

SERVICE INNOVATION IN TIMES OF ECONOMIC CRISIS: THE STRATEGIC ADAPTATION ACTIVITIES OF THE TOP E.U. SERVICE FIRMS

Abstract

This paper examines the long-term strategic adaptation activities top service firms use to respond to economic crisis. Based on a longitudinal dataset of 97 leading European service firms, it empirically conceptualizes three clusters or strategic types of organizational response to overcome long-term financial strain experienced during 2008-2011, it tests the survivability of their strategic orientation and it assesses their relationship with organizational performance during the crisis (2008-2011) and in the post-crisis period (2014-2016). Leading E.U. service firms that attempt to maximize adaptation by 'Commitment-to-expansion' (i.e., increase in R&D investment, strategic M&A and recruitment) ensure the long-term survivability of their strategic orientation and generate growth in their operating profits, sales and market capitalization in contrast to service firms that implement cost-oriented actions (layoffs and cutting back on R&D investment). These results extend the limited knowledge available on strategic adaptation in top E.U. service firms and provide insight into the role that different responses play in fostering recovery from ongoing economic and financial crisis, which have thus far remained empirically under-researched.

1. Introduction

Today, service firms across the globe are recovering from severe economic and social challenges. The 2008-2011 economic downturn hampered corporate expansion and led to increased financial constraints and reduced output. Compared to short-term external threats, global crisis brings together environmental uncertainty, increased complexity, ambiguity and unpredictability (Davis et al., 2009). To recover, service firms face the challenge of developing organizational responses aiming to increase their tolerance of uncertainty and to find new and sustainable sources of growth (Martin-Rios and Parga, 2016a; 2016b). Strategy

theory describes this adaptive process as strategic adaptation and renewal, defined as a firm's ability to disrupt inertia by modifying or replacing its core competencies and capabilities to ensure long-term performance and survival (Agarwal and Helfat 2009). Most of the empirical literature in the field has focused on identifying relationships between external threats and specific management actions (leadership characteristics, product re-positioning or technological changes) (e.g., Lewin et al., 2004). Focusing on the strategic adaptation dynamics associated with long-term financial strain provides an opportunity to examine how service renewal—encompassing innovation, market entry, and labor investment—facilitates adaptation and enables long-term performance. Despite recent advances in our understanding of strategic adaptation, the discussion of how service firms' responses to economic crisis affect organizational outcomes and financial value has just begun. As a result, we do not have a very good understanding of the sector's adaptive behavior in times of environmental scarcity. This raises the following questions: *How do service firms manage the challenges associated with strategic adaptation during times of economic downturn? Also, to what extent do different strategic adaptation actions have a strong and lasting effect on service firms' performance?*

The service sector is the biggest growth driver of the global economy. For industrialized regions, Europe included, it accounts for 75% of GDP. Service industries are also heterogeneous in nature and diverse in terms of variations in the service delivery. This is relevant, as service providers have a wide range of business approaches, from retail to insurance, to media and from financial services to banks and health care. Drawing on the strategic adaptation (Agarwal and Helfat, 2009) and organizational adaptive behavior (March, 1991) literature, it is theorized that service firms do not implement one unequivocal adaptive strategy in addressing the constraints of economic crisis. Speed-to-market innovation decisions are embedded in an environmental context (Jansen et al., 2006). Compared to

manufacturers, value creation in the service sector differs significantly. Value creation in new service development has a shorter life cycle and requires more customer involvement than in manufacturing organizations (Janssen et al., 2016; Martin et al., 2016). Accor Hotels, Deutsche Bank and British Sky Broadcasting are examples of rapid adaptation and service innovation. Apparently, these companies demonstrate a different adaptation model than product-based companies (e.g., Volkswagen, Siemens, or Bayer).

This paper reports repeated (multi-wave) cross-sectional survey research on strategic initiatives leading to service renewal of leading European service firms. For the purpose of this study, we define top service firms in terms of R&D investment and institutionalization. Only service firms where R&D activities are continuous over the economic crisis period were selected. This non-random sample accounts for differences of smaller magnitude; but it also helps address strategic adaptation and renewal strategies in a larger perspective (over a nine-year period). To address our research questions, we apply cluster analysis to the strategic adaptation framework grounded in the work of Agarwal and Helfat (2009). Cluster analysis facilitates understanding how (and why) service renewal develops over time by means of conceptualizing and detecting patterns among the firms under study. The goal of this classification procedure is to contribute to a better understanding of organizational responses to the 2008-2011 economic crisis in this heterogeneous sector and its long-term implementation over the 2012-2016 period. In turn, this paper aims to improve understanding of the performance of strategic initiatives by testing the resulting organizational performance consequences of each conceptual cluster with Cox regression and linear regression models.

The unique contribution of this paper lies in providing evidence of within-industry heterogeneity in strategic adaptation efforts and outcomes. It shows how certain service firms respond to economic downturn by means of expansion initiatives that help reinvent their service offering. A crucial element of these responses is their reliance on innovation,

particularly R&D (Leiponen, 2012; Miles, 2007). We propose that R&D constitutes an important adaptation strategy for top service firms that face economic hardship over a sustained period. The implications of this study are quite extensive, given that leading service firms, as a primary driver of economic wealth in advanced economies, find themselves deeply affected by managerial challenges in terms of anticipating and reacting to changes in the environment, particularly in the treatment of innovation strategy, market entry, and labor investment.

