Modeling Emerging Business Models

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Abstract

Les industries émergentes et, plus encore, les modèles d'entreprise émergents, ont fait l'objet de peu de recherches en matière de gestion. Les modèles d'entreprise sont en effet difficiles à comprendre dans un environnement en mutation. Lorsqu'ils font l'objet d'une typologie, le mouvement d'adaptation concurrentielle et les bouleversements technologiques défont rapidement les schématisations qui viennent d'être développées. Il faut donc mieux comprendre la nature évolutive et dynamique des modèles d'entreprise. Pour pouvoir mieux comprendre les modèles d'entreprise émergents, il faut pouvoir comprendre leur évolution et leur structuration et institutionnalisation progressives. À cette fin, nous devons construire non pas des typologies statiques, mais des taxonomies dynamiques, élaborées selon une approche quantitative et articulée. Dans cet article, nous proposons une procédure statistique, la méthode TwoStep, pour générer des taxonomies de modèles d'entreprise dans les industries émergentes. En proposant une procédure simple pour comprendre les modèles commerciaux évolutifs et dynamiques, nous cherchons à contribuer à la littérature sur les modèles commerciaux émergents, qui manque d'une procédure statistique concrète pour construire des taxonomies de modèles. Pour illustrer les étapes de cette procédure, nous appliquons la classification TwoStep à un cas actuel de modèle commercial émergent : les applications iPhone.

1. INTRODUCTION

Emerging industries are characterized by a high level of instability and uncertainty. Competitive play and the methods used to "create and capture value" are constantly disrupted (Wirtz, Schilke, & Ullrich, 2010). Instability factors, such as technological disruptions, changes in access to information, changes in the customer base and organizational reconfigurations, are particularly numerous (Teece, 2018). As they emerge, industries do not yet have sustainable business models: they are gradually emerging as they become more institutionalized.

Emerging industries and, even more so, emerging business models, have been the subject of little research in management research (Perkmann & Spicer, 2014). Business models are, in fact, difficult to understand in a changing environment. When they are the subject of a typology, the movement of competitive adaptation and technological upheavals quickly undoes the schematizations that have just been developed. The evolutionary and dynamic nature of business models must therefore be better understood.

To be able to better understand emerging business models, we must be able to understand their evolution and their progressive structuring and institutionalization. To this end, we must build not static typologies, but dynamic taxonomies (Hotho, 2014), developed according to a quantitative and articulated approach.

In this article, we propose a statistical procedure, the TwoStep method, for generating business model taxonomies in emerging industries. This method differs from the hierarchical and dynamic cloud classifications usually used in management research, in particular because it allows quantitative and qualitative data to be taken into account. In the case of exploratory analysis, such as the modeling of emerging business models, TwoStep classification automatically and statistically selects the appropriate number of clusters. This classification is implemented in the SPSS data processing software. This software combines two major advantages: it is the most popular among researchers in Management Sciences and is the easiest to use for managers.

By proposing a simple procedure for understanding evolving and dynamic business models, we seek to contribute to the literature on emerging business models, which lacks a concrete statistical procedure for building model taxonomies. To illustrate the steps of this procedure, we apply the TwoStep classification to a current emerging business model case: iPhone applications.

Our article is divided into four parts. The first defines the concepts of "emerging industry" and "business models" and explains the need to move away from static typologies and

adopt dynamic taxonomies. The second part proposes a classification procedure according to the TwoStep method and the third part exemplifies this procedure through the case study of iPhone applications. Finally, a fourth and final part concludes with theoretical contributions and the avenues opened by this research.

2. THE DIFFICULT MODELLING OF BUSINESS MODELS

2.1. Emerging industries and unstable business models

Emerging industries are "newly formed or reformed industries, which emerge as a result of technological innovations, changes in cost structure, the emergence of new consumer needs, or other economic and sociological changes that elevate a new product or service to the level of a potentially viable business opportunity" (Porter, 1980, p. 215). When a market or organizational form emerges, its characteristics are not fully defined. In this context, companies are less subject to conformism and have a greater propensity to experiment (Perkmann & Spicer, 2014). Emerging industries are characterized by a high level of strategic and technological uncertainty (Anderson & Tushman, 1990), insufficient information about competitors and market opportunities (Santos & Eisenhardt, 2009) and initially high and rapidly declining production costs. Emerging industries are formed by the pioneering activity of a few new companies, which benefit from the advantage of the precursor (first mover advantage), but also suffer from a high level of uncertainty and risk (Agarwal & Bayus, 2004). These companies face many specific problems, including the lack of infrastructure and standardisation of products and technologies, lack of credibility in the financial community and lack of regulatory approval. According to Porter (1980, p. 215), "the competitive problem of an emerging industry is that all rules must be established so that companies can then fight and prosper under them. These companies "are made vulnerable by the responsibilities of novelty" (Aldrich and Fiol, 1994).

