

ICEIS 2017

Proceedings of the
19th International Conference on
Enterprise Information Systems

Volume 3

Porto - Portugal

April 26 - 29, 2017

Sponsored by

INSTICC - Institute for Systems and Technologies of Information, Control and Communication

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Edited by Slimane Hammoudi, Michal Smialek, Olivier Camp and Joaquim Filipe

Printed in Portugal

ISBN: 978-989-758-249-3

Depósito Legal: 423915/17

<http://www.iceis.org>

iceis.secretariat@insticc.org

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SELECTED PAPERS BOOK

A number of selected papers presented at ICEIS 2017 will be published by Springer in a LNBIP Series book. This selection will be done by the Conference Co-chairs and Program Co-chairs, among the papers actually presented at the conference, based on a rigorous review by the ICEIS 2017 Program Committee members.

FOREWORD

This book contains the proceedings of the 19th International Conference on Enterprise Information Systems (ICEIS 2017), which was sponsored by the Institute for Systems and Technologies of Information, Control and Communication (INSTICC), held in cooperation with the Association for the Advancement of Artificial Intelligence (AAAI), IEICE Special Interest Group on Software Enterprise Modelling (SWIM), ACM SIGMIS - ACM Special Interest Group on Management Information Systems, ACM SIGAI - ACM Special Interest Group on Artificial Intelligence, ACM SIGCHI - ACM Special Interest Group on Computer Human Interaction, the Spanish Association for Artificial Intelligence (AEPIA) and the Informatics Research Center (IRC). This year ICEIS was held in Porto, Portugal from 26 - 29 April.

The purpose of the 19th International Conference on Enterprise Information Systems is to bring together researchers, engineers and practitioners from the areas of “Databases and Information Systems Integration”, “Artificial Intelligence and Decision Support Systems”, “Information Systems Analysis and Specification”, “Software Agents and Internet Computing”, “Human-Computer Interaction” and “Enterprise Architecture”, interested in the advances and business applications of information systems.

ICEIS 2017 received 316 paper submissions from 42 countries in all continents, which makes it one of the largest conferences in the World in the area of Information Systems, thus demonstrating the success and global dimension of this conference. From these, 71 papers were selected for publication and presentation at the Conference as full papers. These numbers, leading to a full-paper acceptance ratio of 22%, show the intention of preserving a high-quality forum for this conference, a quality that we intend to maintain in the future, for the next editions of this conference.

The high number and high quality of the received papers imposed difficult choices in the selection process. To evaluate each submission, a double-blind paper review was performed by the Program Committee, whose members are highly qualified researchers in ICEIS topic areas.

All presented papers will be available at the SCITEPRESS Digital Library and will be submitted for indexation by Thomson Reuters Conference Proceedings Citation Index (ISI), INSPEC, DBLP, EI (Elsevier Index) and Scopus.

Additionally, a short list of presented papers will be selected to be expanded into a forthcoming book of ICEIS 2017 Selected Papers to be published by Springer in the LNBIP Series.

The technical program of the conference included a panel and 4 invited talks delivered by internationally distinguished speakers, namely: Victor Chang (IBSS, Xi'an Jiaotong Liverpool University, China), Hermann Kaindl (TU Wien, Austria), Marco Brambilla (Politecnico Di Milano, Italy) and Christoph Rosenkranz (University of Cologne, Germany). Their participation positively contributes to reinforce the overall quality of the Conference and to provide a deeper understanding of the fields addressed by the conference.

Moreover, ICEIS 2017 had a workshop entitled Advanced Enterprise Modelling (AEM).

We sincerely thank all the authors for their submissions and participation in ICEIS 2017. Furthermore, we are thankful to all the members of the program committee and reviewers, who helped us with their expertise, dedication and time. We would also like to thank the invited speakers for their excellent contribution in sharing their knowledge and vision and the workshop chairs whose collaboration with ICEIS 2017 was much appreciated. Finally, we gratefully acknowledge the professional support of the ICEIS 2017 team for all organizational processes.

We hope that all colleagues find this a fruitful and inspiring conference. We hope to contribute to the development of the Enterprise Information Systems community and look forward to having additional research results presented at the next edition of ICEIS, details of which are available at <http://www.iceis.org>.

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A Growth State Transition Model as Driver for Business Process Management in Small Medium Enterprises

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Keywords: Growth Stage Models, Growth State Transition Models, Small and Medium Enterprises, Business Process Management.

Abstract: A key constraint for growing small and medium enterprises (SMEs) in South Africa is the business skills required to grow the enterprises through the stages of transformation. Business process management (BPM) is one of the skills that could add value during transformation. Understanding the stages of transformation during SME growth would assist to position BPM as an instrument of value for SMEs. These stages of SME growth are typically defined as part of the SME growth stage models. However, criticism against SME growth stage models is of concern. In this article, we propose the *5S SME Growth State Transition Model* in order to counteract some of the criticisms. The value contribution of the Model lies in defining typical states associated with SME growth that can be used as input in research to position BPM as management approach during SME growth.

