# GENERATIONS OF STRUGGLE IN STAGES OF GROWTH MODELING

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## ABSTRACT

Researchers have struggled for decades to develop stages of growth models that are both theoretically founded and empirically validated. This article presents the concept and hypothesis of stages, the history of stage models, and suggests a procedure which may serve as a useful tool in modeling stages of growth.
**Keywords**: Stages of growth models; organizational evolution; literature review; generations of struggle; procedure for growth modeling.

## INTRODUCTION

Stages of growth models have been used widely in both organizational research and information technology management research. According to King and Teo [1], these models describe a wide variety of phenomena – the organizational life cycle, product life cycle, biological growth, and so forth. These models assume that predictable patterns (conceptualized in terms of stages) exist in the growth of organizations, the sales levels of products, the diffusion of information technology, and the growth of living organisms. These stages are (1) sequential in nature, (2) occur as a hierarchical progression that is not easily reversed, and (3) involve a broad range of organizational activities and structures. This is the core idea of the concept of growth models.

Based on a comprehensive literature review, three core topics emerge when modeling stages of growth. The first challenge is to identify and explore the number of stages of growth. Second, is to develop workable benchmark variables identifying the stage. Third, is to find a proper description of the evolution in the model. Researchers have struggled to develop and test stages of growth models:

1. *The work related to stages of growth has to a large extent been conceptual.* Several authors have proposed theoretical stages of growth models for organizations, but they have not been able to empirically test the models.
2. *Empirical assessment of the stages of growth:* First, the debate over whether stages exist or not suffered from lack of empirical evidence. Then, researchers have tried to statistically test whether firms actually advance through stages over time, finding that

empirical validation of the stages of growth through benchmark variables has been problematic.

3. *There is no inevitable linear sequence of stages in organizational life*. According to Teo & King [2], the contingency perspective emphasizes that there are no predictable patterns whereas the evolutionary perspective emphasizes the presence of predictable patterns. Some researchers support the argument that stages are not tight, discrete packages of internal characteristics that develop in response to dominant problems, but are instead somewhat fluid, with problems overlapping in adjacent stages. Other researchers find support for an evolutionary pattern of growth. Still, there are only a few longitudinal studies examining the progression patterns, and thus findings can only be considered preliminary with tentative conclusions which serve as basis for longitudinal studies.

These and other challenges relate to the area of stages of growth modeling. Whereas most existing research and initiatives focus on development of growth models by suggesting a number of stages, benchmark variables, and the path of evolution between stages, a systematic analysis of the modeling process is currently lacking. Therefore, the objective of this paper is to illustrate the potential of stages of growth modeling if researchers are able to solve theoretical as well as empirical issues in such research.

## THE CONCEPT OF STAGES OF GROWTH

The research addressed in this study is based on literature review on stages of growth models in the context of information technology and systems management. Our review uncovered 27 articles from major IS journals which either contained “stages of growth” or “maturity model” in their title or key words.

### Explanation of the Concept and Hypothesis of Stages

Already two decades ago, Kazanjian and Drazin [3] found that a number of multistage models have been proposed, which assume that predictable patterns exist in the growth of organizations, and that these patterns unfold as discrete time periods best thought of as stages. These models have different distinguishing characteristics. Stages can be driven by the search for new growth opportunities or as a response to internal crises. Some models suggest that organizations progress through stages while others argue that there may be multiple paths through the stages. Kazanjian [4] applied dominant problems to stages of growth. Dominant problems imply that there is a pattern of primary concerns that firms face for each theorized stage. In criminal organizations, for example, dominant problems can shift from lack of skills to lack of resources to lack of strategy associated with different stages of growth. Kazanjian and Drazin [3, p. 1489] argue that either implicitly or explicitly, stages of growth models share a common underlying logic:

> *“Organizations undergo transformations in their design characteristics which enable them to face new tasks or problems that growth elicits. The problems, tasks or environments may differ from model to model, but almost all suggests that stages emerge in a well defined sequence such that the solution of one set of problems or tasks leads to new set of problems or tasks emerging which the organization must address.”*

Benchmark variables are often used to indicate characteristics in each stage of growth. A one-dimensional continuum is established for each benchmark variable. If benchmark variables are to be successful in classifying a maturity model, empirical evidence should conform closely to the proposed conceptual formulations. Since values of each benchmark variable are distinct at each maturity stage, the general proposition can be stated:

> *Proposition 1: Values of benchmark variables for each stage of growth will statistically correspond with the conceptual formulations given for that stage.*