Emerging industries are unstable and do not have sustainable business models on which competitors and new entrants can benchmark and position themselves. According to Woolley (2014), new companies must bear three burdens in this context: the risks associated with novelty, the lack of legitimacy and structure of the industry, and the uncertainty inherent in the technology. According to Aldrich and Fiol (1994), emerging industries can be considered stable when the number of companies in them stabilizes for at least a few consecutive years. The new activity is therefore legitimized by "institutional entrepreneurs", who have been able to create "technical and cognitive norms, motives and behavioural models in line with their identity and

interests", and have established them as recognized standards (Déjean et al, 2004). It therefore seems important, when trying to understand how an emerging industry evolves and structures itself, to study business models dynamically in order to understand their progressive institutionalization. Before moving further in this direction, however, it is necessary to present in more detail the concept of a "business model" and its definitions.

2.2. Definition and variability of the concept of "business model

The business model is a recent concept in the management literature, having emerged in the 2000s with the development of e-business (Amit & Zott, 2001). The development of a global IT network has caused upheavals in competitive dynamics and has led some companies to completely review their activities to bring them into line with current developments. The Internet has disrupted the daily lives of many industries, such as information and music, and has led to the collapse of some entry barriers, restructuring, mergers and bankruptcies, as well as major changes in consumer behaviour. It is in the context of this major upheaval that the use of the term "business model" has increased, to mark the necessary adaptation of business activity to a "high-speed environment" (Wirtz et al., 2010). New economy" companies have been extensively analyzed for their ability to mobilize intangible assets and integrate them into the core of their business model (George & Bock, 2011).

Throughout the development of the literature on business models, no standard definition has really emerged (George & Bock, 2011). The literature has remained fragmented and heterogeneous and the flowering of a multitude of idiosyncratic definitions has thus prevented the development of true cumulative research (Zott, Amit, & Massa, 2011). Nevertheless, as Zott and Amit (2013) have indicated, there are very clear signs of convergence in the literature that give the concept its consistency. First of all, business models are always defined as cognitive instruments, which make it possible to represent, make sensitive and easily understandable the "architecture" of an organization's business (Teece, 2010). The business model is above all a representation tool, which makes it easy to "visualize, understand and communicate a business logic" (Osterwalder, Pigneur, & Tucci, 2005, p. 19). This tool is not limited to the representation of specific elements, internal or external to the company, but rather provides a broad and holistic perspective (Schneider & Spieth, 2013), integrating a vast network of stakeholders and structures related to the production activity. It should also be noted that, from the outset, the business model was characterized by the notion of profit: "simply defined, the business model illustrates how a company makes money and maintains its profitability over time" (Stewart &

Zhao, 2000, p. 290). It is about capturing the "complex processes and mechanisms by which value creation occurs" (Zott & Amit, 2013, p. 403).

The fact that the business model is largely conceived as a holistic representation tool aimed at capturing the value creation process helps to understand why it is difficult for researchers to reach a consensus around a single definition. The business model incorporates a large number of stakeholders and external factors that influence a company's activity. Thus, depending on the local industrial and competitive context, the "formula" of the business model incorporates a highly variable set of elements (Spieth, Schneckenberg, & Ricart, 2014; Zott & Amit, 2013). As George & Bock (2011) indicate, the general mechanisms underlying the evolution of a dominant business model remain to be explored.