1 INTRODUCTION

Growing small enterprises to become medium enterprises, with the objective of job creation, is a top priority in South Africa (DTI, 1995). However, over and above resource poverty, a key constraint is the business skills required to grow the small enterprises through the various stages of transformation. This lack of business skills as a constraint, is confirmed from a global perspective by Jones (2009) in his recommendation for training for all small and medium enterprise (SME) entrepreneurs to prepare them for their journey and the challenges and crises that they will encounter along the way. Hanks et al. (1993) also refer to the lack of business skills and the formidable challenge of guiding an organisation through the growth process. In our wider research, on the possible use of business process management (BPM) as a management approach to assist SME managers, who operate under the constraint of resources poverty, through the transitions of growth, we again realised the need to address the stage-state issue in SME growth. Our view of BPM is guided by the Forrester Research definition of BPM (Miers, 2011), which positions BPM as a management approach,

including support of organisational change, value optimisation and ongoing performance improvement. We argue that the understanding of the typical stages of transformation during SME growth would assist to position BPM as suitable management approach during SME growth. The initial argument may be that there are consolidated growth stage models available for SMEs to define the typical stages of transformation. However, in a review of relevant material on growth stage models (Davidsson et al., 2005, Hanks et al., 1993, Jones, 2009, McMahon, 1998, Miller, 1987, Perenyi et al., 2008, Jacobs et al., 2011), evidence was found that this argument might be questionable, specifically due to the status of such growth stage models for SME's. A review of the work done by , Davidsson et al. (2005), McMahon (1998) and Hanks et al. (1993), for example, revealed criticisms regarding over-determinism and questionable empirical support. Another of the critiques revealed, which is addressed in this paper, is that the growth stage models tend to assume that all SMEs pass inexorably through each stage of the model.

In our earlier work, we investigated the enhancement of growth stage models with enterprise architecture principles, with the objective of

providing guidance to SME managers during the transformation process from being a small enterprise to becoming a big enterprise (Jacobs et al., 2011). One of the suggestions from this work was to consider replacing the stage concept with a 'current to future state transition' approach.

Following up on this suggestion, the focus of this paper is the development of an SME growth state transition model, called the *5S SME Growth State Transition Model*, aimed also at counteracting the identified critique against growth stage models. The intention is, as part of our wider research to position BPM as management approach for SME growth, to use this Model to enrich/adapt BPM approaches to assist SME managers through transitions of growth. The Model is not a proposed alternative for SME growth stage models as such; its aim is specific to identifying transitions as input towards our mentioned research.

Section 2 describes the background to this paper with reference to SME growth and SME growth stage models. The research method is described in section 3. Section 4 elaborates on the problems identified with growth stage models for SMEs. The proposed *5S SME Growth State Transition Model* is presented in section 5, with an overview of a demonstration of the applicability of the *5S SME Growth State Transition Model* discussed in section 6. Section 7 concludes with a discussion of the value of the *5S SME Growth State Transition Model* and a reference to future research.

2 BACKGROUND

2.1 SME Growth

The definition of SMEs in South African legislation makes provision for SME growth with reference to micro, very small, small and medium enterprises. In South Africa a small business is defined, per sector, by the number of employees and/or turnover and/or assets as defined in the National Small Business Act of 1996 (DTI, 2008). As an example, the criteria for a medium enterprise vary per sector from 100 to 200 employees, with a turnover of between R5 million and R64 million, and assets with a value of between R3 million and R23 million.

SME growth is associated with a change in status of the SME through various transitions. The South African Department of Trade and Industry (DTI) defines the transition cycle associated with SME growth from an informal to a formal business as: (1) seed stage, (2) operational, (3) registration for VAT

(value added tax), (4) permanent employment, and (5) registration as a legal entity (DTI, 2008).

2.2 SME Growth Stage Models

Davidsson et al. (2005) and McMahon (1998) refer to the seminal book by Penrose (1959) explaining the two different connotations of growth, namely the amount of growth versus the process of growth. SME growth stage models are related to the process of growth. SME growth is viewed as a series of phases or stages of development through which the business may pass during an enterprise life cycle. In their review of research on small firm growth, Davidsson et al. (2005) define growth stage models as a description of the distinct stages of SME growth, as well as the set of typical problems and organisational responses associated with each stage. A large number of SME growth stage models exist.

The SME growth stage models that focus on generic problems that organisations may encounter during growth are valuable from various perspectives:

- From a management perspective, for the definition of SME operating models and helping SME managers to make important decisions (Jones, 2009).
- From the prediction perspective, one of the objectives of the model by Greiner (1972) is to create awareness among entrepreneurs of possible crises and solutions as part of the transformation through the different stages.
- From the understanding perspective, Massey et al. (2006) confirm that the life-cycle phenomenon has been found meaningful by SME managers.

Concerning growth itself, SME growth stage models can provide value:

- To identify critical organisational transitions, as well as pitfalls the organisation should seek to avoid as it grows in size and complexity (Hanks et al., 1993).
- To provide a better understanding of the growth process of small firm development as input for research and policy-making (McMahon, 1998).
- To assist with managerial growth problems and internal processes, such as growth state transitions, managerial consequences and solutions (Davidsson et al., 2005).
- To assist with the management of key transition points (Phelps et al., 2007).
- To assist in periods of change after operating for some period of time in a definable state that then

changes, sometimes incrementally and other times dramatically (Levie and Lichtenstein, 2010).

Although a wide variety of SME growth stage models were published over the years, these SME growth stage models, as indicated in the introduction, did not escape criticism. It is important to address such concerns, as SME growth stage models are important for SME managers in order to understand, manage and predict problems that are likely to arise during SME growth.

This paper addresses one of these criticisms by proposing an alternative solution to understand typical transitions associated with SME growth.

3 RESEARCH METHOD

As part of our wider research project to position BPM as management approach for SME growth, design science research, following the process suggested by Vaishnavi and Kuechler (2013), was used to guide our research process. For the part of the wider research presented in this paper, a literature review of growth stage models was conducted as first step. Based on the literature review and the analysis of SME growth stages, it became clear that a number of challenges exist with SME growth stage models. One of the problems, namely that stage models and life-cycle theories do not accurately represent the growth of SMEs, was identified as the focus of the problem to be addressed in this paper. In addition, an analysis of the corporate records of an actual SME was used to confirm the criticisms of SME growth stage models associated with the stages specifically. As outcome of the two studies, a suggestion was made to investigate whether a *state transition model* approach could be an alternative to address this problem. The development of the proposed model involved an analysis of a representative set of growth stage models, to identify state transitions, and to define an SME growth state transition classification framework. Mapping the state transitions to the classification framework resulted in the *5S SME Growth State Transition Model*. To demonstrate whether the SME Growth State Transition Model addressed the concern that SME growth stage models did not accurately represent the growth of SMEs, the use of the model was demonstrated by again applying it to the actual SME. Further evaluation was done as part of the wider research to position BPM as management approach for SME growth.

