Limited evidence for servitization in UK Publishing: an empirical analysis

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Abstract

Servitization is a strategic transition of firms towards the creation of additional value through services. In this study we adopt a data-driven approach and assume that company activity descriptions are representative of their activity and partly reflect the adopted strategy. We hypothesise that if there is a trend of traditional publishing firms adopting servitization strategies, this should emerge from textual analysis of company descriptors. Relying on data-driven analysis of publicly available company information for UK and Ireland, we find no significant evidence of strategic diversity as a single group emerges from diverse clustering methods. Our results show either that the publicly available dataset is not representative of the publishing strategy in industry or that there is no real evidence of servitization in the publishing sector. Implications for theory and for industry are discussed.

1 Introduction

Competing purely on costs, quality and technology is becoming more difficult to sustain (Mathieu, 2001; Vendrell-Herrero et al., 2017). A number of manufacturing firms are adopting strategies to create additional value from existing core business by offering services (Wise and Baumgartner, 1999; Neely, 2008; Rebetino et al. 2018; Kohtamaki et al., 2018). Named 'servitization', the move is a phenomenologically observed strategic transition by firms seeking to create additional value through services, usually as additional offers that complement core-products (Vandermerwe and Rada, 1988; Lightfoot, et al., 2013; Peillon et al., 2015).

There is a complex relationship between the integration of a firm's core-products and their customer-oriented services, and understanding is still developing on how they generate additional value together (Vandermerwe and Rada, 1988; Visnjic and Van Looy, 2013; Rebetino et al. 2018; Bustinza et al., 2018; Leoni 2019). In truth, consumers are not interested in products or services, but rather the service that a resource renders and the related experience they gain from interaction (Vargo and Lusch, 2004).

Servitization occurs in numerous industries and this paper focuses on book publishing. The publishing market sector retains pure manufacture in the form of physical printed product, and has firms offering a broad spectrum of digital and service offers both business-to-business and business to consumer. Publishers have been studied previously (Tian *et al.,* 2008; Tian and Martin, 2011; Viljakainen *et al.,* 2013; Øiestad and Bugge, 2014; Viljakainen and Toivonen, 2014; Vendrell-Herrero et al., 2017).

Specifically, this study builds on the work of Kharlamov and Parry (2019) who used textual analysis of company descriptors linked to financial data to examine the structure of the book publishing market in the UK. Kharlamov and Parry (2019) employ a positivist approach to the research of servitization. The method employed supervised analysis of textual descriptors of companies, where researchers label the input data used for analysis. Based on the analysis UK publishers were classified as "pure publishers" (P), "digitised publishers" (D), "servitized publishers" (S) and, "digitised and servitized publishers" (DS), extending Neely's (2008) classification.

In this study we repeat the Kharlamov and Parry (2019) study on UK publishers using a different, unsupervised methodology. No labelled input data are used, but rather word pairings and similarities are sought from the data. We hypothesise that if there is a trend of transitioning from traditional publishing strategies towards servitization, more than one group should emerge from textual analysis of company descriptors. The results presented here show that in taking this approach no group emerges from the data. We propose three ways to interpret our result. (1)Our research methodology may be flawed such that we are unable to clearly identify firms from their descriptions. (2) The publically available dataset (the same set as used in Kharlamov & Parry, 2019) is not representative of the publishing industry. (3) The evidence for servitization in the publishing industry is not as strong as positivist analysis suggests.

This paper proceeds as follows. First, a literature review explains product, service, servitization, and digitalisation. Examples are provided of positivist empirical studies, including our previous work. Different methodologies and their potential impacts on findings are also reviewed. The research methodology explains the unsupervised approached used in this study. Results of the research are then presented and discussed in light of the literature. The paper ends with conclusion and future work.

2 Literature

Servitization is the name given to a strategic transition a firm adopts to create additional value through services (Vandermerwe and Rada, 1988; Kowalkowski et al., 2017a). Manufacturing firms (Neely, 2008; Kowalkowski et al., 2017b) and service businesses (Myrthianos et al, 2014; Parry et al., 2018; Ketelhöhn and Argüello, 2018) seek to growth through diversification of their business models, creating new service offerings in order to gain additional revenues. The servitization literature is progressing understanding of the complex relationship between the integration of the firm's core-products and customer-oriented services (e.g., Kohtamäki et al., 2013), and how together they can create additional value for the firm (Vandermerwe and Rada, 1988; Parry et al., 2012; Brax and Visintin, 2017). Servitization offers an alternative strategy for competition encompassing offers of a combination of goods and services to meet a broader swathe of customer value requirement (Baines et al., 2016). To add services firms need to develop new capabilities, though services in turn provide benefits including locking out competitors and retaining customers, helping to influence product sales through customer contact and potentially maintaining higher profit margins (Gebauer *et al.,* 2005; Olvia and Kallenberg, 2003; Kowalkowski et al., 2017a; Story et al., 2017; Kamp and Parry, 2017).