2.3. From static typologies to dynamic taxonomies

Since the emergence of the concept of a "business model", management research has focused on establishing typologies that seek to capture various industries, including the "new economy". Early research of this type (e.g. Timmers, 1998) focused on describing and classifying, by establishing lists of types of generic business models, often applicable to specific industries (Osterwalder et al., 2005). However, typologies are more than just classification systems. These are collections of ideal-types that meet three criteria according to Doty and Glick (1994): (1) they establish explicitly defined constructs that can be quantified, (2) articulate relationships between these constructs and (3) make their associated predictions testable and falsifiable. Thus understood, a typology can account for causal relationships across multiple configurations, and reduces complexity to conceptually and methodologically apprehensible levels (Hotho, 2014). Because of this explanatory and heuristic potential, they are particularly useful in management sciences (Delbridge and Fiss, 2013).

However, the typologies that have developed to describe business models have often been far removed from the dynamic, quantifiable and articulated ideal described by Doty and Glick (1994). Timmers (1998), for example, has compiled a list of ten business models for e-business, including e-shop, e-auction, e-mail and information broker. It has established its taxonomy according to the criteria of functional integration and degree of innovation. Its typology provides a "snapshot" of effective business models in a limited industry. It can therefore be blamed for its fixed nature: models fixed in taxonomies can be quickly defeated by the movement of competitive adaptation and technological upheavals. More generally, many of the business model typologies have been criticized for being too static (Demil & Lecocq,

2010). To overcome this impasse, one of the proposals made by Hotho (2014) is the construction of dynamic taxonomies. "While typologies are conceptual classification schemes, which may or may not be inductively based on characteristic cases, taxonomies are based on empirical case classifications that are often quantitatively assessed" (Hotho, 2014: 676). Such an approach - dynamic, quantifiable and articulated - would allow us to analyze business models chronologically, understand their progressive institutionalization and understand their fundamental determinants (Wirtz et al 2016; Teece, 2018).

The evolutionary nature of business models, relatively absent from the first typologies, must be better understood. Demil and Lecocq (2010: 227) stress the importance of understanding the evolution of business models "as a process of adjustment involving voluntary and emerging changes in and between essential components that are permanently linked". The evolutionary nature of business models is particularly acute in the case of emerging markets. In an unstable market, whose structures have not yet fully consolidated, it is difficult to intuitively understand how economic actors position themselves in relation to each other. It is necessary to base the analysis on a statistical processing procedure that allows dynamic taxonomies to be carried out, i.e. to regularly reassess the relationship between companies, on the basis of updated data, to determine how they are evolving and to understand how the market is becoming more institutionalised.

3. CLASSIFICATION PROCEDURE

First of all, the reader should be reminded of the definition of a classification. This is an analysis that collects observations in the form of homogeneous groups, called clusters. There are mainly three types of classification (Table 1): hierarchical classification, dynamic cloud classification and TwoStep classification. Although, for hierarchical and dynamic cloud classifications, there are workarounds to incorporate some qualitative variables, the resulting loss of information limits these classifications. The major advantage of TwoStep classification is that it is a mixed method.

Mixed classification methods allow both quantitative and qualitative data to be processed. They are implemented on different software, such as SPSS, SPAD, Tanagra and R. In our research, we will only highlight the mixed classification method of SPSS (i.e., TwoStep classification). This software combines two major advantages: it is the most popular among researchers in Management Sciences and is the easiest to use for managers. In addition, as its name suggests, the TwoStep classification performs two types of statistical analysis, which is

of great scientific importance. Indeed, classifications can be criticized for being too subjective (Ketchen & Shook, 1996). Therefore, it is necessary to use a two-step classification, as recommended in the literature (Hotho, 2014; Ketchen & Shook, 1996; Punj & Stewart, 1983). This is intended to strengthen the validity of the classification (Punj & Stewart, 1983). The advantage of TwoStep classification is that it automatically and successively performs these two steps.