2. Literature Review

2.1. Strategic adaptation and organizational adaptive behavior

Strategic adaptation theory addresses the adaptation and renewal of firms to environmental turbulence and interprets adaptation as proof that “firms had superior regimes of routines or optimal resource allocation strategies that account for competitive advantage and therefore, for survival” (Volberda and Lewin, 2003: 2112). Adaptation and renewal is a strategic capability for containing and creating change. Such strategic choice perspective allows for incorporating an inside-out approach as it assumes that organizations survive or fail as a function of their ability to read and interpret patterns in the environment and adapt over time (McKinley et al., 2014). The strategic adaptation literature primarily deals with the context of strategic renewal and the macro-level mechanisms (i.e. strategic management practices) that may prompt renewal (Flier et al., 2003). Each firm requires distinct operational modes and management processes, and thus the question of prioritization among them is essential from a strategic point of view (Junell and Stahle, 2011).

Research has shown the relevance of performance drivers, such as innovation investments, mergers and acquisitions, joint ventures, alliances and portfolio management, which enable renewal particularly in times of munificence (Volberda et al 2001; Baden-Fuller et al, 1997, Stopford et al 1994). As the literature on strategic decision-making demonstrates,

basic innovation and M&A account for the largest share of strategic actions (Schmitt et al., 2017). These activities facilitate market penetration, product launch and structural change. Innovation strategy has also been of central interest in recent years because it is vital for strategic adaptation as well as for competitive advantage (D'Alvano and Hidalgo, 2012). A primary focus in innovation research is the identification and measurement of R&D intensity in firms (for an overview, see Smith, 2005). In addition, labor investment (increase in headcount or labor reduction) is an important adaptive action (Volberda et al., 2001). Firms must decide whether to invest in their talent pool or cut investment and substitute labor. Finally, market entrance, which usually takes the form of strategic alliances, joint ventures or mergers and acquisitions (M&A), has been the primary focus of a number of recent studies on adaptation and renewal (Kiss and Barr, 2015).

There is less research explaining long-term strategic adaptation in times of economic downturn (Schmitt et al., 2015). Causes of organizational performance and survival are associated with external factors. Adapting poorly to environmental scarcity might result in organizational decline. Organizational adaptive behavior involves learning and acting, which is grounded in adaptation and renewal to meet environmental changes (March, 1991). Agarwal and Helfat's (2009) theoretical model of strategic renewal includes incremental or cost-oriented and discontinuous or expansion activities. Cost-orientation includes experimentation and sequential and gradual alterations to the core businesses of certain firms. In pursuing an incremental strategy, a firm focuses on how it can have the best chance of meeting its short-term financial obligations by minimizing its expenditure. Incremental actions, specifically organizational downsizing, improve efficiency but tend to reduce the total knowledge base of the firm. Yet, reducing the size of the workforce is seen as enabling firms to gain tight control of its cash flow. Strategic renewal also includes expansion transformations. These include replacing multiple dimensions including the business model,

resources and capabilities, technological base, and organizational structure. Firms that implement discontinuous renewal seek to compete in a new way, either in their existing industry or by entering new industries to overcome environmental shocks. These actions attempt to maximize recovery via transformation actions, which are expected to create organizational value and achieve substantive outcomes, not just maximize outputs (Pearce and Robbins, 2008). Yet, they are costly and require considerable time to produce results. Finally, firms may adopt a mix of strategies for dealing with decline effectively, which suggests that both activities—incremental and discontinuous—are interrelated and can occur simultaneously (Schmitt and Raisch, 2013).

2.2. *Service response to economic downturn*

Research typically focuses on responses by manufacturing activities to more or less short-term external threats (McKinley et al., 2014). Less is known, however, about how services fare in the face of external crisis and the practices they adopt to overcome it. Due to the distinctive nature of their business and organization, service industry firms promote adaptation and address environmental decline in various ways. For example, time-to-market and customer interface are unequivocally different between manufacture and service firms. Whereas manufacture firms might hold the introduction of a given innovation, services must react promptly to customers' demands, thus having lower degree of control over the innovation process (Sundbo and Gallouj, 2000). According to the strategic adaptation view of economic crisis, service firms' responses can be categorized into different groups based on similar patterns of adaptive behavior. Yet, research into this area is severely constrained by data availability. Theory contends that service firms that purposively address economic decline by actively developing renewal plans have a better chance of adapting to the situation and generating organizational growth (Flier et al., 2003). There is some evidence that certain service firms are more likely to implement discontinuous adaptation actions in the face of

environmental scarcity (Zuñiga-Vicente and Vicente-Lorente, 2006). These studies point to distinctive features of service innovation and their relevance for service adaptation and success, including the adoption of new ways of organizing work processes and managing employees, innovating the customer experience, and fostering internal and external relationships (Martin et al., 2016). Recent studies offer empirical evidence about the substantial role that R&D plays in service firms' innovation strategies (Leiponen, 2012). Also, the decline literature has found that M&A is an important medium used to enter new markets, expand service portfolios, and gain access to resources, for example in banking (Kjellman et al., 2014) and the airline industry (Lawton et al., 2011). Nonetheless, there is little research that supports that idea in the context of economic crisis. There is a lack of consistent research to classify adaptation and renewal actions in the service industry, unlike the ample literature in manufacturing.

