JOBM
Journal of Business Models

The Importance of Classification to Business Model Research

Dr. Susan C. Lambert[1]

Abstract

Purpose: To bring to the fore the scientific significance of classification and its role in business model theory building. To propose a method by which existing classifications of business models can be analyzed and new ones developed.

Design/Methodology/Approach: A review of the scholarly literature relevant to classifications of business models is presented along with a brief overview of classification theory applicable to business model research. Existing business model classifications are evaluated in terms of their propensity to contribute to theory building and a method for designing classifications schemes is proposed.

Findings: Little attention has been paid to the rationale underlying the design of business model classifications and often there is no explicit consideration of the suitability of the classification for its intended purpose. Each classification contributes to the understanding of business models in practice but there is a dearth of taxonomical research that can facilitate progression of business model research towards theorizing.

Originality/Value: This paper addresses the research element of classification that is largely overlooked yet is crucial for business model theory building. The nature of business model classifications is examined in the light of classification philosophies and a structured method of classification design is proposed. A case is made for the development of a general classification of business models that can facilitate the progression of business model research towards theory building.

Keywords: classification, business model, taxonomy, typology, theory building

Article Classification: Conceptual

[1] Torrens University, Australia

Please cite this paper as: Lambert, Susan C. 2015. 'The importance of classification to business model research', *Journal of Business Models*, Vol. 3, No. 1, pp. 49-61

1. INTRODUCTION

The business model concept has defied its early critics who saw it as a novel concept that was no more than another way of articulating business strategy (Baden-Fuller & Mangematin, 2013) and although there is still no universally accepted definition or framework of a business model, like its predecessor concepts including strategy, the meaning is evolving through research and practical applications.

Numerous studies seek to determine what is taking place in actual organizations and how business models relate to e-business, strategy, innovation and technology (Zott, Amit, & Massa, 2011). As with other, nascent fields of research such as small enterprise and organizational science, in 'the absence of careful empirical analysis, a plethora of conceptually based models have emerged' (Hanks, Watson, Jansen, & Chandler, 1993, p.11).

A range of empirical studies use the business model to classify enterprises and to identify relationships between enterprise performance and the business model. In addition, the motivation for and frequency of business models innovations and the relationships between business model innovation and firm success are the subjects of empirical research that helps us to understand the business model concept (Lambert & Davidson, 2013). In some studies, the business model is used as an independent variable and in others as a dependent variable (Zott et al., 2011).

Much of the research is predicated on a classification of business models and in many instances the classification is proposed with little or no justification or explanation. Each of the many classifications is conceived to meet the specific needs of the researcher, and they vary considerably in terms of purpose and the scientific rigor used in their development. Some classifications are constructed using a large number of business model characteristics and potentially serve a relatively wide range of purposes and others are based on a small number of business model characteristics, serve specific purposes and, consequently, facilitate only a limited range of generalizations. Each of the well-structured business model classifications makes a contribution to the business model knowledge base; however, distinguishing one classification from another, evaluating their utility for future research, and understanding the underlying decisions on which the classifications are based, are not always possible because very little consideration is paid to the taxonomical issues (Baden-Fuller & Mangematin, 2013; Mäkinen & Seppänen, 2007; Morris, Schindehutte, Richardson, & Allen, 2006).

This paper proceeds with a discussion of the significance of classification followed by a brief overview of classification philosophies that are relevant to business models. Next, business model classifications that are present in the scholarly literature are analyzed in the light of the philosophies presented, and a case is made for a more transparent and structured approach to the design of classification schemes for research. A classification design method is then proposed. The paper concludes with a summary of the findings and a discussion of the importance of classification to business model research.

2. THE UNIVERSAL SIGNIFICANCE OF CLASSIFICATION

Classification is critical to the understanding of objective reality. It involves the ordering of objects into groups or classes on the basis of their similarity and ordering of objects into classes provides meaning to reality (Bailey, 1994, 2005; Simpson, 1961).

> The action of putting things which are not identical into a group or class is so familiar that we forget how sweeping it is. The action depends on recognizing a set of things to be alike when they are not identical. We order them by what it is that we think they have in common, which means by something that we feel to be a likeness between them (Bronowski, 1951, p.21).

It is widely recognized that classification is a necessary step in understanding a research area, however throughout history there has been continuous debate about the best way to classify objects, what criteria to use, and what purpose the classification can serve.