Neely (2008) and Benedettini et al. (2015, 2017) analyse financial and economic performance related to servitization of manufacturing firms. Kharlamov and Parry (2019) advance this systematic approach to classify publicly available company data, building and improving on the previous methodologies to identify statistically significant differences in economic and financial performance between servitized, digitized and traditional publishers.

The positivistic approach although powerful in most applications, can lead to questionable generalisations. Identifying statistically significant differences between a priori identified groups can lead to potential issues in the external validity of such analysis. The positivist supervised learning employs prior knowledge of what the output values of an analysis 'should' be. Effectively the analysis employs model answers of the expected text and then the algorithm searches for that text and returns the desired results. This is an empirical positivist approach to research.

Neely et al. (2008) uses a semi-automated process, that represents a positivist study using a supervised algorithm. Data is drawn from the OSIRIS database with financial data on 50,000 global firms. The analysis focuses on manufacturing firms of +100 employees and data is collected from 25 countries. The text descriptors are transferred into excel where categorization was undertaken using keywords and phrases. As part of the method 50 firms are manually coded and then automated using search strings e.g. IF(ISNUMBER(SEARCH("consult*",$D4)),1,0.

3 Methodology

As an alternative to pre-defining segments and then analysing their differences, an unsupervised analysis can be used, where groups naturally form based on similarities (Rokach & Maimo 2005). If conceptual groups do indeed exist their relevant features should coalesce them into similar groupings. Such unsupervised learning has no specified target to search for, but rather looks for repeated commonality within data and reports natural structure within a dataset. The value of the use of non-positivist approaches is that researcher can be creative and introduce new conceptual ideas that can later be tested in practice using quantitative methods. Non-positivistic studies tend to avoid generalizations and make localized claims that are often only applicable to the context in question (Rokach & Maimo 2005).

Firm data is drawn from the FAME database that offers financial data and company reports of UK and Irish companies (Bureau Van Dijk, 2015). We extract the overview (trade description, full overview, history, primary business line) and financial data (Number of Employees per Year, Turnover per Year, Turnover per Employee, Profit per Employee per Year, Return on Assets (ROA), Profit Margin per year) from FAME to build the dataset used in this paper, which include variables not previously considered by Neely (2008). The extracted data contains firm's financial performance over a period of 10 years. The entire population of publishing firms contains 2,850 observations. The panel is unbalanced since for some of the publishers data was absent for some of the years between 2007 and 2016. Some of the reasons behind our inability to collect financial data for a subset of publishers are due to: (i) some companies going out of business as of 2007; (ii) records for several businesses missing in the database; (iii) several records not updated for many years. Our requirement for inclusion of a publisher into the sample is that they have economic, financial and staff data in the records between 2007 and 2016. Analysing data in the panel format rather than simple cross-section allow us to capture the dynamic nature of the publishing business. This method does not allow for a longitudinal analysis as overview descriptions are available only for the date of extraction. Previous descriptors are not kept within the database. We made requests to Bureau Van Dijk, but the descriptors are not available.

Table 1 Extracted data fields

Type	Field
Overview	Trade description
	Full overview
	History
	Primary Business Line
Financial Data	Number of Employees per Year
	Turnover per Year

	Turnover per Employee
	Profit per Employee per Year
	Return on Assets (ROA)
	Profit Margin per year

In order to create similarity scores we adopt the following procedure based on Guru et al. 2004 and Kerr et al. 2008, which is aligned with techniques presented in Rokach & Maimo, 2005. The descriptive information is collated, transformed into lower-case and punctuation is eliminated forming a long array or words respective to a specific firm. A total of 285 arrays are obtained (one per firm). To create the full list of all possible terms used in the sample, we collate all 285 descriptive arrays into one and that large array is then broken up into single words. All duplicates are removed, resulting in a pool of 3421 unique words. In order to score each firms similarity, we search for each of the 3421 words in the original firms descriptors (285 arrays). If the unique word searched is present in the array describing the firm, it is attributed 1, otherwise the word scores 0. This is repeated for all the 3421 unique words for each of the 285 arrays describing firms, which forms Boolean arrays made of 1's and 0's. This translates into a total of 974,985 searches overall. The size of the Boolean matrix is 285 by 3421 where lines contain Boolean arrays marking positive and negative search results. To calculate the directional proximity score for a pair of firms, we sum the product of the multiplication between the Boolean array i of one firm and another Boolean array j divided by the length of the array A. The formula below represents the proximity between firm i to firm j where proximity is directional and normalised.

$$Proximity_{ij} = \frac{\sum A_i A_j}{\sum A_i A_i}$$

A = Boolean matrix with all possible keywords vs. all firms

$$Total\ number\ of\ keywords\ for\ Firm\ i = \sum A_i A_i$$

$$Number\ of\ common\ keywords\ for\ Firm\ i\ and\ Firm\ j = \sum A_i A_j$$

The normalised proximity score ranges from 0% (no common words) to 100% (description i is fully contained in description j).