2.3. *Economic crisis and service adaptation firms*

When a firm faces strategic uncertainty, such as when environmental turbulence has generated severe financial distress, it requires action in a time frame that is shorter than a regular planning cycle (Smart and Vertinsky, 1984). Economic crisis provokes environmental complexity, increases perceived environmental uncertainty and determines how well service firms can understand or predict the external changes and trends affecting their businesses. Economic crisis shrinks the economy and constitutes a threat to firms, consumers, competitors and suppliers. The potential harm to an organization requires managers to take steps to protect the company from further damage. This connects to a central problem in the strategy field: whether firms are driven by the environment or their own decisions (e.g. management) (Volberda and Lewin, 2003). Firm behavior, like strategic adaptation, is an important consideration in times of economic downturn. Service firms need to make urgent decisions regarding employment, layoffs, growth and alliances and innovation strategy (e.g., planning

and R&D). Yet, firms vary in their strategic responses to conditions of economic decline (Schmitt et al., 2015) and their long-term commitment to adaptation actions.

The economic crisis of 2008-2011 was a period of market turbulence and sharp decline. Market turbulence relates to the degree of instability and uncertainty within a firm's markets. During that period, both the financial and productive sectors were affected, wreaking unprecedented global havoc. The fallout was particularly severe in Europe (Guillen and Suarez, 2010). According to Eurostat, annual GDP grew at a compound annual growth rate (CAGR) of 1.5%, which is less than the CAGR of GDP during the same period in the U.S. (6%). Although service activities are heterogeneous and show different exposure to the economic downturn, practically all activities saw a deceleration in their growth rates (average -3.2%) (OECD, 2015). According to Eurostat, close to half of European firms reported innovation activity during 2010-2014. Yet, compared with the 2006-2009 period, the share of innovative enterprises decreased roughly 4%. Likewise, in nearly all European countries the economic crisis negatively affected the top E.U. service firms. Figure 1 illustrates the two waves of the economic crisis and their impact on top E.U. service firms' net sales, employment level and R&D investment.

-----Insert Figure 1 about here-----

Yet, no direct link has been established thus far between economic crisis, service strategic adaptation initiatives and long-term organizational performance. The literature assumes that service firms facing high uncertainty will tend to adopt more defensive or cost-oriented strategies (Peric and Vitezic, 2016) to ease the negative influence on performance. In times of severe economic crisis, managers' perception of high levels of environmental uncertainty may reduce their ability to properly deploy long-term plans for their businesses and hence negatively influence organizational performance. Despite the fact that the crisis had a substantial impact on service industries and it is expected that leading service firms from

European countries exhibited diverse patterns of strategic adaptation, there has been little research on how these firms overcame the crisis, the long-term survivorship of their strategic renewal pattern (Kwee et al., 2011) and the effectiveness of their responses (Martin-Rios and Parga, 2016a). Therefore, a cluster analysis of dynamic decline and adaptation is required. With this study, we offer a dynamic classification model for evaluating a range of leading service firms' strategic reorientation actions based on strategic management, innovation, and comparisons between country, industry, and market turbulence. Moreover, survivorship analysis tests the strategic endurance of renewal patterns resulting from clusters analysis. Finally, linear regression analysis examines the long-term performance impact of the different strategic responses to adaptation both during the economic crisis (2008-2011) and in the years after the crisis (2014/2016).

3. Methods

3.1. Data

The database used in this study was constructed by merging the E.U. Industrial R&D Investment Scoreboard data (hereinafter, R&D Scoreboard) and data from NEXIS, the newspaper database. The R&D Scoreboard is a scientific initiative led by the European Commission's Joint Research Centre (European Commission, 2012). This database has been used in past published research to assess differences in R&D among U.S. and E.U. firms (Moncada-Paternò-Castello et al., 2010) or R&D investment in high-tech sectors (Ortega-Argilés et al., 2010). It contains economic and financial data extracted from the audited annual reports and accounts of top companies ranked by their investments in R&D. It refers to all R&D financed by a particular company from its own funds, regardless of where that R&D investment is allocated. To maximize comprehensiveness and avoid double-counting, the dataset uses the consolidated group accounts of the ultimate parent company. As such, majority-owned subsidiaries are consolidated in the accounts of the parent company, whereas

joint ventures that are 50% owned by each of the two partners are included as stand-alone companies. The R&D Scoreboard is therefore an indicator of a particular corporation's global financial commitment to R&D. Moreover, a commercially available online database (NEXIS) of newspaper articles worldwide, which contains the full texts of dozens of newspapers, magazines, newsletters and wire services, was used to retrieve all dated occurrences of expansion actions related to strategic M&A articles involving our sample of service firms.