Since ancient times, the natural historians worked to 'bring order to the apparent chaos of the natural

world' (Huxley, 2007, p.12) and for centuries, biologists have understood the importance of classifying objects according to a general, widely accepted classification scheme which facilitates the naming of objects and provides a common language within the entire domain. The study of diversity brought life to taxonomic research the philosophical basis of which shaped the resultant biological research (Huxley, 2007). The importance of classification is not, however, peculiar to biological science research. Researchers in the organizational sciences (Carper & Snizek, 1980; Chrisman, Hofer, & Boulton, 1988; McKelvey, 1982; Scott, 1987; Sells, 1964), behavioral sciences (Mezzich & Solomon, 1980), social sciences (Bailey, 1994), and information and computer sciences (Fettke & Loos, 2003; Vessey, Ramesh, & Glass, 2005), recognize the value of both conceptually derived and empirically derived, general classification schemes for their fields of research.

Embedded throughout management research are classifications of research objects as diverse as teams (Hollenbeck, 2012), activities within the strategy process (Eppler & Platts, 2009) and reasons for financial report restatement (Gertsen, van Riel, & Berens, 2006). Firms are classified according to size (Brews & Purohit, 2007), entrepreneurial orientation (Jambulingam, Kathuria, & Doucette, 2005), industry (Yip, Devinney, & Johnson, 2009), and business models (Lambert & Davidson, 2013). Without some level of consensus on the classification of objects within a field of research, knowledge accumulation and meta-analysis are impeded (Hollenbeck, 2012) and theorizing is forced to be on a grand scale. Classifications make it possible to study and make generalizations about discrete, homogeneous groups of objects and, ultimately, propose mid-range theories that apply only to those discrete groups of objects (Rich, 1992). Such mid-range theories might explain why some business models perform better than others or are more sustainable than others, or they might explain why some business models are vulnerable to technological, political or social change and others are not. Mid-range theories could explain how the dimensions of particular classes of business models can be manipulated to enable organizations to adapt to change or to pursue new strategies.

In this paper I examine the basis of business model classifications, revealing that although many specific classifications exist, there are no general classifications. The analysis is based on identifying the philosophy behind the classification which has implications for the functions and characteristics of the resultant classification. The following section provides a brief overview of the essentialist and empiricist philosophies of classification and their respective outputs.

3. PHILOSOPHIES OF CLASSIFICATION

Two distinct theories of classification have been widely adopted in the research of inanimate objects including business models; essentialism and empiricism. The suitability of each theory depends on the purpose of the classification.

Essentialism stems from the Aristotelian view that there exist a few essential characteristics, which define the essence of an organism and that, by identifying these characteristics, classes of organisms can be created. Classes based on a small number of characteristics considered essential to defining the essence of the group are called *monothetic* groups. For objects to qualify for membership of the group, they must possess the characteristics used to define the group; and possession of the characteristic is both sufficient and necessary for membership in the group (Bailey, 1994; McKelvey, 1982). Classifications that are the product of essentialist philosophy are called *typologies*.

Typologies can take the form of *traditional* (commonsense) or *theoretical* classifications (Rich, 1992; Warriner, 1984). Traditional classifications 'depend on implicit recognition of the categories referred to, for there are no explicit classificatory criteria' (Warriner, 1984, p.134) and they are based on broad similarities and differences that are apparent to the users and that reflect the interests of the users. Traditional classifications are useful for identifying and naming things that exist in the real world such as organizations. Organizations can be classified as educational institutions, manufacturers, retailers and service providers. This traditional classification might be useful to identify types of organizations but its usefulness is limited because the similarities of organizations within a class and the differences

between classes are not expressed and classifications can overlap.

Theoretical typologies, on the other hand, are derived on the basis of a prior theory such as economics, management, strategy, or entrepreneurship theory. The researcher conceptualizes and names the 'types' that are relevant to the research and decides, a priori, the few characteristics that represent the essence of the object which in turn, relates to the purpose of the classification. For example, theoretical typologies of organizations include those based on their function in society, who benefits from their output, inputs and the technology employed (McKelvey, 1982). The result is a deductively-derived classification designed for a specific purpose; 'but no matter how useful they may be in predicting certain features of special interest to particular theories, they have limited general utility' (Warriner, 1984, p.135).

Baden-Fuller and Haefliger (2013) argue that conceptual typologies are forward looking classifications. Theoretical classifications may have no empirical equivalents, and may be ideal types or completely hypothetical (Bailey, 1994). For example, economists classify economies as traditional, market, command and mixed economies although there are no instances of pure market or command economies. The ideal types are benchmarks against which existing economies can be compared and therefore be better understood. Theoretical classifications can be supported by empirical cases, for example, a typology of financial instruments can be populated with instances of financial instruments. All members of a category must possess the characteristic(s) which define that category. Typologies are mostly generated through qualitative classification rather than quantitative analysis, although they can be formed by conceptualizing types and then analyzing the results using statistical techniques (Bailey, 1994). The Nosella et al. (2005) and Bigliardi et al. (2005) business model classifications of the biotechnology industry illustrate how theoretical basis and empirical processes can be combined.

