PA, 20 July*, available at: www.pmgbenchmarking.com (accessed 20 July 2013).
- Quinn, R.E. and Cameron, K. (1983), "Organizational life cycle and shifting criteria of effectiveness: some preliminary evidence", *Management Science*, Vol. 29 No. 1, pp. 33-51.
- Robinson, H.S., Anumba, C.J., Carrillo, P.M. and Al-Ghassani, A.M. (2006), "STEPS: a knowledge management maturity roadmap for corporate sustainability", *Business Process Management Journal*, Vol. 12 No. 6, pp. 793-808.
- Röglinger, M., Pöppelbuß, J. and Becker, J. (2012), "Maturity models in business process management", *Business Process Management Journal*, Vol. 18 No. 2, pp. 328-346.
- SEBRAE – Serviço de Apoio às Micro e Pequenas Empresas (2011), "Critérios de classificação de empresas: EI - ME – EPP", available at: www-sebrae-sc.com.br/leis/default.asp?vcdtexto=4154 (accessed 6 July 2013).
- Sentanin, O.F., Santos, F.C.A. and Jabbour, C.J.C. (2008), "Business process management in a Brazilian public research centre", *Business Process Management Journal*, Vol. 14 No. 4, pp. 483-496.
- Stewart, G. (1997), "Supply chain operation reference model (SCOR): the first cross-industry framework for integrated supply chain management", *Logistics Information Management*, Vol. 10 No. 2, pp. 62-67.
- Söderberg, L. and Bengtsson, L. (2010), "Supply chain management maturity and performance in SMEs", *Operations Management Research*, Vol. 3, Nos 1/2, pp. 90-97.
- Solaimani, S. and Bounwman, H. (2012), "A framework for the alignment of business model and business processes: a generic model for trans-sector innovation", *Business Process Management Journal*, Vol. 18 No. 4, pp. 655-679.
- Sundberg, H.P. (2013), "Process based archival descriptions – organizational and processes challenges", *Business Process Management Journal*, Vol. 19 No. 5, pp. 783-798.

Further reading

- Ballou, R.H. (2006), "The evolution and future of logistics and supply chain management", *European Business Review*, Vol. 19 No. 4, pp. 332-348.
- Bowersox, D.J., Closs, D.J. and Cooper, M.B. (2010), *Supply Chain Logistics Management*, 3rd ed., McGraw-Hill, New York, NY.
- McComarck, K., Ladeira, M.B. and De Oliveira, M. (2008), "Supply chain maturity and performance in Brazil", *Supply Chain Management*, Vol. 13 No. 4, pp. 272-282.

Corresponding author

Rodrigo Paiva Souza can be contacted at: rpaivasouza@yahoo.com.br

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgrouppublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.