In order to validate stages of growth model, it is necessary to demonstrate that transition occur through the stages. Thus, we need to empirically demonstrate that most organizations will evolve in the general direction from first stage to second stage and so on. The second proposition can be stated:

> *Proposition 2: Organizations show predictable patterns of growth from first stage to second stage, and so on, until it reaches the final stage.*

**Number of Stages of Growth**

Various multistage models have been proposed over time. For example, Nolan [5] introduced a model with six stages for information technology maturity in organization, which later was expanded [6]. King and Teo [1] suggested a four-stage model for the evolution of information systems planning. Earl [7] suggested a stages of growth model for evolving the e-business, while Layne and Lee [8] developed a stages of growth model for fully functional e-government. In the area of knowledge management, Nikhil, Sharon and Anju [9] developed a five level model. In the area of data warehousing three stages of growth was identified [10]. Teo and Pain [11] introduces a model for web adoption and examines the characteristics of different level web sites in terms of their features. Each of these models identifies certain characteristics that typify firms in different stages of growth. Among these multistage models, models with four stages seem to have been proposed and tested most frequently.

**Workable Benchmark Variables**

A typical approach of model testing includes the following steps. First, a verbal description of the stages of growth is provided and managers are asked to indicate which stage most closely describes the present situation or status in their company. Second, managers are asked to indicate the importance of certain benchmark variables or critical success factors (e.g., using Guttman scaling or 7-point Likert scaling). Finally, managers are asked to indicate paths of evolution. Results from model testing show that empirical validation is problematic [12-14], but some researchers have succeeded in their validation [1, 2].

The measurement of benchmark variables have been carried out using Guttman scales or Likert scales. Guttman scaling is a cumulative scaling technique based on ordering theory that suggests a linear relationship between the elements of a domain and the items on the text, while Likert scale is a psychometric scale commonly used in questionnaires, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement.

The idea of benchmark variables seems attractive at first sight, but appears to be difficult to implement. To start with, there must be a definition of the variable (e.g. a quantifiable concept). Second, there has to be arguments why the benchmark variables proposed have been selected. Third, benchmark variables should involve activities and structures that are characteristic for each stage of maturity. In some of the conceptual models benchmark variables seems to come out of the blue.

**Path of Evolution**

The concept of stages of growth has created a number of skeptics. Some argue that the concept of an organization progressing unidirectional through a series of predictable stages is overly simplistic. For example, organizations may evolve through periods of convergence and divergence related more to shifts in information technology than to issues of growth for specific IT. According to Kazanjian and Drazin [3], it can be argued that organizations and organizational relationships do not necessarily demonstrate any inexorable momentum to progress through a linear sequence of stages, but rather that observed configurations of problems, strategies, structures and processes will determine firm's progress. Kazanjian and Drazin [3] addressed the need for further data-based research to empirically examine whether organizations in a growth environment shift according to a hypothesized stage of growth model. Since Kazanjian and Drazin [3] published their work, several research studies have attempted to empirically validate growth models with mixed results. In summary, there is only partial support for the contention that the development of organization through a predictable pattern that can be related to the problems a firm finds pressing at sequential times.

**Generations of Struggle**

The findings from our literature review indicate that in the late 1970s and 1980s stages of growth were considered to be a new field of research mainly within the field of information systems management. Nolan's [5] stages of growth model of the evolution of data processing became a landmark reference. Nolan developed a model with six stages of growth and some workable benchmark variables identifying the stages. Several other researchers have been inspired by Nolan's model and they have studied growth in areas such as growth of end user computing [15], evolution of information centers [16], and growth patterns of technology based new ventures [4]. In their review of Nolan's stage hypothesis Benbasat et al [17] found that empirical support was generally weak and inconclusive.

The first generation exemplified with Nolan [5] was a continuous evolution. The second generation exemplified with King and Teo [1] was organizational consistency over time. Results from King and Teo's research support the stages of growth model for integration between business planning and information systems planning, and the benchmark variables suggested was generally found to be successful in predicting the stage of integration. In Teo and King [2], they argue that the evolutionary perspective and the contingency perspective differ in that the contingency perspective emphasizes that there are no predictable patterns, whereas the evolutionary perspective emphasizes the presence of predictable patterns. While both perspectives have been used in both organizational and systems research, they are quite different

ways of viewing changes over time. Teo and King [2] combined evolutionary and contingency modeling, where the evolutionary perspective provided the structure to the contingency perspective.

In the third generation, initial stage models are typically based on ideas from previous research and practical insight from certain areas of organizational development, e.g., knowledge flow [9], e-government interoperability [18]. Progress has been made, when modeling processes present theoretically and empirically tested stages of growth models.