As typologies categorize objects according to a limited number of defining characteristics (often as few as two), they are able to simplify complex concepts. Researchers base the defining characteristics on their personal perspective and bias (Hambrick, 1984). However, the simplicity of typologies limits their power to explain or predict phenomena (Hambrick, 1984); and any increase in the number of defining characteristics will lead to a disproportionate increase in the level of complexity of the task and in the ultimate result of the research itself.

> For example, even if all [defining characteristics] are dichotomous, the formula for determining the number of [types] is 2^5, where 5 is the number of [defining characteristics]. Thus for five dichotomous [defining characteristics] the typology will contain only 2^5 or 32 [types], but for 12 dichotomous [defining characteristics] the number of [types] is 2^{12} or 4,096. (Bailey, 1994, p.4)

Keeping the number of defining characteristics small is consistent with the essentialist philosophy that there are only a few characteristics that capture the essence of the object. Where researchers need to use a large number of defining characteristics, they must ask whether the essentialist philosophy is appropriate for the purpose.

In contrast to essentialism, empiricism is based on Adansonian principles whereby polythetic groups of objects are formed. Polythetic groups of objects '…have the greatest number of shared character states, and no single state is either essential to group membership or sufficient to make an [object] a member of the group' (Sneath & Sokal, 1973, p.21). Classifications that are the product of empiricist philosophy are called *taxonomies.*

Note the dual meaning of 'taxonomy'. A taxonomy is an empirically derived classification of objects based on the totality of their observable characteristics. The term taxonomy is also used to refer to the '…theoretical study of classification, including its bases, principles, procedures, and rules' (Simpson, 1961, p.11). Researchers who develop classification schemes carry out taxonomic activity, yet their output, the actual classification schemes, can be typologies (specific classifications) or taxonomies (general classifications). This dual meaning can lead to confusion and even misuse of the term in the business model literature where many classifications are referred to

as taxonomies when they are in fact typologies. An analysis of existing business model classifications is presented later in this paper.

Empirically derived classification has come to be known as *numerical taxonomy* (Sneath & Sokal, 1973). Numerical taxonomies evaluate affinity between objects numerically (using multivariate techniques) creating taxa (categories) based on a large number of characteristics commonly referred to as variables. Objects are ordered according to their degree of affinity (McKelvey, 1982; Sokal & Sneath, 1963). A priori, all characteristics have equal weighting, and similarity between objects is a function of the similarity between each of their many individual characteristics.

A taxonomy can serve as a general classification of objects from which generalizations can be made, hypotheses proposed, and eventually mid-range theory generated since 'it is the intimate connection with empirical reality that permits the development of a testable, relevant, and valid theory' (Eisenhardt, 1989, p.532). By using a large number of variables the researcher bias that is present in typologies is potentially reduced. However, there are still many subjective decisions to be made. In fields of study where little is known about the object of classification and research is exploratory, the researcher must trawl the data using as many variables as practical. The danger with this approach is that key variables may be overlooked and irrelevant variables may dominate. The resultant classification may be statistically valid but may not be intuitively sensible or useful. Where there is little domain knowledge, an alternative to the pure inductive method is to seek expert opinion on variable selection, what Ketchen (2005) refers to as the *cognitive approach*. In research areas that are more mature, with existing theories in relation to the object of classification, the researcher can utilize that prior knowledge to minimize the chance of irrelevant data obstructing the classification and to ensure all key variables are included. In addition, where causal relationships are known, they can be taken into account in order to avoid overrepresentation of constructs (Ketchen, 2005). A large number of variables is still required; however, utilizing existing theory to refine the variable set is beneficial for classifications that are aimed at confirming existing theory.

Variables are identified and measurement rules determined to allow data to be collected and coded for cluster analysis. The data can be further analyzed using a range of multivariate techniques. The aim is to minimize within-group variance and maximize inter-group variance, thereby creating homogeneous groups. Once created, these homogeneous groups can be used for a multitude of research applications, enabling the study of both within-group behavior as well as inter-group behavior.