Companies were selected because of their investment in R&D. We excluded all service firms from the sample that were removed from the R&D Scoreboard anytime during the entire 2007-2011 period, which allows us to focus more narrowly on the top E.U. service firms, in terms of investment in basic innovation. Comparative information on R&D investment between the top and other service firms is provided in Table 1. We built up a balanced multi-wave, longitudinal database consisting of 97 top European R&D investors. Data was gathered during a period of twelve months, thus the range actually spans two years (e.g. the 2008 edition spans from July 2007 to July 2008). Survivorship of strategic patterns data was extracted from 2012-2016 of the R&D Scorecard and performance data was obtained from 2014 to 2016. The NEXIS news database allowed us to examine 3,175 M&A news accounts appearing in the English language press published between January 1, 2007 and December 31, 2016. By merging the two databases we obtained the information needed to compute our dependent organizational and financial variables, our main impact variables (cost-oriented actions and expansion actions), and our additional control variables (i.e., industry and country R&D investment). Common method bias (CMB) concerns were addressed in a variety of ways. We applied a repeated (multi-wave) cross-sectional study design by testing the strategic renewal initiatives for the 2007-2016 period. Also, we used multiple data sources (R&D Scoreboard and NEXIS) to diminish the influence of CMB. Descriptive and performance statistics for the combined sample and the full sample (only for 2011) are provided in Table 1.

Demographic, expansion, and cost-oriented data were tested for normality of distribution and homogeneity of variance with the Kolmogorov-Smirnov test. Firms in our sample appear representative of the top E.U. service firms reported in the R&D Scoreboard. The firms display considerable cross-sectional variation in size and geographic location. The U.K. emerges as the most innovative country in terms of the number of leading service firms, with 34% of all E.U. firms in the sample, followed by Germany with 20.3%. Also, France shows a high share of leading service firms, while Southern and Eastern European countries have marginal shares. Finally, the firms included in our sample are more profitable and have higher market-to-book ratios than any average population of service firms in Europe over our sample period.

-----Insert Table 1 about here-----

3.2. *Measurements*

To empirically conceptualize strategic types of response to environmental decline in E.U. service firms, we used two kinds of measures. The first kind captured a firm's expansion actions, the second addressed cost-oriented actions.

Capturing Expansion Actions. We concentrated on two dimensions of expansion actions, namely variation in R&D investment and M&A. To proxy for the existence of strategic expansion actions, we use the arithmetic mean of these two measurements (R&D investment and M&A events). Although this is not a perfect measure for strategic expansion actions, it should be highly correlated with the concept being studied.

Variation in R&D. The definition of R&D used by firms in their audited reports are in line with accepted international accounting standards, specifically IAS 38, and are based on the definition provided in Frascati's R&D manual. As operationalized in the Scoreboard, R&D investment is the cash investment funded by the companies themselves, excluding R&D conducted under contract for clients such as governments or other companies and also

companies' share of any associated company's or joint venture's R&D investment. Considering t_1 the starting year of the economic decline (2008), we have obtained the variation of this R&D investment over the years as follows:

$$\frac{(R\&D\ investment\ t_x - R\&D\ investment\ t_1)}{R\&D\ investment\ t_1} \times 100$$

Based on the four-point scale developed by Moncada-Paternò-Castello et al. (2010), we developed a five-point scale to measure the relative variation in R&D investment for the economic crisis period, including the possibility of drops in the level of R&D investments: 1: 'high decrease' (-20% and below), 2: 'moderate decrease' (-20 to -1%), 3: 'unchanged to low increase' (0-10%), 4: 'moderate increase' (between 10-20%) and, 5: 'high increase' (higher than 20%). We created a variable for the 2008-2011 period and for 2014-2016 for those companies that were still included in the R&D Scorecard.

Mergers & Acquisitions. M&A has become an important medium through which companies can expand service portfolios, enter new markets, acquire new technology, gain access to research and development, and gain access to resources, which enable them to compete on a global level. A variable was created that lists the total number of M&A made by each service firm over 2008-2011 (mean: 5.04; s.d.: 3.06). A second variable for 2014-2016 (three-year time lag) was created for those companies that remained in the R&D ranking after the crisis (mean: 3.27; s.d.: 3.45).

Labor variation. Labor cost reduction—measured as the negative change in the number of employees from the previous year—represents one of the most important retrenchment actions as identified in the literature (Trahms et al., 2013). The R&D Scoreboard includes the number of employees in a service firm as the total number of employees, on average, within the consolidated company or year-end headcount, if the average is not stated. We measured the variation in the number of employees over the years as follows:

$$\frac{(\text{Number employees } t_x - \text{Number employees } t_1)}{\text{Number employees } t_1} \times 100$$

The results obtained were assessed on a Likert-type scale with ranges of: 1: 'high decrease (-10% and below)', 2: 'moderate decrease (-10 to -1%)', 3: 'unchanged to low increase (0-10%)', 4: 'moderate increase' (between 10-20%) and, 5: 'high increase' (higher than 20%). The first two ranges denote retrenchment actions (labor reduction), whereas the last two ranges indicate the opposite (i.e., increase in headcount). In order to perform a deeper analysis of employment variations, we have also measured annual variations (2008-2009, 2009-2010, 2010-2011), using the same scale. As with M&A, we created a variable for 2014/2016 to test the long-term effect of labor variations on renewal strategies for the companies remaining in the R&D Scoreboard.

Country Investment R&D. The physical location of a given service firm depends on the country where the ultimate parent company has its registered office. The registered office is the company address notified in the official trade registry. It is normally the place where a company's books are kept. With that information, we have considered the average growth rate of R&D spending by country, measured as the average Gross National R&D (%GDP) for the 2008-2011 and the 2014-2016 period.

Industry sectors. The sector disaggregation in the R&D Scoreboard, provided at the two, three, four-digit level, follows the ICB (Industry Classification Benchmark) system adopted by Dow Jones (U.S.) and the FTSE (Europe) for classifying companies by sector. All indexes have been calculated for each service industry at the three-digit level.