Finally, the proximity matrix containing all the pairwise proximity scores is clustered and analysed using both textual analysis as well as profiled using financial and economic data if any significant differences between textual data are found.

4 Results

The analysis suggests that the sample should be broken up in two groups. Sorted by two groups, the proximity matrix is colour coded and illustrated in Figure 1. The colour coding associated blue to 0%, orange to 50% and red to 100% with the respective gradient encoded in between. The similarity within each of the two clusters is 52% in both clusters. Cluster B is 62% similar to cluster *A*, but cluster A is only 40% similar to cluster *B*. The resulting scores are plotted in Figure 1 where all 285 firms are compared pairwise in a square 285x285 matrix. Due to size, the scores are colour coded to represent the distribution between 0% and 100% similarity. The visual inspection of the figure suggests that there are no significant differences between possible groups.

Figure 1 Proximity matrix heatmap (directional and normalised)

Using clustering on the proximity matrix, we select a hierarchical clustering method based on squared Euclidean distances. The reason behind selecting this clustering method is its robustness and ease of interpretation as the routine starts by closeting the most similar pair and expands further based on the distance between items, repeating the process until a single cluster remains. One of the methods of selecting the number of clusters is based on the subjective judgement of the aggregation dendrogram. Visual inspection of the dendrogram suggests that the group exhibits two major clusters.

Figure 2 Cluster 1 word cloud

The analysis of the two clusters in terms of textual description is represented in Figure 2 and 3. In Figure 2 cluster 1 is characterised by keywords such as publishing, books, company. Wordclouds are one of the many ways used to represent textual information based on bibliometrics (Rokach & Maimo, 2005). The word cloud illustrating cluster 2 in Figure 3 is not obviously visibly different with the same set of words being the most prominent. Whilst Wordclouds can provide insight to recurrent themes and dominant keywords contained in a

sample, they require further analysis to gain insight into deeper meaning (Leginus et al., 2016; Stott et al., 2018).

Figure 3 Cluster 2 word cloud

The observation of Table 2 listing the top 25 keywords is also inconclusive regarding the different focus between the two clusters. Terminology that can be associated to servitization: service*; management; distri*; marketing; langua*; illust*; financial*; conference*; transl*; organization*; organisation*; wareh*; subscription*; membership*; event*; conver*. Terminology that can be associated to digitization: electronic*; digit*; audio; online; softw*; web*; eboo*; internet*; e-boo*. Both sets show approximately the same split of words, without any significant differences.

Table 2 Top 25 keyword frequency for cluster 1 and cluster 2.

Cluster 1		Cluster 2	
379	Books	198	Company
347	company	156	Publishing
239	publishing	114	Books
164	engaged	97	Engaged
134	united	84	Book
98	publication	83	United
88	book	66	Services*
83	Services*	60	Limited
83	limited	56	Kingdom
83	known	54	Registered
77	kingdom	46	Business
72	formerly	44	Office
71	office	38	Publication
67	located	37	Holding
66	registered	35	Known
61	business	35	Music
58	group	34	Located
57	london	32	Management*
56	publishes	31	Incorporated
56	also	31	Formerly
54	publisher	31	London
50	Distribution*	28	Provision
49	incorporated	26	Operates

44	products	25	Head
42	children's	25	New

The analysis above leads to an inconclusive result as the unsupervised method fails to detect any significantly different groups of publishers in terms of their descriptive information. We find no significant evidence of strategic diversity with these results. Ultimately it is a single group descriptor that emerges from the clustering method.

5 Discussion and Conclusion

The originality and contribution of this work is the use of unsupervised clustering to detect naturally occurring groups in large datasets: we don't prescribe categories of firms to match our understanding/bias. This sets our work apart from most previous studies on servitization (Neely, 2008; Benedettini et al., 2015, 2017), which start with a priori defined groups and in most cases successfully find differences between them.

In undertaking this analysis, we find no clear trend in UK data in terms of observable differences in the strategies of publishers, assuming that the descriptive information is in part representative of the strategy or focus adopted by the respective firm. Our results lead us to three potential outcomes, that either: the research methodology is flawed; the publicly available dataset/descriptor is not representative of the publishing strategy in industry; or that there is no real evidence of servitization in the publishing sector.

Failure to detect the differences could be attributed to the possibility that the methods employed in this research are flawed. Future work will test this hypothesis using a larger dataset. We will undertake an analysis for whole of the EU, in either manufacturing or publishing. To test if the descriptors are representative we will further experiment with a different method using webscraping to gather textual descriptions of activities and offers from company websites. We believe that collection of primary data directly from firms as opposed to via third party aggregators is potentially more representative and complete than the FAME database.

If the third of the potential outcomes of our analysis is correct, it poses a challenge to existing rhetoric about servitization and digitization. The evidence from analysis does not recognise the widespread existence of servitization. Failure to detect it can mean that servitization is perhaps not as ubiquitous as some may suppose.

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