4 ELABORATION OF THE IDENTIFIED PROBLEM

4.1 Criticism of SME Growth Stage Models

In the introduction, we mentioned the criticisms of over-determinism, questionable empirical support for growth stage models, and the fact that the stage models tend to assume that all SMEs pass inexorably through each phase of a growth stage model. In addition, the following is a summary of the criticisms identified based on the content of reviews of SME growth stage models by Hanks et al. (1993), McMahon (1998), Davidsson et al. (2005), Massey et al. (2006), Phelps et al. (2007) and Levie and Lichtenstein (2010):

- SME growth stage models are conceptually rather than empirically based: There is a lack of empirical validation of the proposed SME growth stage models and even if empirical studies were carried out, the outcome did not favour the SME growth stage model theory (Levie and Lichtenstein, 2010, Churchill and Lewis, 1983).
- The definition of a stage is vague and too general and the terminology is not explicitly defined: Not only does the vague definition of a stage make it difficult for the SME manager to apply the model, but it also results in disparities between models.
- The number of stages varies from between two and eleven and the transition through the stages result in variations: There is no consensus on how many stages there are in SME growth stage models, and whether organisations evolve through the same series of stages.
- Descriptive model versus explanatory or predictive model: The models serve well for descriptive purposes, but have limited explanatory or predictive power.
- Stage models and life-cycle theories do not accurately represent the growth of SMEs: Whether a specific SME growth stage model originated from evolution or revolution as its foundation (Greiner, 1972), stages of corporate development (Scott and Bruce, 1987), morphogenesis (Kazanjan, 1988) or an organisational life cycle (Lippitt and Schmidt, 1967), the SME growth stage models are all based on the underpinning assumptions of an organismic metaphor regarding growth. Such assumptions typically include the assumptions

that growth is linear, sequential, deterministic and invariant. Levie and Lichtenstein (2010) reviewed more than 100 SME growth stage models published over a period of more than 40 years and concluded that stage models and life-cycle theories do not accurately represent the growth of SMEs.

Although all these criticisms are important, this paper specifically addresses the last one related to the stages of growth stage models.

4.2 Analysis of an Actual SME

An analysis of the corporate records of an actual SME, company SME X, growing from a small enterprise into a medium enterprise was used to confirm the criticisms of SME growth stage models associated with the stages specifically. The nature of the underlying business of the small enterprise was that of a consulting practice with a narrowly defined service range. During the 2011/2012 financial year, the number of full time employees was around 35 and the number of subcontractors varied between 10 and 20. The SME's management wanted to understand the areas of concern and wished to identify the initiatives to be included in the business plan to deliberately manage the growth from a small to a medium enterprise.

During 2010, SME X developed an operating model with one of the objectives being the growth of the enterprise from a small into a medium enterprise. The growth model for 2011/2012 financial year was based on the replication of new pipelines. The replication model (Ross et al., 2006) was therefore a good fit to describe the growth model.

The Model for Small Business Growth (Scott and Bruce, 1987) was used in the analysis of company SME X. The Model consists of five stages as illustrated in Table 1. The principles of the Evolution of Five Phases of Growth (Greiner, 1972) were the foundation of the Model for Small Business Growth (Scott and Bruce, 1987). The Evolution of Five Phases of Growth highlighted typical crises and solutions as part of the transformation through the different stages of SME growth. In the Model for Small Business Growth, the different criteria, such as the stage of the industry and key issues, were presented in relation to each stage, from the Inception stage (Stage 1) through to the Maturity stage (Stage 5). For example, in Stage 1, *Inception*, the key issues were those of obtaining customers and economic production, which changed in Stage 5, *Maturity*, to those of expense control, productivity, and niche marketing if the industry was declining.

Using the 2010 operating model of company SME X, the current and future states of the SME were mapped according to the Model for Small Business Growth (Scott and Bruce, 1987). The outcome of this mapping of SME X is illustrated in Figure 1. Based on the SME growth stage model principles, the expectation was that there would be a single value for all areas of concern, e.g. for all areas of concern the stage would be Stage 3, an indication that the company was in that specific stage of growth. A second expectation was that for all areas of concern the future state would be the next stage, for example Stage 4, indicating that the company was moving to the expansion stage.

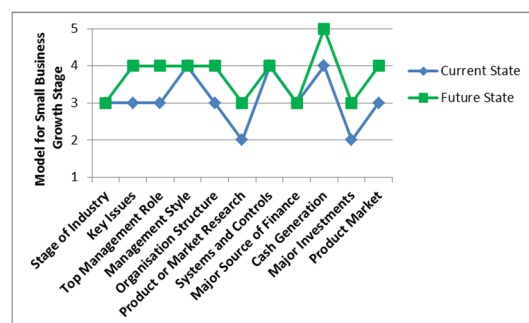


Figure 1: Current and Future States of Company SME X based on 2010 information.

This mapping of the current and future states of the company illustrated the challenges faced by the company in determining its current and future stage according to the guidelines of growth stage models. For the product and market research as well as major investments, the current state of company SME X was still Stage 2, but for management style, systems and controls and cash generation, the current states were associated with Stage 4. For the other six areas of concern, the current state of company SME X was indicated as Stage 3. Regarding moving to the future state the intent, for the majority of the areas of concern, was to move to the next stage. However, for three of the areas of concern, namely management style, systems and controls as well as major source of finance, there was no business value in moving to the next stage.