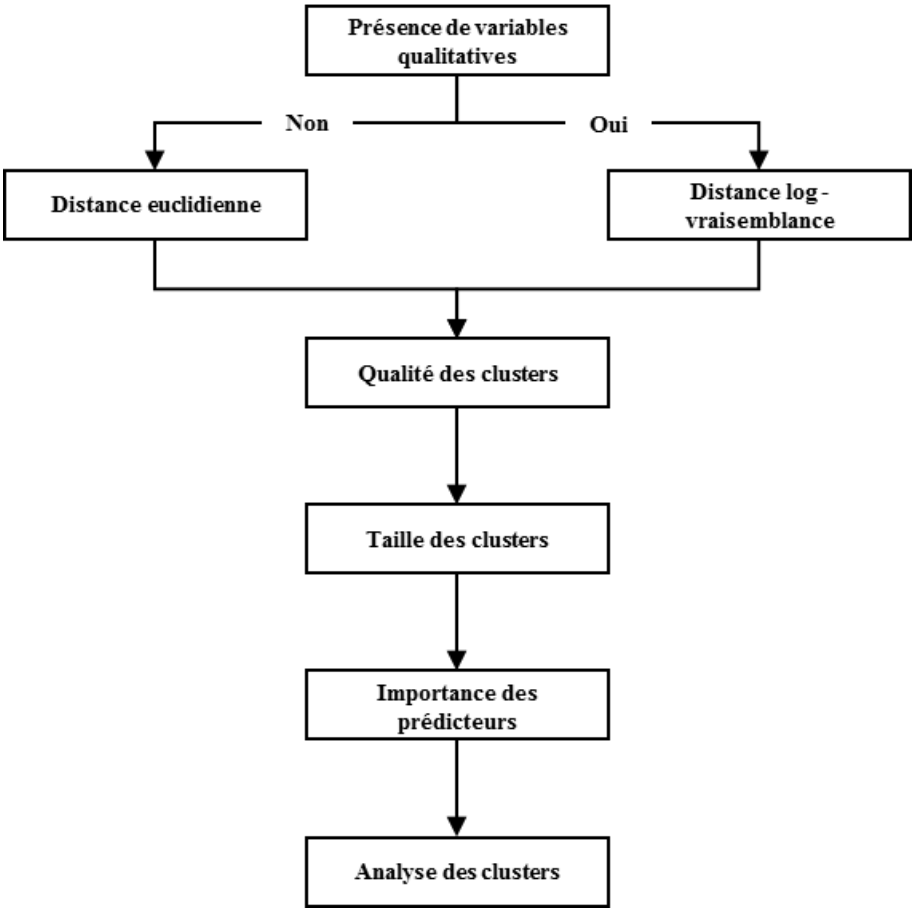
Table 1 — Comparison of classification methods

Méthodes de classification	**Conditions d'utilisation**
Classification hiérarchique	Base de données de taille réduite Etude exploratoire Variables quantitatives
Classification en nuées dynamiques	Base de données de grande taille Etude confirmatoire Variables quantitatives
Classification *TwoStep*	Base de données de taille indifférente Etude exploratoire et/ou confirmatoire Variables quantitatives et qualitatives

TwoStep classification allows quantitative and qualitative data to be taken into account. The analysis can be exploratory or confirmatory, depending on the needs of the researcher or manager. In the case of an exploratory analysis, the TwoStep classification will automatically and statistically select the appropriate number of clusters. On the other hand, during a confirmatory study, the researcher or manager determines, a priori, the number of clusters he wishes to obtain. Since our research focuses on modeling emerging business models, we will

only detail the procedure for conducting an exploratory study. The steps of this procedure are shown in Figure 1.

Figure 1 — Procedure



To illustrate the steps of this procedure, we apply the TwoStep classification to a current emerging business model case: iPhone applications. The objective is not to carry out a case study here, but to propose a pedagogical example of the implementation of the TwoStep classification. For this reason, only a limited and relatively undiversified number of variables will be included here.

4. THE EXAMPLE OF IPHONE APPLICATIONS

Business models for mobile applications are emerging (Täuscher & Laudien, 2018). By 2018, Apple's App Store has more than two million mobile applications, making it the second largest platform of its kind after Google Play. The service has generated more than $130 billion since

2010, with 170 billion downloads. French iPhone users use about 40 mobile applications per month. They have downloaded more than 4.5 billion applications since the creation of the App Store, representing $2.3 billion in revenue.

We propose here to model the business models of mobile applications for iPhone. To do this, we have a database of 6264 applications (Table 2). This database comes from Kaggle, the reference platform for data scientists.