Essentialist and empiricist theories of classification imply important differences in the taxonomical approaches used to create a catalogue of objects and in the resulting catalogue itself. The utility of those catalogues also differs. A typology is developed with a specific purpose in mind, is based on only a few characteristics and therefore has limited utility (McKelvey, 1982). By contrast, taxonomies are the result of grouping objects based on the totality of their observable characteristics. Although many researchers use the terms interchangeably, they are not equivalent: typologies and taxonomies have their own limitations and strengths. The characteristics and functions of typologies and taxonomies are summarised in Table 1.

Table 1: Summary of Characteristics and Functions of Typologies and Taxonomies

TYPOLOGIES	TAXONOMIES
The product of essentialist philosophy	The product of empiricist philosophy
Categories (types) are conceptually derived	Categories (taxa) are empirically derived

Table 1: Summary of Characteristics and Functions of Typologies and Taxonomies

TYPOLOGIES	TAXONOMIES
Few characteristics considered	Many characteristics considered
Reasoning by deduction	Reasoning by inference
Mostly qualitative classifications	Quantitative classifications
Monothetic groupings	Polythetic groupings
Specific classification	General classification
Provides a basis for only limited generalizations	Provides a basis for wider generalization

4. BUSINESS MODEL CLASSIFICATIONS

Scholars have long recognized that the business model literature lacks a systematic approach to the development of classifications and that many of the so-called taxonomies are simply lists of existing business activities, or at best, typologies of generic kinds of business models (Baden-Fuller & Morgan, 2010). The varied use of the terms typology and taxonomy in the business model literature creates misunderstanding and confusion for those attempting to analyze and compare the various classification schemes. Early business model classifications are simple identification schemes (traditional typologies) that use no explicit criteria for classification and produce generic types or shorthand descriptions of existing business models (Baden-Fuller & Morgan, 2010). For example, Applegate (2001) proposes four business model types; focused distributor models, portal models, producer models and infrastructure provider models. Laudon & Traver (2003) identify seven types of business models; portal, e-tailor, content provider, transaction broker, market creator, service provider and community provider. Bambury (1998) and Eisenmann (2002) propose fourteen and eight business model types respectively. The criteria used to define each type is not explicit, instead the types are broadly described in free form narrative.

Theoretical typologies are based on prior theory such as economics, strategy, and entrepreneurship. Numerous theoretically based typologies of business models are present in the literature providing alternate means of comparing business models according to a small number of clearly specified criteria. Market related criteria including customer profile (Bienstock, Gillenson, & Sanders, 2002; Leem, Suh, & Kim, 2004), market configuration factors (Timmers, 1998; Tapscott, Ticoll & Lowy, 2000), transaction factors (Wang & Chan, 2003) and marketing strategy (Weill & Vitale, 2001) dominate the classification criteria. Product related factors (Timmers, 1998; Bienstock at al., 2002) and resources (Weill & Vitale, 2001; Betz, 2002) also feature in the classification criteria.

Baden-Fuller and Mangematin (2013) argue that the essential characteristics of the business model, which they define as "a *meta* concept to exemplify firm strategy" (Baden-Fuller & Mangematin, 2013, p. 419) are customer, customer engagement, monetizaton and value chain and linking mechanisms. Their purpose is to "capture the essence of the cause-effect

relationships between customers, the organization and money (Baden-Fuller & Mangematin, 2013, p. 419) which corresponds to an essentialist view of business models best served by a typology.

Some theoretical typologies form the basis of empirical research that collects evidence of empirical cases (Kauffman & Wang, 2008; Malone et al., 2006; Rajala & Westerlund, 2007; Sabatier, Mangematin, & Rousselle, 2010). The differentiating criteria of theoretical typologies are chosen to serve the specific tasks, for example measuring and comparing financial performance (Malone et al., 2006), analyzing the software industry's resource requirements and mode of management (Rajala & Westerlund, 2007), and identifying the characteristics of business models associated with the survival of Internet firms (Kauffman & Wang, 2008). These empirically supported typologies serve the purposes for which they are intended; however, their utility for other research is limited due to the small number of differentiating criteria used.

There are few empirically derived taxonomies of business models present in the literature. The Italian biotechnology industry is the subject of one series of studies (Bigliardi, Nosella, & Verbano, 2005; 2005) and two non-industry-specific studies involve United States based firms (Malone, Morris, Schindehutte, Richardson, & Allen, 2006; 2006).

What is missing from the literature is an empirically derived general classification (a taxonomy) of business models that uses many criteria to classify business models and is relevant to multiple industries. Such a general classification of business models will allow general patterns of configurations of business model variables to be inferred from the results. Simple relationships between variables can be hypothesized and tested and mid-range theories of business models, those intended to hold true for particular categories of business models rather than for all instances of business model, can be proffered.