Whether the observation, that an enterprise is not necessarily in the same stage for all areas of concern, was contributing towards, or was a result of, the criticism of SME growth stage models, was not clear.

Table 1: Model for Small Business Growth (Scott and Bruce, 1987).

	Stage 1 Inception	Stage 2 Survival	Stage 3 Growth	Stage 4 Expansion	Stage 5 Maturity
Stage of Industry	Emerging, fragmented	Emerging, fragmented	Growth, some larger competitors, new entries	Growth, shakeout	Growth/ shakeout or mature/ declining
Key Issues	Obtaining customers, economic production	Revenues and expenses	Managed growth, ensuring resources	Financial growth, maintaining control	Expense control, productivity, niche marketing if industry declining
Top Management Role	Direct supervision	Supervised supervision	Delegation, coordination	Decentralisation	Decentralisation
Management Style	Entrepreneurial, individualistic	Entrepreneurial, administrative	Entrepreneurial, coordinated	Professional, administrative	Watchdog
Organisation Structure	Unstructured	Simple	Functional, centralised	Functional, decentralised	Decentralised functional/product
Product and Market Research	None	Little	Some new product development	New product, innovation, market research	Production innovation
Systems and Controls	Simple bookkeeping, eyeball control	Simple bookkeeping, personal control	Accounting systems, simple control reports	Budgeting systems, monthly sales and production reports, delegated control	Formal control, systems management by objectives
Major Source of Finance	Owners, friends and relatives, suppliers leasing	Owners, suppliers, banks	Banks, new partners, retained earnings	Retained earnings, new partners, secured long-term debt	Retained earnings, long-term debt
Cash Generation	Negative	Negative / breakeven	Positive but reinvested	Positive with small dividend	Cash generator, higher dividend
Major Investments	Plant and equipment	Working capital	Working capital, extended plant	New operating units	Maintenance of plant and market position
Product and Market	Single line and limited channels and market	Single line and market but increasing scale and channels	Broadened but limited line, single market, multiple channels	Extended range, increased markets and channels	Contained lines. Multiple markets and channels

What was, however, confirmed with this analysis of company SME X, is that the typical SME growth stage model may be value adding to create awareness of concepts related to growth. It also, however, revealed that a new approach is required in order to understand typical transitions during SME growth, which can affect how to position BPM as management approach for SMEs.

5 PROPOSED 5S SME GROWTH STATE TRANSITION MODEL

The development of the proposed *5S SME Growth State Transition Model* involved five steps, starting with the identification of a list of SME growth stage models to consider, followed by the selection of a list of ten representative SME growth stage models to analyse in order to derive possible SME growth state transitions. The terminology used in the ten SME growth stage models was used to define an SME growth state transition classification framework. The detailed SME growth state

transitions were mapped against the SME growth state transition classification framework, resulting in the consolidated *5S SME Growth State Transition Model*.

The identification of an inventory of existing SME growth stage models is discussed in section 5.1. The selection of a representative set of SME growth stage models is described in section 5.2. The set of SME growth state transitions derived from these selected SME growth stage models is described in section 5.3. In order to consolidate the derived SME growth state transitions in section 5.5, a classification framework is defined in section 5.4.

5.1 Identification of SME Growth Stage Models

The literature review of SME growth stage models by Levie and Lichtenstein (2010) included references to 104 distinct articles referencing SME growth stage models published during the period 1962 to 2006. Ten SME growth stage models, representing the majority of concepts found in the 104 growth stage models, were identified for

inclusion in the detailed state transition analysis. An in-depth analysis of all 104 models is identified as further research.

The identification of articles describing SME growth stage models, as candidates for selection of one of the ten representative models, focused on two periods, namely articles published in the period 1962 to 2006 and articles published during the period after 2006. For the period 1962 to 2006, candidates were identified by cross-mapping the references of the following literature reviews:

- Hanks et al. (1993) include references to eleven articles describing SME growth stage models.
- McMahon (1998) refers to 31 articles describing SME growth stage models.
- Davidsson et al. (2005) refer to nine articles describing SME growth stage models.
- Phelps et al. (2007) include 33 different references in their SME life cycle literature review.
- Levie and Lichtenstein (2010) cite 104 articles describing SME growth stage models. For the purpose of the identification of ten acknowledged references to SME growth stage models, only references also listed by one of the other literature reviews or references that were cited four or more times were considered, resulting in 28 of the 104 articles being included in the candidate list of SME growth stage model references.

For the period after 2006, a review of literature resulted in the identification of an additional seven references to SME growth stage models.

5.2 Selection of Representative SME Growth Stage Models

The selection of the ten representative SME growth stage models from the identified publications of SME growth stage models was done by applying the following criteria:

- A reference to an SME growth stage model was included if the reference was referenced by at least four of the five literature reviews.
- As an additional test it was checked that the references most cited, according to Levie and Lichtenstein (2010), were all included for consideration as a representative SME growth stage model.
- The SME growth stage models were further examined to determine if the description of an SME growth stage model in literature was sufficient to derive SME growth state transitions.

The seven references published after 2006 were also considered as candidate sources. Only three of these seven references included enough detail to derive transitions. The SME growth stage models described by Phelps et al. (2007), Lester and Parnell (2008) and Levie and Lichtenstein (2010) were consequently included in the final list of references of SME growth stage models.

The final selection of ten representative references used as sources to derive SME growth state transitions from SME growth stage models is listed in Table 2. The name used to identify a specific SME growth stage model was derived from the content of the published article.

Table 2: Representative References to SME growth stage models.