Table 2 — App Store (n = 6264 applications)

Nom de la variable	Type de variable	Description	Échantillon
Catégorie	Qualitative	Livre, Business, Catalogues, Éducation, Divertissement, Finance, Nourriture et boisson, Jeux, Santé et remise en forme, Mode de vie, Médical, Musique, Navigation, Informations, Photo et vidéo, Productivité, Références, Achats, Réseaux sociaux, Sports, Voyage, Utilitaires, Météo	Le genre le plus représenté est celui des Jeux (54.3%)
Classification d'âge	Qualitative	4+, 9+, 12+, 17+	Les applications 4+ représentent 62.8% de l'échantillon
Gratuité	Qualitative	Oui/Non	54 % des applications de l'échantillon sont gratuites
Popularité	Quantitative	Nombre d'évaluations recueillies par l'application	Les applications recueillent, en moyenne, 14813 évaluations
Note	Quantitative	Note donnée par les utilisateurs, variant de 1 à 5	La note moyenne des applications est de 4.05

To carry out the statistical analysis, we follow our methodology presented above (Figure 2). First, we must answer the following question: "Does my database contain qualitative variables? "In the view of Table 2, we can answer in our case that yes (cf. the variables category, age classification, free). We are therefore launching a TwoStep classification analysis based on log-likelihood distance. The quality of the clusters then appears (Figure 2). We verify that the algorithm is indeed that of the TwoStep classification; the number of entries represents the number of variables included in the analysis (5); the analysis statistically shows five clusters; a quick look at the silhouette measurement of cohesion and separation shows us that our analysis is of correct quality. The signals are therefore green. We can now analyze the five clusters identified by the TwoStep classification analysis.

Figure 2 — Cluster quality

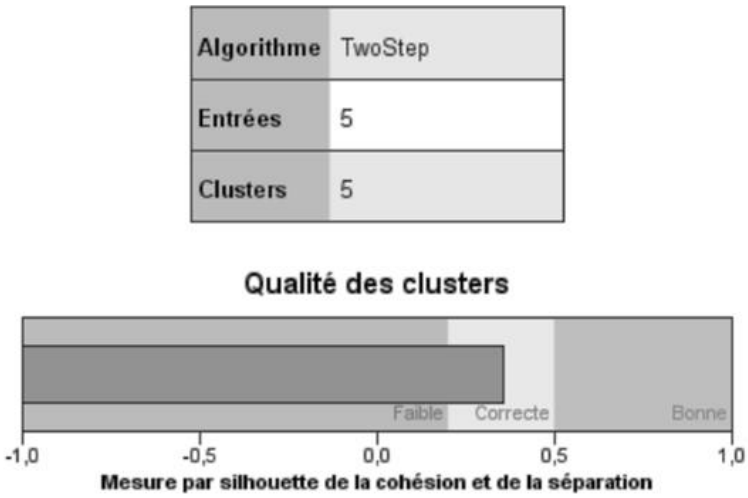


Table 3 shows the size of the smallest cluster (i.e., which contains the smallest number of iPhone applications; n = 1082) and the largest (n = 1657). In order to ensure the robustness of the analysis, these two sizes should be put into perspective. The size ratio between the largest and smallest cluster should be as low as possible. Indeed, this size ratio determines the silhouette of cohesion and separation.

Table 3 — Cluster size

Taille du cluster le plus petit	1082 (17.3%)
Taille du cluster le plus grand	1657 (26.5%)
Rapport des tailles	1.53

Figure 3 shows the importance of predictors. Predictors are the variables in our database. They are ranked in order of importance (i.e., according to the weight of the variables in the formation of the five cluster structure), from strongest to weakest. We see here the preponderance of qualitative variables (i.e., free, category and age classification). It is by taking into account the importance of these predictors that we can finally study the very content of clusters.