Organizational Performance. We included three financial measures to assess organizational performance: operating profits, market capitalization and net sales. The 3-year *Operating profit CAGR* is calculated as profit or loss before taxation, plus net interest cost (or minus net interest income) minus government grants, less gains (or plus losses) arising from the

sale/disposal of businesses or fixed assets. CAGR absorbs the effect of volatility of periodic returns that can make arithmetic means irrelevant. CAGR has been calculated by taking the 3rd root of the total percentage growth rate during the periods being considered: 2008-2010 (end-2007/beginning-2008 to end-2010/beginning-2011) and 2014-2016 (end-2013/beginning-2014 to end-2015/beginning-2016). *Market capitalization CAGR* is the share price multiplied by the number of shares issued at a given date. Market capitalization is a suitable formula for evaluating the historical return of the stock of a given firm. The R&D Scoreboard data on market capitalization data is extracted from both the Financial Times London Share Service and Reuters 3000 Xtra. For those companies for which not all the equity is available on the market, the R&D Scoreboard takes into account the gross market capitalization amount. Market capitalization CAGR have been calculated for 2008-2010 and 2014-2016. *Net sales CAGR* have been collected from companies' annual reports and accounts by Bureau van Dijk Electronic Publishing GmbH (BvD) and follow the usual accounting definition of sales, excluding sales taxes and shares of sales of joint ventures and associates. Sales CAGR have been calculated for the periods being considered: 2008-2010 and 2014-2016.

4. Analysis and Results

The first part of this section presents the results of our empirical conceptualization of strategic types of response to economic downturn in E.U. service firms. We have drawn on cluster analysis to empirically conceptualize differences, as it is an exploratory statistical procedure widely used in innovation studies (Keupp and Gassmann, 2009). We identify homogeneous groups of strategic responses and introduce an empirical typology of service response to environmental decline. The second part contains the results from the survivor analyses. We applied Cox regression to competing renewal strategies in survival analysis. Finally, the final part presents the results of the best subset regression. We applied linear

regression to examine the performance impact of the different strategic responses to adaptation. Hence, the estimation results should be interpreted with caution, as evidence that certain long-term adaptation strategies are correlated with certain types of organizational outcomes, however they do not inform us of the directionality or causality of such relationships.

4.1. Empirical conceptualization of organizational responses to environmental decline

To empirically conceptualize service responses to economic crisis among E.U. service firms, we used cluster analysis in order to group top services applying similar strategic responses to economic crisis into homogeneous groups. Three indicators of service firms' decisions are taken into account: investment in R&D and organizational expansion through M&A, as a failure prevention approach, and a standardized variable containing the information regarding labor cost fluctuation. A (non-hierarchical) two-step cluster analysis is performed in order to group service firms into a number of categories, which maximizes intra-cluster homogeneity and achieves the greatest possible separation of clusters (large inter-cluster variance).

With this method, three clusters are identified according to the standard statistical criteria (the pseudo F statistic, approximate expected overall R^2 , and cubic clustering criterion). In accordance with previous studies applying cluster analysis (e.g., Hollenstein, 2003), the resulting three clusters are determined by the statistical properties of the ratios' inter-cluster variance to intra-cluster variance and the consistency of the clusters identified with existing literature on firms' adaptation to downturns.

The differential comparison of the clusters is offered in Table 2. All post-hoc tests (tests with contrasts or univariate F-tests) performed indicate that the variance inside the clusters is lower than in the overall sample. Hence, the solution can be considered satisfactory in statistical terms. Additionally, the Kruskal-Wallis test is used to test the null hypothesis

between clusters, which indicates that the variances are not equal (Kruskal and Wallis, 1952). The differences across all three clusters are significant. Finally, ANOVA tests further confirm that differences between the three clusters are statistically significant (see Table 3).

The three clusters are classified as follows: Cluster 1 includes service firms with a significant increase in expansion actions, with a huge growth of R&D investments, and stability in the number of employees; Cluster 2 contains firms that address the external uncertainty by means of cost-reducing actions, including cutting labor costs and reducing innovation activities and investment; and Cluster 3 includes firms attempting a significant increase in R&D investments, moderate growth in M&A actions, as well a marked increase in the number of employees.

---Insert Table 2 here-----

---Insert Table 3 here-----

The different clusters are distributed unevenly across various service activities. These results point at the coupling between industry-level forces and firm-level decision-making dynamics. For example, firms in healthcare services mostly opt for 'Commitment-to-expansion' actions, whereas banks and media services generally opt for balancing actions. General retail services have predominantly aimed for cost-oriented actions. There is also diverging intra-industry adaptation behavior in line with theoretical expectations on how service firms adapt to crisis. For example, none of the nine companies in the travel and leisure industry in our sample were part of the foodservice industry, despite the fact that this activity employs more people than any single other retail sector (Euromonitor International, 2016). Accor Hotels is the only hospitality organization and, as expected, follows a 'Cost-oriented' strategy. Adaptation in the competitive travel and tourism environment results in either resource-balancing decision-making (TUI Group and Deutsche Bahn) or 'Commitment-to-expansion' (Lufthansa). Finally, there are five online gaming organizations, which unlike the

other leisure activities and consistent with their competitive priorities, adopt a 'Commitment-to-expansion' approach as they invest vastly in R&D and human capital to develop state-of-the-art software applications.

