

ELECTRONIC COMMERCE MATURITY: A REVIEW OF THE PRINCIPAL MODELS

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ABSTRACT

It has been more than three decades since Nolan proposed his stages of growth model for information systems. Since then several studies on the stages of growth theory appeared in the academic literature. Since models oriented to the management and planning of information systems even models oriented to the development of information systems. But the object of this article is to present the most cited maturity models for the electronic commerce or electronic business and compare them. This comparison will be made using a comparative framework to evaluate electronic business stages of growth models, illustrating perspective, development, emphasis, verification, focus, source, barriers to growth and number of stages.

KEYWORDS

Electronic Commerce, Electronic Business, Maturity Models, Stages of Growth.

1. INTRODUCTION

Stages of growth models describe the maturing of the use of information systems in organizations. They are a useful framework to describe an organization's current position as well as a range of possible position in the future in terms of their e-business maturity. Understanding the growing of electronic commerce / electronic business implementation process enhances the ability of organizations to plan and develop their information systems strategy. Earlier studies, which propose the major stages of growth models such Gibson and Nolan (1974), Earl (1989) and Gallier and Sutherland (1991), have been widely discussed and are particularly useful in understanding the implementation of the information systems in organizations [Chan and Swatman, 2004]. But with the advent of the Internet and the Electronic Commerce new inter-organizational relations had been created, imposing major changes within companies while offering important opportunities for growth.

This article presents the most cited maturity models of electronic commerce or electronic business and compares them.

2. DEFINITION OF ELECTRONIC COMMERCE AND ELECTRONIC BUSINESS

The terminology involved within the field of Information Communication Technology (ICT) usage on the Internet is vast and contradictory. Two frequently used terms are electronic commerce and electronic business. Kalakota and Whinston (1996) define electronic commerce as the "... buying and selling of information, products and services via computer networks". Laudon and Travel (2006) define electronic commerce as the "use of the Internet and the Web to transact business". Sewell and McCarthy (2001) identify electronic business as business facilitated by ICT. Others argue that electronic business encompasses the entire word of internal and external electronically based activities, including electronic commerce [Kalakota and Robinson, 2003]. In the scope of this paper, electronic commerce will be regarded as a subset of electronic business.

3. MATURITY MODELS

One of the best known stages of growth model related to organization information systems is the "stages of growth model" developed by Nolan (1973). Nolan's first "stages of growth model", later extended by Gibson and Nolan (1974) and Nolan (1979), is probably the first to attempt to relate the transition of information technology management processes to the maturity of information technology.

Nolan's model was frequently adjusted and adapted to the managerial reality of the 90s and to the information technologies evolution during the last years. These adjustments were necessary since the initial model, and despite still allowing for the determining of the level of computing maturity of the organization, it did not take into consideration new elements such as micro-computing or Internet.

Gallier and Sutherland (1991) suggest a maturity model describing the phases through which organizations use information systems and technologies.

New maturity models, better adapted to the realities of electronic commerce, have been developed by other researchers and practitioners. Recent research on growth stages and electronic commerce has shown the usefulness of these models in describing the company position in terms of electronic commerce development and of its possible development in the future [McKay et al., 2000], [Earl, 2000], [Prananto et al., 2001], [Rayport and Jaworsky, 2002] and [Rao et al., 2003].

Among recent models, the following can be mentioned: the electronic commerce maturity model [KPMG, 1997], with three maturity stages (Experimentation, Ad-hoc implementation and Integration); Grant's Model [Grant, 1999] considers five maturity stages (Immaturity, On the Internet, E-commerce provisional strategy decided, Ready to implement and Integrated and effective e-commerce); the maturity model of McKay et al. [McKay, 2000] with the six maturity stages (No Presence, Experimental On-line presence, Interactive On-line presence, Electronic commerce, Internal Integration and External Integration); the model of Earl (2000), with six maturity stages (External communication, Internal communication, Electronic commerce, Electronic business, E-Enterprise and Transformation); the SOG-e Model [Prananto et al., 2001] also with six maturity stages (No presence, Static online presence, Interactive online presence, Internet commerce, Integrated organization and Extended enterprise); the model of Rayport and Jaworski (2002), this model outlines four phases (Broadcast, Interaction, Transaction and Collaboration); the model of Rao et al. (2003) suggest also four stages: (Presence, Portals, Transaction integration and Company integration) and the model of Chan and Swatman (2004), with four stages of growth (Initial e-commerce, Centralized e-commerce, Looking inward for benefits and Global e-commerce).

3.1 Comparison of the models

To compare the models we used the comparative framework to evaluate e-business stages of growth models (table 1). This comparative framework contained the following eight elements [Jones et al., 2006]:

Perspective

Four common perspectives were identified namely Technological, Industry, Business-based and evolutionary development.

Development

Development identifies whether the frameworks have a linear or non-linear structure. Models with a linear development are identified by reference to stages or levels within their frameworks or diagrammatical evidence of a staged development structure. Non-linear frameworks describe enterprise development without a staged development.

Emphasis

This factor identifies the business type targeted by the framework. Three main business types were identified within the models, namely Small and Medium Enterprises (SME), Large Enterprises (LA) and Non-Specific (NS).

Verification

This element identifies the empirical verification underpinning this framework.

Barriers

This factor recognizes the existence of barriers to the growth of e-business within individual frameworks.

Focus

Focus identifies whether the scope of the model was e-commerce, e-business or non-specific.

Source

The source factor identifies the models by public sector, private sector or academia.

Stages

This factor identifies and quantitatively analyses the stages.

Table 1. Comparison of the maturity models using the comparative framework of Jones et al. (2006)

Model	Perspective	Development	Emphasis	Verification	Barriers	Focus	Source	Stages
KPMG	Business	Linear	Non-specific	No	No	E-commerce	Private Sector	3
Model of Grant	Business	Linear	SME	Yes	No	E-business	Academia	5
Model of McKay	Technology	Linear	Non-Specific	No	No	E-business	Academia	6
Model of Earl	Business	Linear	Non-Specific	No	No	E-business	Academia	6
SOG-e	Technology	Linear	Non-Specific	Yes	No	E-business	Academia	6
Model of Rayport and Jaworski	Technology	Linear	Non-Specific	No	No	E-business	Academia	4
Model of Rao	Technology	Linear	Non-Specific	No	No	E-business	Academia	4
Model of Chan and Swatman	Business	Linear	Non-Specific	Yes	No	E-business	Academia	4

Making an overall analysis, all the models identified have a linear development, only one model is specific for SME, the focus is majority e-business, the source the academia and none of them recognized the existence of barriers to growth either within their frameworks.

We cannot say that the models are very different, with more or less stages, but all of them put the organization in one maturity stage. However, the more tested model was the SOG-e, having been applied in some Australian companies [Prananto et al., 2003], [Prananto et al., 2004].

4. CONCLUSION

In this paper we make reference to some of the most cited maturity models for e-commerce and e-business and then we compare them. It is clear through the comparative framework to evaluate e-business stages of Jones et al. (2006) that none of the models considers constraints on development and strategic development

within the framework, but it is obvious that enterprise growth is inhibited by barriers to development such as limited skills and finance. Therefore, we think it is important to study the inhibitors at different stages of e-business maturity. In addition, we intend to implement a questionnaire to the 500 bigger Portuguese enterprises in a way to identify the constraints and barriers in each maturity stage, and in the stage change using the SOG-e model.

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