A good classification scheme forms the foundation of theory development. To advance research towards mid-range theories, it is necessary to order the objects within the research domain since 'theory cannot explain much if it is based on an inadequate system of classification' (Bailey, 1994, p.15). Classifications '...are partway between a simple concept and a theory. They help to organise abstract, complex concepts' (Neuman, 2003, p.46). Business models are abstract, complex concepts, and we can enhance our understanding of them by developing a general classification scheme.

So far I have made a case for the explicit and thoughtful consideration of the basis of classifications used in business model research. In the next section, I propose a classification design method that can aid in the design of a classification scheme that is consistent with its purpose.

5. CLASSIFICATION DESIGN FOR BUSINESS MODEL RESEARCH

To encourage the application of theoretical rigor to the design of classification schemes in business model research and communicating their underlying structure to potential users, I now propose a method for the design of classification schemes based on the extant classification literature presented earlier in this paper. Figure 1 outlines six decision steps that lead to a classification outcome appropriate for the intended purpose.

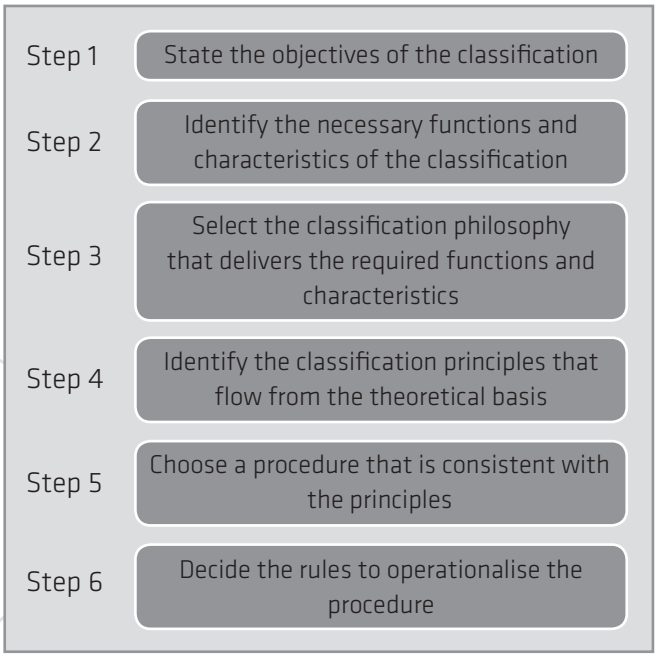

Figure 1: Classification Design Steps

Step 1: Specify the purpose of the classification. The purpose might be specific or it might be broad to facilitate broad generalizations.

Step 2: Identify the necessary functions and characteristics of the classification that will best serve the intended purpose.

Step 3: Select the classification philosophy that delivers the functions and characteristics required of the classification. For example, to understand the relationship between business models and social and environmental sustainability, we need a specific classification that uses characteristics of the business model that the researcher believes to be relevant to the study. The classification criteria would be based on existing sustainability research, just as Baden-Fuller and Haefliger (2013) and Baden-Fuller and Mangematin (2013) determined their classification criteria to better understand the relationship between business models and technological innovation. Classifications such as these are consistent with an essentialist philosophy of classification that would produce a typology.

Step 4: Identify the classification principles relevant to the classification philosophy. For example, the essentialist philosophy requires the categories to be conceptualized using as few characteristics as possible and forming monothetic groups and the empiricist classification philosophy requires categories to be determined through observation.

Step 5: Choose procedures that are consistent with the philosophy and principles. The conceptualization of categories requires a procedure that identifies a small number of classification criteria. To establish categories through observation there needs to be a procedure to discover variables.

Step 6: Decide the rules by which the procedures will be carried out. The procedure to define the object for classification is quite straightforward when the object is tangible but it is more challenging and requires carefully conceived rules when the object is abstract. Business models are abstract objects that have no universally accepted definition and whose components vary according to user perception.

For example, a rule related to the procedure of defining the sampling unit is to treat multiple business models within the enterprise as a single hybrid business model rather than as multiple, discrete business models. A rule associated with conceptualizing categories is to specify the number of categories required. Table 2 shows examples of principles, procedures and rules associated with both essentialist and empiricist philosophies of classification.

A general classification of business models based on empiricism would create polymorphic categories of business models (i.e., groups of business models based on overall similarity) using computerized statistics programs to perform cluster analysis that identifies the taxa based on the observed variables. Decision rules relating to the selection and measurement of variables and choice of particular statistical techniques must be made explicit. Clustering is often performed using both hierarchical and non-hierarchical methods to minimize the impact of the limitations of each method (Henry, Tolan, & Gorman-Smith, 2005; Huberty, Jordan, & Brandt, 2005; Ketchen, 1996). Finally, the clusters would be interpreted and labelled and differences between clusters identified. Both numerical descriptions such as z-scores, inter-cluster distance, and linear discriminant functions can form part of the analysis.