4.2. Characterizing service response to economic crisis

Cluster 1: 'Commitment-to-expansion' service firms. This cluster has a high increase in R&D expenditure, expansion through M&A, and even the highest employment growth, suggesting that these firms attempt to overcome the economic crisis and seek to compete in a new manner in its existing industry or to enter new industries to overcome environmental shocks. Their continued commitment to expansion decision-making is expected to help them navigate through a declining economic context. For these reasons, we have labelled this group 'Commitment-to-expansion' service firms. This group includes 37.7% of the companies in the sample. It is possible that these firms represent the top leaders in their activity, since they invest actively in expansion actions regardless of the general level of innovation activity in the sector. Furthermore, most of the companies located in cluster 1 are headquartered in Central Europe.

Cluster 2: 'Cost-oriented' service firms. Cluster 2 includes firms that have reduced their investment in strategic actions and their staff. They score the lowest on strategic actions and the highest on retrenchment-defensive actions. In that regard, firms in cluster 2 exhibit a significant reduction in employment (layoffs), a decrease in R&D, and limited to no expansion through M&A. For these reasons, we have labelled this group 'Cost-oriented' service firms. This group accounts for 35.7% of the population. The pattern is clear: their decisions to overcome the crisis revolve around retrenchment actions such as reducing operating costs through layoffs (Pearce and Robbins, 2008). Reducing the size of the workforce is seen as enabling firms to gain tight control of their cash flow. The decisions made by these firms were stable over the period under study (2008-2011). Results show that

none of these firms increased, even slightly, its headcount during this period. Not surprisingly, most of the companies in this cluster operate in support services and the general retail sector. Remarkably, most of the companies in cluster 2 are located in Northern Europe.

Cluster 3: ‘Resource-balancing’ service firms. A mix of cost-oriented and expansion organizational actions is found in Cluster 3. Service firms grouped within this cluster try to recover from the economic and financial crisis by employing an overarching two-pronged strategy consisting of expansion actions (i.e., sharp increase in R&D expenditure and/or M&A deals) as well as incremental actions in the form of job cuts or a hiring freeze. For these reasons, we have labelled this group “Resource-balancing service firms”. Consistent with the literature, their organizational response is a function of the firm’s ability to integrate contradictory cost-control and expansion actions (Schmitt and Raisch, 2013). Geographically speaking, firms from all of the three European regions (Northern, Central and Southern) are represented equally, for the most part, in this group.

4.3. Long-term strategic orientation

We then used a Cox regression model (a semiparametric model that provides useful information regarding the relationship of the hazard function to predictors) to model the long-term survivability of their strategic orientation. Reports on the competing renewal strategies significantly related to adaptation strategy survivability (defined as remaining in the R&D Scorecard in the post-crisis period 2012-2016), in our group of leading services (Table 4).

-----Insert Table 4 about here-----

We estimated simple hazard and survival functions using the Cox regression model, only distinguishing between the initial service firms that remain in the R&D Scorecard and those that leave the R&D Scorecard in the post-crisis period (2012-2016). We grouped the dataset into the three clusters and estimated the corresponding survival functions for each group. Since staying in the R&D Scorecard constitutes an important adaptation action this can be

viewed as a test of survival of the different strategic adaptation patterns in the post-crisis 2012-2016. We summarized services' overall R&D activity with a single dummy variable taking the value of one (1) if the firm remained in the R&D Scorecard over 2012-2016. Table 5 provides models to predict the survival that a strategic adaptation pattern is not terminated (Chi Square=5.43, $p < 0.06$). The Cox regression coefficients are the logits of the survival. The positive and significant coefficient for 'Commitment-to-expansion' strategy leads to the reasonable assumption that leading services pursuing expansion renewal strategies during times of crisis will have a higher probability of maintaining their strategic adaptation pattern after the crisis (survivability).

-----Insert Table 5 about here-----

Figure 2 plots the survival functions for 'Commitment-to-expansion', 'Cost-oriented' and 'Resource-balancing' groups. The estimated survival function for 'Commitment-to-expansion' firms is greater than the survival function for 'Cost-oriented' and 'Resource-balancing' firms throughout the entire post-crisis period analyzed. The figure shows that risk of failure increases rapidly for services pursuing either a 'Cost-oriented' or a 'Resource-balancing' strategy, particularly for the former. Table 5 and Figure 2 provide strong indicative evidence that strategic adaptation initiatives may have an important impact on leading service firms' strategic renewal orientation to survive.

-----Insert Figure 2 about here-----

4.4. Service response and organizational performance

Finally, regression analyses were conducted to examine the relationship between organizational performance variables (operating profits CAGR, market capitalization CAGR and net sales CAGR) and strategic adaptation actions (R&D investments, M&A actions and labor variation) during the economic crisis 2008-2010 (Table 6) and the post-crisis 2014-2016

(Table 7). The R&D investment average in the country during the period and the firm age were included as control variables.