Representative List of References to SME Growth Stage Models	Name of the SME Growth Stage Model
Greiner (1972)	Evolution in Five Phases of Growth Model
Adizes (1979)	Organisational Passages Model
Churchill and Lewis (1983)	Stages of Small Business Growth Model
Quinn and Cameron (1983)	Integrated Life Cycle Model
Miller and Friesen (1984)	Corporate Life Cycle Model
Scott and Bruce (1987)	Model for Small Business Growth
Hanks et al. (1993)	Structural Variable Model
Phelps et al. (2007)	Tipping Point Framework
Lester and Parnell (2008)	Organisational Life Cycle Scale
Levie and Lichtenstein (2010)	Stage Categories Model

5.3 Deriving SME Growth State Transitions

Each of the SME growth stage models, listed in Table 2, was analysed and the SME growth state transitions were derived for use in the development of the *5S SME Growth State Transition Model*. The focus of this activity was to determine whether it was possible to derive the states as the result of a transition from the SME growth stage models.

As example, the result of deriving the growth state transitions from the study by Hanks et al. (1993) is included in this paper. In the Structural Variable Model (Hanks et al., 1993), it is proposed that each life cycle stage of an enterprise consists of an unique configuration of variables related to the organisation context and structure. Two sets of variables are used to measure the context and the

structure of the enterprise. The contextual variables include measures such as age, size and rate of growth, and were not used to derive states related to SME growth. The structural variables, which were used to derive states related to SME growth, include measures of vertical differentiation, structural form, formalisation, decision-making, specialisation and centralisation. The states derived from the Structural Variable Model are listed in Table 3.

A similar process was followed to identify growth state transitions from the other nine representative SME growth stage models.

5.4 Proposed 5S Classification Framework for SME Growth State Transitions

The first step towards the definition of the *5S Classification Framework* was the consolidation of all the states from the analysis of the ten selected SME growth stage models.

The ten selected SME growth stage models did not use the same classification scheme to group the different states. A prerequisite for the consolidation of the states was therefore the development of a classification framework to group the different states, resulting in the *5S SME Growth State Classification Framework*. Based on the principle that seven plus/minus two elements are easier to process and to remember, the objective was to group the identified states into a framework with a maximum of nine elements.

The resulting *5S SME Growth State Classification Framework*, as presented in Table 4, includes five classes as well as sub-classes. The names of derived classes each starts with the letter *S*, namely *Strategy, Structure, Systems, Style of Management* and *Staff*. As a way of verifying the classification, it was compared with other SME growth stage models. The classes of the *5S SME Growth State Classification Framework* was similar to the categories of attributes as described by Levie and Lichtenstein (2010).

5.5 Consolidation into 5S SME Growth State Transition Model

The consolidated list of states derived from the representative set of growth stage models was thereafter mapped to the *5S SME Growth State Classification Framework*, as presented in Table 5 to Table 12 (see Appendix). The content of these tables was determined through synthesis.

Table 3: States derived from Structural Variable Model (Hanks et al., 1993).

Context	State Description
Formalisation	Formal policies and procedures guide most decisions. Important communication between departments is documented by memo. Formal job descriptions are maintained for each position. The top management team is comprised of specialists from each functional area. Reporting relationships are formally defined. Lines of authority are specified in a formal organisation chart. Rewards and incentives are administered by objective and systematic criteria. Capital expenditures are planned well in advance. Plans tend to be formal and written. Formal operating budgets guide day-to-day decisions.
Organisation (Structure)	Simple (Owner/Manager assisted by individuals with varying responsibilities. No divisions or functional departments) Function (Separate departments or functions (i.e. engineering, marketing, production, personnel) Division (Separate groups for similar products, markets or geographic regions)
Top management decision	Entrepreneurial (One individual makes decisions based on personal judgment) Professional (Functional specialists make decisions based on expertise and analytical tools)
Centralisation	Who is the last person whose permission must be obtained before legitimate actions may be taken in the following areas? Promotion of a direct worker Addition of a new product /service Unbudgeted expenditure (\$500-\$1000 in 1994) Selection of type or brand of new equipment Dismissal or firing of a direct worker
Specialisation (Responsible person per area)	Public/shareholder relations Shipping and receiving Building maintenance Customer/Product service Production planning / scheduling Personnel Advertising Legal affairs Purchasing Sales Quality control Employee training Market research Accounting Inventory control Industrial engineering Research and development Safety / security Payroll Finance

Table 4: 5S Growth State Classification Framework.

Class	Sub-Classes
Strategy	<ul style="list-style-type: none"> • Product leadership • Operational excellence • Market share • Customer focus
Structure	
Systems	<ul style="list-style-type: none"> • Process • Information systems • Controls • Planning
Style of Management	<ul style="list-style-type: none"> • Delegation of authority • Decision-making style
Staff	

The consolidation was based on the classes and sub-classes as defined by the *5S State Growth Classification Framework*. This final deliverable is referred to as the *5S SME Growth State Transition Model* and is collectively represented by the content of Table 5 to Table 12.

The *5S SME Growth State Transition Model* is structured in such a way that it can be used as an assessment sheet, by adding three columns (current state, future state and not applicable), allowing the SME manager to indicate the current state as well as the future state, or whether the statement is not applicable to the specific SME. The future state column would indicate the list of transitions to be managed for the specific SME. If the current state is also the future state, both cells should be selected.

5.5.1 SME Assessment of the Strategy as Differentiator in the Market

The consolidation of the states associated with the *Strategy* (S1) class is grouped in Table 5 (see Appendix) according to the following four strategies: *product leadership*, *operational excellence*, *marketing or distribution channels* and *customer focus*.

5.5.2 SME Assessment of Structure

SME growth results in a transition from an informal structure to a more formal *Structure* (S2), with a number of options, as presented in Table 6 (see Appendix).