Table 2: Examples of Principles, Procedures and Rules for the Design of an Essentialist and an Empiricist Classification Scheme

	CLASSIFICATION PHILOSOPHY	
	ESSENTIALISM	EMPIRICISM
Associated Principles	• Categories derived conceptually • Form monothetic groups	• Categories derived through observation • Collect data based on many variables • Form polythetic groups
Related Procedures	• Define the criteria to form categories • Define the sampling unit and determine the population • Identify objects that fit the categories • Analyse the results quantitatively and/or qualitatively	• Define the samling unit and determine the population • Discover and measure the variables • Code the variables • Form clusters using computerized statistical software • Analyse results quantitatively
Related Rules	• Derive 16 categories • Treat multiple business models within the enterprise as a single hybrid business model	• Apply both hierarchical and non-hierarchical clustering methods • Use numerical descriptions such as z-scores, inter-cluster distance, and linear discriminant functions in the analysis

6. CONCLUSION

Classification is an integral part of business model and other management research (Christensen & Carlile, 2009) and to facilitate the evaluation of classifications the relevant principles, procedures and rules require explication. In this paper I have provided an overview of the theory of classification to bring to light the significant differences between classification schemes and their relevance to research. I have highlighted the differences between typologies and taxonomies to show how each serves different research needs. A study of existing business model classifications present in the extant literature reveals that there exist many specific classifications but no general classification of business models that can form the basis of generalizations. Without the ability to generalize about homogeneous groups of business models, mid-range theory building is stifled.

To guide the construction of taxonomically sound business model classification schemes, I have offered a structured method that links the purpose of the classification to the corresponding philosophy of classification and to the necessary functions and characteristics. The individual classification design steps make transparent the decisions embodied in the classification scheme so that future researchers can build on and refine existing classification schemes rather than starting anew each time a classification is required.

> A classification scheme, like a good theory, is seldom finished. It is only given interim acceptance with the understanding that further studies will tend to elaborate and refine it, or disconfirm it (McKelvey, 1982, p.30).

Thoughtful consideration of the purpose of business model classification schemes that extends beyond the immediate requirement has the potential to create a bridge between current and future research. An awareness of the principles that underlie existing classification schemes improves the potential to leverage from prior research. The use of classification throughout all fields of research to create order in the field and to facilitate mid-range theorizing renders it an important construct worthy of careful and explicit consideration by business model researchers.

References

Applegate, L. (2001), E-Business Models: Making Sense of the Internet Business Landscape, In G. Dickson & G. DeSanctis (Eds.), *Information Technology and the Future Enterprise, New Models for Managers*. Prentice Hall, Upper Saddle River NJ.

Baden-Fuller, C. & Haefliger, S., (2013), Business models and technological innovation. *Long Range Planning,* Vol. 46, No. 6, pp. 419-426.

Baden-Fuller, C. & Mangematin, V., (2013), Business models: A challenging agenda. *Strategic Organization,* Vol. 11, No. 4, pp. 418-427.

Baden-Fuller, C. & Morgan, M. S., (2010), Business Models as Models. *Long Range Planning,* Vol. 43, No. 2-3, pp. 156-171.

Bailey, K. D. (1994), *Typologies and Taxonomies: An Introduction to Classification Techniques*. Sage Publications Inc Los Angeles.

Bailey, K. D., (2005), Typology Construction, Methods and issues. *Encyclopedia of Social Measurement,* Vol. 3, pp. 889-898.

Bambury, P.October 1998, (1998). A Taxonomy of Internet Commerce. *First Monday, 3*(10). http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/624/545October 1998.

Bienstock, C., Gillenson, M. & Sanders, T., (2002), A Typology of E-Commerce Business Models. *Quarterly Journal of Electronic Commerce,* Vol. 3, No. 2, pp. 173-182.

Bigliardi, B., Nosella, A. & Verbano, C., (2005), Business models in Italian biotechnology industry: a quantitative analysis. *Technovation,* Vol. 25, No. 11, pp. 1299-1306.

Brews, P. & Purohit, D., (2007), Strategic Planning in Unstable Environments. *Long Range Planning,* Vol. 40, No. 1, pp. 64-83.

Bronowski, J. (1951), *The Common Sense of Science*. Heineman Educational Books Ltd London.