Regression models show the impact that labor variations (growth vs. layoffs) have on firms' net sales over the 2008-2010 period of extreme market turbulence and sharp decline. Those companies that did lay off employees had better results in terms of net sales. This is consistent with the view that labor-cost savings facilitates higher profits contemporaneously. Interestingly, commitment-to-expansion actions do not explain the changes in the firms' operating profits, market capitalization or net sales during the crisis. The overall quality of the model is low (a corrected R2 of 0.02, 0.08 and 0.06), due to the low statistical variance of the dependent variables.

-----Insert Table 6 about here-----

To assess the long-term impact of adaptation strategies in the post-crisis period, further linear regression models were conducted with those firms that remained in the R&D Scorecard throughout 2012-2016. Models included in Table 7 explain a significant share of the firm-level market capitalization, operating profits and net sales CAGR variance. Although M&A actions do not explain any effect on the performance variables, R&D investment and labor variation are relevant factors positively related to organizational performance, particularly, market capitalization. In this case, the overall quality of the model is high (a corrected R2 of 0.23 for operating profits, 0.11 for market capitalization and 0.60 for net sales) and significant.

-----Insert Table 7 about here-----

5. Discussion

This article sheds light on the strategies that service firms implemented to weather the slumping business environment resulting from the global financial crisis of 2008-2011. It focuses on organizational adaptive behavior and examines the activities carried out by the

leading European service firms to overcome long-term financial strain. Due to the distinctive nature of its business and organization, service firms deploy specific actions that entail strategic adaptation. Because of the disruptive nature of economic crisis, these strategic actions become even more relevant amid persistent economic depression, during which operational actions might not be enough to guarantee successful firm adaptation (Schmitt et al., 2015).

It also contributes to the literature in reporting an empirical analysis of both quantitative and qualitative data, testing for an indirect link with long-term survivability of strategic orientation, and investigating the relationship between renewal strategy and organizational performance. Studying how service firms utilize and deploy renewal strategies in a financial crisis furthers understanding of this multidimensional construct and the relationships between the different sub-dimensions (e.g., Martin-Rios and Parga, 2016a). Moreover, when classifying responses to economic crisis, lessons can be learned from the actions that top service firms take to overcome economic downturn that may be relevant for other service firms facing organizational decline. This is particularly relevant for new, small and growing service firms as they are more exposed to environmental turbulence in the form of more frequent and intense competitive and operational disruptions (Leiponen, 2012; Martin-Rios and Erhardt, 2017).

To our knowledge, this is the first study to take a multi-wave and longitudinal perspective on strategic adaptation and renewal in the service industry during economic downturn. It is statistically documented in cluster analysis and regression. By applying cluster analysis to a set of strategic responses (employment growth, innovation activities, and M&A transactions), three clusters were identified for leading European service firms. Relatively few firms were found in the 'Cost-oriented' cluster. That cluster was dominated by service firms that based their decisions on employment and innovation reduction. Relatively more service firms were

found in the 'Commitment-to-expansion' cluster. Those firms increased employment, innovation investment and strategic expansion with a view to entering new markets and extending old ones. Furthermore, a third group of service firms formed the 'Resource-balancing service firms' cluster. These leading firms attempted to implement complementary actions. In a period of sharp decline and economic hardship, this group of service firms reduced their labor costs while increasing their innovation investments. It follows that the leading E.U. service firms that pursue resource-balancing or complementary actions as a way to recover from a recession can be expected to have a wide portfolio of related innovation activities (R&D initiatives) even as their knowledge base erodes due to layoffs. As a result, 'Resource-balancing' companies dropped the R&D ranking more than 'Commitment-to-expansion' firms; however, were more likely to remain than 'Cost-oriented' firms. This finding contributes to the emerging literature on complementarity in strategic adaptation literature (e.g. Schmitt et al., 2015) by broadening the scope of analysis to leading European companies in the service sector. Furthermore, a third group of service firms formed the 'Resource-balancing service firms' cluster. In a period of sharp decline and economic hardship, this group of service firms reduced their labor costs while increasing their innovation investments. It follows that the leading E.U. service firms that pursue resource-balancing or complementary actions as a way to recover from a recession can be expected to have a wide portfolio of related innovation activities (R&D initiatives) even as their knowledge base erodes due to layoffs. As a result, 'Resource-balancing' companies dropped the R&D ranking more than 'Commitment-to-expansion' firms; however, were more likely to remain than 'Cost-oriented' firms. This finding contributes to the emerging literature on complementarity in strategic adaptation literature (e.g. Schmitt et al., 2015) by broadening the scope of analysis to leading European companies in the service sector.

Our descriptive model allows us to make several theoretical contributions to the adaptation literature. We refine prior perspectives of strategic adaptation by showing how distinct long-term adaptation strategies may lead to a more robust recovery from an ongoing economic and financial crisis. The defensive-expansion dichotomy for dynamic adaptation poses an important empirical question: which strategy leads to a more robust recovery from an ongoing economic and financial crisis? This is a crucial question as failing to observe external environmental changes and adapt to them limits the firm's ability to build sustained organizational competence and, in the worst case scenario, might lead to organizational decline and bankruptcy (Volberda and Lewin, 2003). This study offers evidence that service firms under different responses to economic crisis indicate disparate long-term survivability of their strategic orientation and generate disparate organizational and financial outcomes.