Figure 3 — Importance of predictors

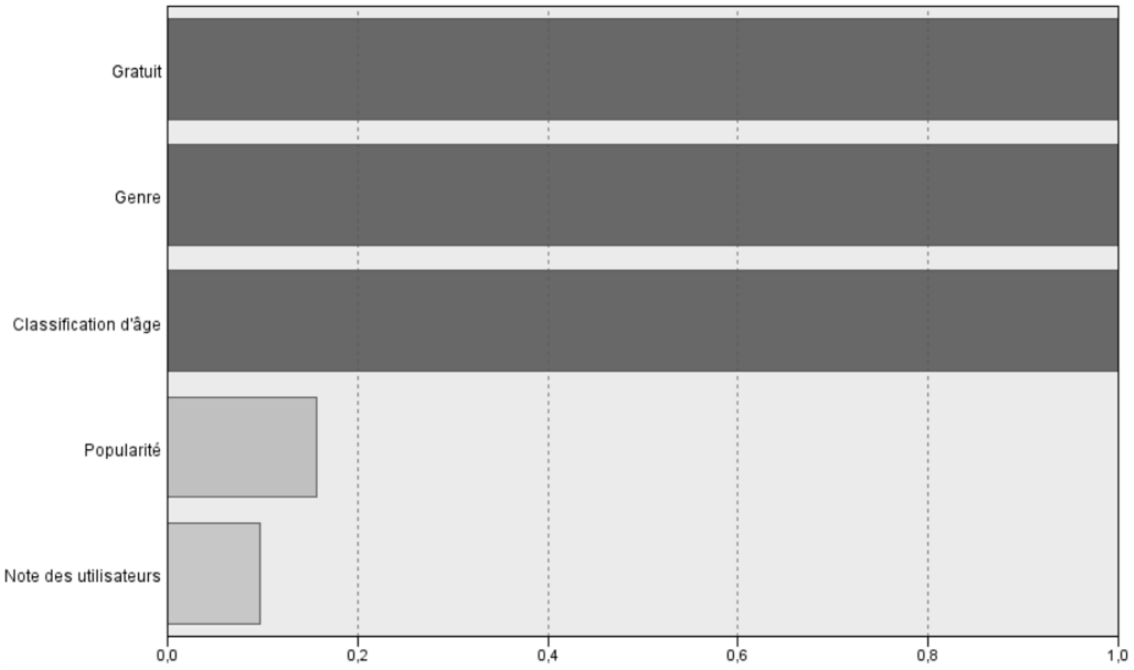


Table 4 represents the clusters that have statistically and automatically emerged following the TwoStep classification analysis. We have named each of the clusters according to their constitution. In this regard, we have just defined the five business models present in the ecosystem of mobile applications for iPhone: age-limited pay games, free applications for millenials, free popular platforms, niche pay applications and free games for all audiences. For each business model, we provide examples from our database. For example, among the applications whose business model is free games for all audiences are Candy Crush and Angry Birds.

Table 4 — Clusters

	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**	**Cluster 5**
Nom	Jeux payants avec limite d'âge	Applications gratuites pour millenials	Plateformes populaires gratuites	Applications payantes de niche	Jeux gratuits tous publics
Taille	1082	1221	1138	1657	1166
Catégorie	Jeux	Jeux Divertissement Réseaux sociaux	Divertissement Photos et vidéo Éducation Achats Réseaux sociaux	Jeux Éducation Photo et vidéo Productivité Utilitaires	Jeux
Class. d'âge	9+ et 12+	9+, 12+, 17+	4+	4+	4+
Gratuit	Non	Oui	Oui	Non	Oui
Popularité	Basse	Moyenne	Élevée	Basse	Moyenne
Note	Élevée	Moyenne	Basse	Moyenne	Élevée
Exemples	Call of Duty: Zombies Assassin's Creed Grand Theft Auto III Street Fighter IV Resident Evil 4 The Sims 3 Final Fantasy Rayman Jungle Run Lara Croft GO Warhammer Quest	Pokémon GO Clash Royale Boom Beach Hearthstone Agar.io Tinder Badoo Reddit Twitch Hulu musical.ly YouTube Music Amazon Prime Video	Facebook Instagram Twitter WhatsApp Snapchat LinkedIn Netflix YouTube Spotify Amazon Skype Airbnb TripAdvisor Uber Duolingo	Tetris Scrabble Premium Where's My Water Sunday Lawn Flick Home Run! CamScanner + PicLab Studio PDF Reader Pro Printer Pro Yoga Studio iTranslate Voice iStudiez Pro TeachMe	Candy Crush Soda Saga Angry Birds HD Angry Birds 2 Bejeweled Classic Solitaire Rayman Adventures Sonic All-Stars Racing FIFA Mobile SimCity BuildIt Madden NFL slither.io

5. DISCUSSION

The TwoStep classification procedure proposed in this article can be interpreted as a response to Hotho's (2014) call for the construction of dynamic taxonomies. Each taxonomy established on the basis of this method is a "snapshot" of the business models in use in a given industry. To understand the successive recompositions of business models over time, it is necessary to regularly repeat the analysis procedure, in order to obtain a succession of "clichés" that can then be organized sequentially. To do so, it is necessary to regularly reassess the relationship between companies, on the basis of updated data, to determine how they are evolving in relation to each other. By regularly repeating the TwoStep classification procedure, the researcher will be able to identify the different development phases of an emerging industry, but also to identify the moment when it becomes institutionalized, when market forms eventually crystallize. Thanks to this sequencing work, the researcher will be able to evaluate, a posteriori, the factors that have had the greatest impact on the construction and stabilization of the industry.