5.5.3 SME Assessment of the SME as a System

Within the context of an SME as a system, a ‘system’ is referring to a set of distinct parts that interact to form a complex whole. The four distinct parts of the *Systems* (S3) class are the *processes*,

enabling information systems, *controls* and specifically the concept of *planning* as part of the SME as a system. These sub-classes of states are included in Table 7 to Table 10 (see Appendix).

5.5.4 SME Assessment of the Style of Management

The style of management matures as the SME grows. Within the *5S SME Growth State Transition Framework the Style of Management (S4)* has two concepts related to the SME assessment, namely the delegation of authority and the *decision making style*. The sets of state statements are included in Table 11 (see Appendix).

5.5.5 SME Assessment of the Staff Component

The state descriptions that form part of the *Staff* (S5) component is included in Table 12 (see Appendix).

6 DEMONSTRATION OF THE APPLICABILITY OF THE 5S SME GROWTH STATE TRANSITION MODEL

The applicability of the proposed *5S SME Growth State Transition Model* was illustrated by again studying company SME X to demonstrate that the identified growth state transitions are indeed applicable to SMEs.

The study was based on the historical records of company SME X. The states were mapped to four major periods in the growth of the company. The growth was defined by the number of staff and contractors in that specific period. These periods can be summarised as:

- 2002 - 2005: This period was associated with early establishment, initially with four founders, and ending with seven permanent staff members and five contractors.
- 2006 - 2009: This period was related to partnering with a Broad-Based Black Economic Empowerment partner as well as a product vendor. The staff numbers grew to fifteen permanent staff members, and the number of contractors varied between five and ten.
- 2010 - 2013: This was a period of growth with a well-defined business model, restructuring of the shareholders model, and a maximum of just

over fifty staff members and close to twenty contractors.

- 2014: This year was a period of transformation and diversification in order to adapt to market conditions. The number of staff members declined and the use of contractors was minimal. The period associated with a specific growth state transition statement is indicated in Table 5 to Table 12 (see Appendix).

The demonstration of the *5S SME Growth State Transition Model* as applied to the history of company SME X highlighted the following:

- The Model would mature by use with the addition, deletion and consolidation of growth state transitions.
- Some of the growth state transitions may be industry-specific.
- Application of the Model could result in various outcomes, such as not being applicable, single occurrence, multiple occurrences and repetitive occurrences.

The most important awareness was that the Model successfully eliminated the constraint of stages associated with SME growth stage models.

7 CONCLUSION

The research objective of the work presented in this paper was to develop an SME growth state transition model that can be used as input to our research to position BPM a management approach for SMEs. The requirement was for such a model to address the criticism regarding the sequential nature of the existing SME growth stage models. The development of the *5S Growth State Transition Model* included: (1) the identification of SME growth state transitions as defined in existing SME growth stage models, (2) the definition of a *5S SME Growth State Classification Framework* for the classification of the growth state transitions, and (3) the consolidation of the identified growth state transitions by mapping them to the *5S SME Growth State Classification Framework*.

A study based on information from company SME X demonstrated that the *5S Growth State Transition Model* is a fair representation of the SME growth state transitions. These state transitions identified potential changes and transformations in the organisation.

BPM is typically a discipline that adds value during changes and/or transformations. The value contribution of the *5S SME Growth State Transition*

Model can be summarised as a better understanding of the transitions associated with SME growth, making it possible to position BPM as a management approach to manage change during transformation. The next challenge is to develop a BPM approach, supportive of self-sufficiency, which can be used as input to the development of a BPM approach to assist SME managers to manage a specific growth state transition.

ACKNOWLEDGEMENTS

The work presented in this paper was conceptualised based on the research for the PhD Degree of Dina Jacobs, completed in 2016, at the Vaal Triangle Campus of North-West University, South Africa. Paula Kotzé and Alta van der Merwe were her PhD promoters.

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APPENDIX

The transition period(s) for company SME X is indicated in square brackets and colour blue after the transition statement. Refer to section 6 for a description of the transition periods.

Table 5: SME Assessment of the Strategy as Differentiator in the Market.

SME Assessment of the Strategy as Differentiator in the Market (S1)
S1.1 Product leadership as differentiator in the market The SME is offering a unique or superior product to the market. It is important for the SME to gain and/or maintain the product leadership in the market.
S1.1.1 Diversification by acquisition is a strategy to gain and/or maintain product leadership in the market. [2006-2009]
S1.1.2 Major and frequent product/service innovations is a strategy to gain and/or maintain product leadership in the market through new products. [2014]
S1.1.3 Small and incremental product/service modifications is a strategy to gain and/or maintain product leadership in the market. [2006-2009; 2010-2013; 2014]
S1.2 Operational excellence as differentiator in the market The SME is differentiated by operational excellence in the market. The differentiator may be based on price, reliability, flexibility and/or responsiveness. The reliability is referring to quality and/or on time delivery. It is important for the SME to gain and/or maintain the competitive advantage in the market based on operational excellence.
S1.2.1 Managing the supply-chain upstream and/or downstream is a strategy to gain and/or maintain a competitive advantage in the market. Working closely with suppliers and the distribution network enables an integrated end-to-end service as part of operational excellence. [Not applicable]
S1.2.2 Identification of a niche product/service to close a gap in the end-to-end supply-chain delivered is a strategy to gain and/or maintain a competitive advantage in the market. [2014]
S1.2.3 Economic production is a strategy to gain/or maintain a competitive advantage in the market. The focus is on efficiency, improving the production/service delivery process, to eliminate rework and to cut cost. [2014]
S1.3 Marketing / distribution channels as differentiator in the market The strategy is to establish the brand in the market and/or to create a network of distribution channels for the SME to gain and/or maintain market share.
S1.3.1 Expansion of market and distribution channels is a strategy to ensure dominance of distribution channels and the associated competitive advantage in the market. [2014]
S1.3.2 Geographical expansion is a strategy towards diversification and getting entry to new markets. [2006-2009]
S1.3.3 Market segmentation with different lines of products/services per market is a strategy for the SME to gain and/or maintain a competitive advantage in the market. [2006-2009; 2010-2013; 2014]

Table 5: SME Assessment of the Strategy as Differentiator in the Market. (Cont.)