Carper, W. B. & Snizek, W. E., (1980), The Nature and Types of Organizational Taxonomies: An Overview. *Academy of Management Review,* Vol. 5, No. 1, pp. 65-75.

Chrisman, J. J., Hofer, C. W. & Boulton, W. R., (1988), Toward a System for Classifying Business Strategies. *Academy of Management Review,* Vol. 13, No. 3, pp. 413-428.

Christensen, C. M. & Carlile, P. R., (2009), Course Research: Using the Case Method to Build and Teach Management Theory. *Academy of Management Learning & Education,* Vol. 8, No. 2, pp. 240-251.

Eisenhardt, K. M., (1989), Building Theories from Case Study Research. *Academy of Management Review,* Vol. 14, No. 4, pp. 532-550.

Eisenmann, T. (2002), *Internet Business Models, Text and Cases.* McGraw-Hill Irwin New York.

Eppler, M. J. & Platts, K. W., (2009), Visual Strategizing: The Systematic Use of Visualization in the Strategic-Planning Process. *Long Range Planning,* Vol. 42, No. 1, pp. 42-74.

Fettke, P. & Loos, P., (2003), Classification of reference models: a methodology and its application. *Information Systems and eBusiness Management,* Vol. 1, No. 1, pp. 35-53.

Gertsen, F. H. M., van Riel, C. B. M. & Berens, G., (2006), Avoiding Reputation Damage in Financial Restatements. *Long Range Planning,* Vol. 39, No. 4, pp. 429-456.

Hambrick, D. C., (1984), Taxonomic Approaches to Studying Strategy: some Conceptual and Methodological Issues. *Journal of Management,* Vol. 10, No. 1, pp. 27-41.

Hanks, H. S., Watson, C. J., Jansen, E. & Chandler, G. N., (1993), Tightening the Life-Cycle Construct: A Taxonomic Study of Growth Stage Configurations in High-Technology Organizations. *Entrepreneurship, Theory & Practice*, pp. 5-30.

Henry, D. B., Tolan, P. H. & Gorman-Smith, D., (2005), Cluster Analysis in Psychology Research. *Journal of Family Psychology,* Vol. 19, No. 1, pp. 121-132.

Hollenbeck, J. R., Beersma, B., & Schouten, M. E. , (2012), Beyond Team Types and Taxonomies: A Dimensional Scaling Conceptualization for Team Description *Academy of Management Review,* Vol. 37, No. 1, pp. 82-106.

Huberty, C. J., Jordan, E. M. & Brandt, W. C. (2005), Cluster Analysis in Higher Education Research, In J. C. Smart (Ed.), *Higher Education: Handbook of Theory and Research* (Vol. *XX*, pp. 437-457). Springer.

Huxley, R. (2007), *The Great Naturalists*. Thames & Hudson London.

Jambulingam, T., Kathuria, R. & Doucette, W. R., (2005), Entrepreneurial orientation as a basis for classification within a service industry: the case of retail pharmacy industry. *Journal of Operations Management,* Vol. 23, No. 1, pp. 23-42.

Kauffman, R. J. & Wang, B., (2008), Tuning into the digital channel: evaluating business model characteristics for Internet firm survival. *Information Technology and Management,* Vol. 9, No. 3, pp. 215-232.

Ketchen, D. J., (1996), The Application of Cluster Analysis in Strategic Management Research: An Analysis and Critique. *Strategic Management Journal,* Vol. 17, No. 6, pp. 441-458.

Lambert, S. C. & Davidson, R. A., (2013), Applications of the Business Model in Studies of Enterprise Success, Innovation and Classification: An Analysis of Empirical Research from 1996 to 2010. *European Management Journal,* Vol. 31, pp. 668-681.

Laudon, K. & Traver, C. (2003), *E-commerce; business, technology, society*. Pearson Prentice Hall Upper Saddle River, New Jersey.

Leem, C. S., Suh, H. S. & Kim, D. S., (2004), A classification of mobile business models and its applications. *Industrial Management & Data Systems,* Vol. 104, No. 1, pp. 78-87.

Linder, J. C. & Cantrell, S., (2001), Five business-model myths that hold companies back. *Strategy & Leadership,* Vol. 29, No. 6, pp. 13-18.

Mäkinen, S. & Seppänen, M., (2007), Assessing business model concepts with taxonomical research criteria. *Management Research News,* Vol. 30, No. 10, pp. 735-748.

Malone, T. W., Weill, P., Lai, R., D'Urso, V. T., Herman, G., Apel, T. & Woerner, S., (2006), Do Some Business Models Perform Better than Others? *MIT Sloan Research Paper* No. 4615-06.