**Practical Use of Stages of Growth Models**

Companies can use models to identify which stage they are in, particularly when using the characteristics of each stage [7]. Having positioned their firm, the particular model potentially helps managers in identifying upcoming issues and thus provides a framework for planning and orchestrating the evolutionary journey. Using the benchmark variables suggested for a specific model may provide practitioners with a set of considerations that may deserve special attention. And thus, the concept of stages of growth models should enable practitioners to better understand, manage and plan for the evolution in their firms [1]. According to Burn [19] an important feature of the stages of growth model is that it can identify for management where major transition points occur and also the change factors which need to be managed if staged growth is to be accomplished effectively.

## MODELING PROCESS FOR STAGE MODELS

Based on our discussion in this conceptual research paper, we suggest a modeling process as illustrated in Figure 1. The modeling process represents an evolution where the stage model changes its status from a suggested stage model, via a conceptual and theoretical stage model, to an empirical stage model, and finally to a revised stage model:

- *Suggested Stage Model*. The initial stage model is based on ideas from both research and practice. Research literature has defined evolutionary aspects of the phenomenon, and practitioners perceive different maturity levels for the phenomenon.
- *Conceptual Stage Model*. The number of stages and the contents of stages are developed in an iterative cycle involving dominant problems that seem different at various stages. Case studies are applied to illustrate content characteristics of each stage as well as significant differences between stages, where preceding and following stages have different kinds of dominant problems.
- *Theoretical Stage Model*. Relevant theories are applied to explain stages, their contents as well as the evolution from one stage to the next stage. Benchmark variables are derived from these theories. At the same time, theories and benchmark variables are discussed in focus groups.
- *Empirical Stage Model*. Each benchmark variable is assigned benchmark value for each stage of growth. A survey is carried out, where stages, evolution as well as benchmark values are empirically tested.
- *Revised Stage Model*. Based on the empirical test from survey research, the empirical stage model is revised.

Researchers can use this framework to assess current status and to identify key issues that need to be addressed to guide development of stages of growth models. Future research should be concerned with measurement issues, accuracy of the evolutionary path indicated, and explore economic effects of reaching higher levels of maturity.

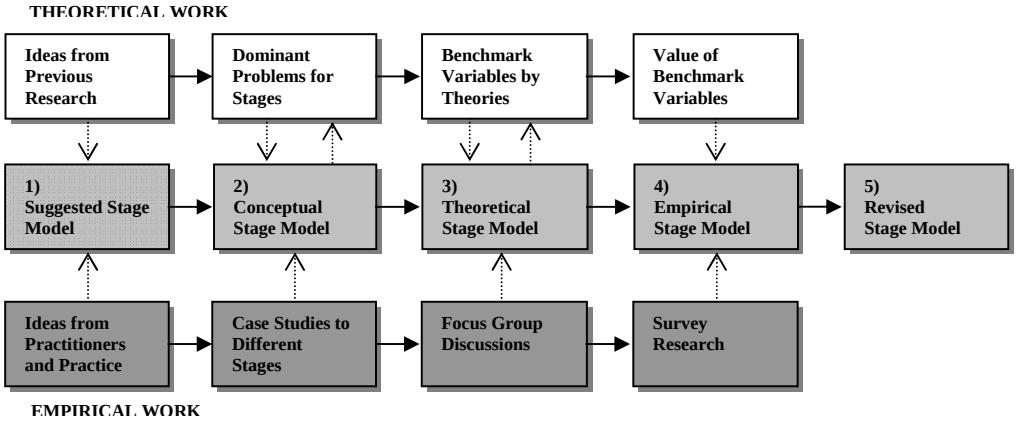


**Figure 1:** Suggested procedure for the stages of growth modeling process

## CONCLUSIONS

Stages of growth models have the potential of creating new knowledge and insights into organizational phenomena. Such models represent theory building tools that conceptualize evolution over time in a variety of areas. For researchers, a stage model represents a theory to be explored and empirically validated. For practitioners, a stage model represents a picture of evolution, where the current stage can be understood in terms of history and future. However, researchers have struggled for decades to develop stages of growth models that are both theoretically founded and empirically validated. This article presented characteristics of stage models, criticism of stage models, history of stage models, Guttmann scaling for cumulative growth, and a literature review on stages of growth models, as well as a procedure for the stages of growth modeling process. This paper has suggested an iterative process for the stages of growth modeling to improve theory building and empirical validation.

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