S1.4 Customer focus as differentiator in the market The SME creates and maintains strong customer relationships and the strategy is to ensure that the SME is the preferred product or service provider of the customer.
S1.4.1 Customer preference requires diversification of marketing, products and administrative practices, Scanning customer preference and acting on it is a strategy to gain and maintain the competitive advantage in the market. [Since 2006-2009 part of operations]
S1.4.2 High performance enterprises have a stronger awareness of customers and customer needs and it is a strategy of the SME to know and obtain customers to become/remain a high performance enterprise. [2014]

Table 6: SME Assessment of Structure.

SME Assessment of the Structure (S2) <i>It is possible to select more than one option for example decentralised geographically (S2.4) as well as shared services (S2.6).</i>
S2.1 Simple informal structure The owner or manager is assisted by individuals with varying responsibilities. There are no divisions or functional departments. An informal structure is built around the owner manager and it is typical of small companies in the early stages of their development. The entrepreneur often has specialist knowledge of the product or service. [2002-2005]
S2.2 Functional structure There are separate departments or functions (i.e. engineering, marketing, production, personnel). It is most appropriate to small companies which have few products and locations and which exist in a relatively stable environment. <ul style="list-style-type: none"> • Product based departments: Structuring by product involves organising the business into departments, each of which focuses on a different product. • Customer based departments: A business may be divided by the type of customer (e.g. public sector or private sector customers). [Not applicable]
S2.3 Decentralised by geographical area Some businesses organise their activity according to geographical area. This is common in large multinational companies but it might also be appropriate for medium-sized businesses, for example a group of taxi firms, a small retail chain or a fast-food chain with several branches. Organising by area means each site can operate according to local demand but still be directed by business policy. Sometimes logistics relating to shipping, resources and staff make geographical structure the best choice. [2006-2009]
S2.4 Divisional structure There are separate groups for similar products, markets or geographic regions. There is a degree of difference among organisational divisions in terms of their overall goals, marketing and production methods and decision-making styles. Managers who are responsible for their own resources head them. Divisions are likely to be seen as profit centres and may be seen as strategic business units for planning and control purposes. [2014]
S2.5 Shared services structure Shared services is the provision of a service by one part of an organisation or group where that service had previously been found in more than one part of the organisation or group. Thus the funding and resourcing of the service is shared and the providing department/division effectively becomes an internal service provider. [2006-2009]

Table 7: SME Assessment of the Processes as part of the SME as System.

SME Assessment of the Processes as part of the SME as System (S3.1)
S3.1 Processes A business process describes the work that is being done in a business. As the SME grows it is important to define, standardise, align and optimise the processes overtime. In order to identify opportunities for optimisation the initial step is to measure the performance of the processes.
S3.1.1 The record keeping processes to keep record of all transactions as well as all communications are defined and implemented. [Since 2002-2005 part of operations]
S3.1.2 The way of work to eliminate inefficiencies and to improve productivity is reviewed. Redundant activities are identified and removed. The level of standardisation of the process is monitored with the objective to reduce rework over time. Note: Efficiency is referring to how work is being done. [2006-2009; 2010-2013;2014]
S3.1.3 The way of work is reviewed to ensure all processes are effective, i.e. that what is being done and the outcome of a process is adding value. Note: Ensure that you do not increase the efficiency of a process that is not effective. [2010-2013; 2014]
S3.1.4 Processes to consider for specialisation are identified. At the early stages of the SME the owner(s) is filling all the roles. As the SME grows specialised processes are allocated to specialists or outsourced to a third party. The following are examples of processes to be considered for specialisation: public/shareholders relations, shipping and receiving, building maintenance, customer/product service, production planning/scheduling, personnel, advertising, legal affairs, purchasing, sales, quality control, employee training, market research, accounting, inventory control, industrial engineering, research and development, safety/security, payroll, finance. [Since 2006-2009 part of operations]
S3.1.5 The performance of a business process is monitored, starting with the selection of a key performance indicator (KPI) and measurement of this one KPI. An example is to measure on time delivery or another example is to monitor the number of rework requests as a result of quality deviations. KPIs are often related to time, cost or quality. [2010-2013; 2014]

Table 8: SME Assessment of the Information Systems as part of the SME as System.

SME Assessment of the Information Systems as part of the SME as System (S3.2)
S3.2 Information Systems Information systems are referring to technology that is enabling the business process. Examples are spreadsheets, cloud based information systems or even mobile applications.
S3.2.1 Reporting is enabled by an information system to track revenue and expenses on a monthly basis. [Since 2002-2005 part of operations]
S3.2.2 A financial system is implemented to automate the financial transactions including invoicing and management of expenses together with the management of creditors and debtors. [Since 2006-2009 part of operations]
S3.2.3 A marketing system is implemented to manage customer information and lead management. [2014]
S3.2.4 A production system or professional services system is implemented with a time sheet system playing an important role in professional services and the management of raw material and batches in production. [Since 2006-2009 part of operations]
S3.2.5 A human resource management system is implemented to manage human resources, payroll and compliance with labour legislation. [Since 2006-2009 part of operations]
S3.2.6 A logistics or distribution system is implemented to manage delivery of products. [Not applicable]
S3.2.7 A management information system is implemented for information dissemination and retrieval. Relevant and undistorted information reach decision makers on time. [Since 2010-2013 part of operations]
S3.2.8 Coordination of diverse activities is enabled through inter alia collaboration systems, document management or enterprise content management and workflow. [2014]
S3.2.9 Information systems is used to better serve markets. Examples are online trading, tracking of orders, social media for marketing and process execution (using workflow, business rule engine and an integration platform). [2014]

Table 9: SME Assessment of Controls as part of the SME as System.