McKelvey, B. (1982), *Organizational Systematics: Taxonomy, Evolution, Classification*. University of California Press Berkeley.

Mezzich, J. E. & Solomon, H. (1980), *Taxonomy and Behavioral Science: Comparative Performance of Grouping Methods*. Academic Press Inc (London) Ltd. London.

Morris, M., Schindehutte, M., Richardson, J. & Allen, J., (2006), Is the business model a useful strategic concept? Conceptual, theoretical, and empirical insights. *Journal of Small Business Strategy,* Vol. 17, No. 1, pp. 27-49.

Neuman, W. L. (2003), *Social Research Methods: Qualitative and Quantitative Approaches* (5th ed.). Pearson Education Inc Boston.

Nosella, A., Petroni, G. & Verbano, C., (2005), Characteristics of the Italian biotechnology industry and new business models: the initial results of an empirical study. *Technovation,* Vol. 25, No. 8, pp. 841-855.

Rajala, R. & Westerlund, M., (2007), Business models - a new perspective on firms' assets and capabilities: observations from the Finnish software industry. *International Journal of Entrepreneurship and Innovation,* Vol. 8, No. 2, pp. 115-125.

Rich, P., (1992), The Organizational Taxonomy: Definition and Design. *Academy of Managment Review,* Vol. 17, No. 4, pp. 758-781.

Sabatier, V., Mangematin, V. & Rousselle, T., (2010), From Recipe to Dinner: Business Model Portfolios in the European Biopharmaceutical Industry. *Long Range Planning,* Vol. 43, No. 2-3, pp. 431-447.

Scott, W. R. (1987), *Organizations Rational, Natural, and Open Systems* (second ed.). Prentice-Hall New Jersey.

Sells, S. B. (1964), Toward a Taxonomy of Organizations, In W. W. Cooper, H. J. Leavitt & M. W. Shelly (Eds.), *New Perspectives in Organization Research* (pp. 515-531). John Wiley & Sons. Inc., New York.

Simpson, G. G. (1961), *Principles of Animal Taxonomy*. Columbia University Press New York.

Sneath, P. H. & Sokal, R. R. (1973), *Numerical Taxonomy: The Principles and Practice of Numerical Taxonomy*. W.H. Freeman and Company San Francisco.

Sokal, R. & Sneath, P. (1963), *Principles of Numerical Taxonomy*. W H Freeman and Company.

Tapscott, D., Ticoll, D. & Lowy, A. (2000) *Digital Capital: Harnessing the Power of Business Webs*, Harvard Business School Press.

Timmers, P., (1998), Business Models for Electronic Markets. *Electronic Markets,* Vol. 8, No. 2, pp. 3-8.

Vessey, I., Ramesh, V. & Glass, R. L., (2005), A unified classification system for research in the computing disciplines. *Information and Software Technology,* Vol. 47, No. 4, pp. 245-255.

Wang, C.-P. & Chan, K.01/02/2008, (2003). Analyzing the taxonomy of Internet business models using graphs. *First Monday*. http://journals.uic.edu/ojs/index.php/fm/article/view/1058/97801/02/2008.

Warriner, C. K. (1984), *Organizations and Their Environments: Essays in the Sociology of Organizations* (Vol. 3). JAI Press London.

Weill, P. & Vitale, M. (2001), *Place to Space*. Harvard Business School Press Boston.

Yip, G. S., Devinney, T. M. & Johnson, G., (2009), Measuring Long Term Superior Performance: The UK's Long-Term Superior Performers 1984-2003. *Long Range Planning,* Vol. 42, No. 3, pp. 390-413.

Zott, C., Amit, R. & Massa, L., (2011), The Business Model: Recent Developments and Future Research. *Journal of Management* Vol. 37, No. 4, pp. 1019-1042.

About the author

Susan C. Lambert, Dr., is Associate Professor (Accounting) at Torrens University Australia and has a strong interest in applying the business model concept to strategic decision making in business and in academic settings.
She has held senior academic and administrative positions in business schools and has taught a range of accounting, auditing, business information systems and electronic business courses. She is especially interested in how technology can be used in higher education to improve student learning and to reach students who would otherwise miss out on a higher education.
Prior to joining academia she was a sales consultant for IBM International and prior to that she worked as a professional accountant. She is a Fellow of Chartered Accountants Australia and New Zealand and she remains active in this body.
Her primary research interests revolve around business models and their application to environmental and social sustainability research and to universities.
Email: susan.lambert@tua.edu.au