Our article thus responds to the need to propose a representation of evolutionary and dymanic business models based on component modeling. It is based on the TwoStep classification procedure, little discussed in the management literature, and never before recommended for building taxonomies.

The example we have chosen to illustrate the TwoStep classification procedure concerns the emerging market for mobile applications. Since the objective of our article is to develop a methodological procedure and not to analyse this market, we have deliberately included a limited number of variables in our demonstration. This is based entirely on product variables and is limited to data collected on a single device, the App Store. A research procedure that goes beyond the example to analyse the institutionalisation of the digital applications market should include, in addition to qualitative and quantitative product variables, organisational data (e.g. which company operates the application? what are its resources and skills?). As we have seen in the first part of this article, business models generally incorporate a large number of stakeholders and external factors that influence a company's activity, factors that vary greatly depending on the local industrial and competitive context. Such research should also repeat the manoeuvre over several years in order to create a "sequence" from which it would be possible to identify inflection points and institutionalization of the market. This work is a research avenue, which would allow to verify ideas often expressed, but not well documented, concerning applications.

For example, our TwoStep classification procedure could be used to study Apple's monopolistic practices on its platform. As a Wall Street Journal survey indicates, Apple is suspected of manipulating the search results of the App Store, to the benefit of its own applications. For free applications, the first places are occupied by Apple applications in 60% of cases. When the user is looking for applications with high added value, and therefore for a fee, the results highlight applications from the parent company in 95% of situations. Apple disputes these observations from journalistic investigations. Our TwoStep classification procedure could make it possible, in the long term, to study the monopolistic or not of Apple's activities on its platform. By taking snapshots, at regular intervals, of the App Store's business model configuration, we may be able to see the emergence of a cluster composed solely of Apple applications.

The TwoStep classification procedure presented here is particularly well suited for analysing emerging business models, but can also be used to analyse markets in crisis. As Porter (1980: 215) explains, "from a strategic point of view, the problems of an emerging industry also arise when an old industry experiences fundamental changes in its competitive rules". Any industry can be disrupted by environmental changes and be forced to "confront strategic issues that do not differ substantially from those in an emerging industry".

Compared to other classifications (i.e., hierarchical and dynamic cloud classifications), the TwoStep method is the most relevant for generating evolving and dynamic representations of business models. Indeed, although they propose bypasses to integrate certain qualitative variables, the other classifications are limited to quantitative variables and are therefore victims of a loss of information. The TwoStep classification is a mixed method, i.e. it can process both quantitative and qualitative data. In addition, TwoStep classification automatically and statistically selects the appropriate number of clusters, which is central to exploratory research, such as modeling emerging business models. The scientific robustness of the results is supported by a two-step algorithm. As its name suggests, TwoStep classification performs types of statistical analysis. This has the effect of eliminating arbitrariness and giving the researcher or manager control over his tool.

However, the procedure we present in this article has limitations, which relate to the problems posed by the very concept of business models. The procedure makes it possible to perform dynamic taxonomies and sequence them, but does not prevent a relative impoverishment of the analysis, if the set of variables considered during the operation proves too narrow. Business models offer, as mentioned, an inclusive, broad and holistic perspective. These are heuristics, which have the advantage of readability, but which can sometimes be

blamed for reduction effects. So, Aversa, and alii. (2015) explain that research in the field has paid little attention to the fact that companies often use several business models simultaneously. Sequencing work can also be made difficult by the fluctuation of the variables to be considered. Each new snapshot, each new taxonomy operation, may require the addition of new variables, of recent appearance, to the operation and the removal of others, which have lost all importance. These fluctuations complicate the reproduction of the procedure and the final comparison of results.

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