SME Assessment of the Controls as part of the SME as System (S3.3)
S3.3 Controls Controls are defined and implemented in order to limit or rule actions or behaviour. Controls are embedded in the processes and to implement controls it is important to measure compliance to these controls.
S3.3.1 Rules (policies, procedures and standards) are formalised and institutionalised.. SME growth is often associated with an increase in staff, and it is important to set the rules and apply the rules consistently to all staff. [Since 2006-2009 part of operations]
S3.3.2 Operational controls such as the control of stock are implemented. [Since 2006-2009 part of operations]
S3.3.3 Financial controls including the performance of sub-units, departments, divisions and products are monitored. [Since 2010-2013 part of operations]
S3.3.4 The compliance to regulations and quality standards is monitored. [Since 2010-2013 part of operations]
S3.3.5 The SME is always ready for a due diligence appraisal whether it is to support a business plan to attract funding, whether it is undertaken by a prospective shareholder or whether it is part of the evaluation of the SME as a supplier on a large contract. A due diligence appraisal establishes the assets and liabilities of a company and evaluate its commercial potential. Well-established policies, procedures and rules as well as operational and financial controls contribute towards a positive outcome of a due diligence appraisal. [2010-2013]

Table 10: SME Assessment of Planning as part of the SME as System.

SME Assessment of Planning as part of the SME as System (S3.4)
S3.4 Planning Planning is the process of predicting how the future should look like to achieve effectiveness and efficiency in a company. Planning follows a specific process. In order to manage the performance of a business it is important to monitor the progress against a plan such as the financial budget.
S3.4.1 Cash is managed to make provision for the investments required to enable growth. Cash forecasting is based on the financial plan (the budget) as well as the actual financial results. [Since 2010-2013 part of operations]
S3.4.2 The processes for planning, scheduling and coordination are defined and implemented. The allocation of resources to complete specific work is known as scheduling. Coordination is the synchronisation and integration of activities, responsibilities, and command and control structures to ensure efficient completion of work. [Since 2010-2013 part of operations]
S3.4.3 A long-term vision is in place to ensure that the tactical and operational plans are driven by the strategic vision. [2006-2009; 2010-2013; 2014]
S3.4.4 Both operational and strategic plans are defined for marketing, production, human resources and finance. [Since 2010-2013 part of operations]
S3.4.5 An operating budget to support strategies is in place and is used to manage operations. [Since 2010-2013 part of operations]
S3.4.6 Capital expenditure is planned well in advance. [2014]
S3.4.7 A marketing forecast is available. [2014]

Table 11: SME Assessment of Style of Management.

SME Assessment of Style of Management
S4.1 Delegation of Authority
Delegation of authority in the context of SME growth means that the SME manager (often then owner) is entrusting someone else to do parts of the job on the SME manager. The state transitions associated with the delegation of authority are grouped as level of delegation, management of the delegation of authority and the authority associated with the delegation.
Note: Level of Delegation
S4.1.1 The SME manager is supervising the employees directly. [2002-2005]
S4.1.2 Supervisors are responsible for the supervision of employees. According to Zheltoukhova and Suckley (2014) only 12% of employees of small enterprises (10-49 employees) report to a manager with a span of control larger than ten. [2010-2013]
S4.1.3 A functional structure results in delegation of authority to functional managers. [Not applicable]
S4.1.4 A divisional structure results in delegation of authority to divisional managers. [2010-2013]
Note: Management of the Delegation of Authority
S4.1.5 Delegation of authority is managed by setting objectives for managers and measure performance against the objectives. [Since 2010-2013 part of operations]
S4.1.6 Delegation of authority is managed by putting a process in place to escalate exceptions to the SME manager. [Since 2010-2013 part of operations]
Note: Authority associated with the Delegation
S4.1.7 Delegation of authority includes authority to promote direct workers, dismiss direct workers, add new products or services, select new equipment and approve unbudgeted expenditure. [Not applicable]
S4.1.8 Delegation of day-to-day operating authority. [2010-2013]
S4.1.9 Centralisation of strategy-making power (acquisitions, diversification and vision). [Since 2010-2013 part of operations]
S4.1.10 Formal definition of reporting relationships. Lines of authority specified in organisation chart. [2002-2005]
S4.2 Decision making Style
Decision making style is providing insight on how a manager is making decisions.
S4.2.1 Intuitive decision making is replaced with an understanding of the decision making process to make more informed decision. [2002-2005]
S4.2.2 Specialists are appointed to make decisions on the basis of expertise and analysis of information. [Since 2010-2013 part of operations]
S4.2.3 Participation of employees in the decision making process is promoted with an associated increase in the level of motivation of employees. [2014]

Table 12: SME Assessment of the States Associated with the Staff Component.

SME Assessment of the Staff Component (S5)
S5.1 An incentive scheme is included as part of the remuneration package. [2010-2013]
S5.2 A performance management process is defined and implemented. [2006-2009]
S5.3 Job descriptions are based on the processes and clear role clarification is ensured. [2006-2009]
S5.4 A training and development programme is implemented for employees. [Since 2006-2009 part of operations]
S5.5 Communication and change management are in place. [2006-2009]
S5.6 The culture and values of the SME are protected as the SME grows. [2014]