Using a Cox regression, we assessed the extent to which the renewal strategies used by the 97 companies were sustained over time. Despite theory suggesting that expansion decision-making is essential for overcoming financial crisis, there is little empirical evidence for this contention. In particular, there is a dearth of research on how top service firms fare after periods of sharp decline. Firms in our study that maximize adaptation by discontinuous renewal capabilities (increase their R&D expenditure and expand through M&A and employment growth during and after times of economic uncertainty) denote a strong commitment to the long-term survivability of their strategic orientation, have better financial outputs and were less likely to be delisted after the crisis than services matched on defensive, cost-oriented actions. Financial results accelerate in the post-crisis as the firm reaps the benefits of a previous investment in expansion renewal activities.

The superior performance cannot be attributed solely to better decline management, but there is some evidence that growth and expansion initiatives increase opportunities to recover from environmental turbulence. R&D investment and employment growth are associated with

higher financial results (i.e., operating profits, market capitalization and net sales) throughout 2012-2016. These 'Commitment-to-expansion' actions prove to be less influential variables in our regression for 2008-2011. These results contribute to the literature by suggesting that these practices become even more relevant after a period of persistent economic depression, during which cost-oriented actions might not be enough to guarantee firm survival (Davis et al., 2009). Successful long-term organizational adaptation and renewal require services a dedicated long-term employment and innovation strategy (and hence management), to exploit and refine existing adaption and expansion practices. In doing so, these firms may counteract structural inertia, coevolve, adapt and reinvent themselves over time (Lewin et al., 2004). It is likely that high levels of expansion actions, supported by high performance, can better moderate environmental decline; services better manage decline, increase their overall investment in innovation, and manage resources more efficiently (Erhardt et al., 2016; Martin-Rios and Parga, 2016a, 2016b).

A few limitations of this study are worth noting. First, the firms included in our sample are more profitable and have higher market-to-book ratios than the average population of service firms in Europe over our sample period. In that sense, we took survivorship bias into our calculations when considering how to adapt to economic crisis while maintaining a sustained level of R&D investment. Nevertheless, regression models produced interesting results regarding the impact that strategic renewal patterns have had on firms' financial performance and employment variations (growth vs. layoffs) after the 2008-2011 period of extreme market turbulence and sharp decline. Moreover, the sample consists of medium-sized and large service firms that invest in R&D. Therefore, the results may not directly be transferable to small service firms whose investment capacity in innovation is often relatively limited because of lower absolute R&D expenditures and limited service diversification. Accordingly, further research should be carried out on the organizational responses to decline

in a larger pool of newer, smaller, low-profit service firms. Moreover, the descriptive findings reflect the current situation in leading European service firms. Thus, it would be worthwhile to conduct a similar study in the United States because some U.S. firms are leaders in the area of R&D expenditure and service innovation (Mowery, 2009).

In conclusion, this research highlights strategic actions as the true driver of organizational adaptation in the aftermath of a complex economic recession. Strategic expansion actions are related to increases in innovative capabilities through spending more on R&D, relying on strategic M&A, and increasing the labor force. Those leading service firms that attempt to maximize adaptation by strategic expansion actions may be best positioned to ensure their strategic orientation in the long-term and increase their operating profits and market capitalization.

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TABLES

Table 1. Descriptive statistics

Variable	Full sample (2011)		Leading service firms (2008-2011)	
	N = 205	%	N = 97	%
Sector				
Banks	33	15.9%	16	16.5%
Computer Services	27	13.0%	9	9.3%
Food & drug retail	8	3.9%	4	4.1%
General retail	13	6.3%	8	8.2%
Health Care equipment	28	13.5%	17	17.5%
Life Insurance	4	1.9%	2	2.1%
Media	12	5.8%	7	7.2%
Non-life Insurance	9	4.3%	4	4.1%
Other financial	22	10.6%	7	7.2%
Support Service	32	15.5%	14	14.4%
Travel & Leisure	19	9.2%	9	9.3%
Size in employees				
0-1,000	35	16.9%	10	10.3%
1,001-5,000	52	25.1%	33	34.0%
5,001-10,000	33	15.9%	19	19.6%
10,001 +	85	41.1%	35	36.1%
Country				
Austria	5	2.4%	3	3.1%
Belgium	6	2.9%	4	4.1%
Denmark	6	2.9%	4	4.1%
Finland	3	1.4%	1	1.0%
France	25	12.1%	15	15.5%
Germany	42	20.3%	20	20.6%
Greece	1	0.5%	1	1.0%
Ireland	5	2.4%	2	2.1%
Italy	7	3.4%	4	4.1%
Luxembourg	2	1.0%	1	1.0%
Poland	3	1.4%	1	1.0%
Portugal	3	1.4%	1	1.0%
Spain	3	1.4%	1	1.0%
Sweden	15	7.2%	10	10.3%
The Netherlands	9	4.3%	1	1.0%
UK	70	33.8%	28	28.9%
Renewal and performance				
	y-1 (€m)	y-1/y-2(%)	y-1 (€m)	y-1/y-2(%)
One-year R&D investment	69.0	32.1	91.9	92.0
One-year employment growth	35,339.9	1.7	49,509.2	10.9
One-year net sales €m	6,941.3	4.1	9,103.7	6.3

Table 2. Cluster analysis of organizational response activities (mean values for 2008-2011)

	R&D Investments	M&A Actions	Employment Evolution	Number of service firms (%)
Cluster 1 'Commitment to expansion service firms'	4.44	2.69	4.50	37 (37.7%)
Cluster 2 'Cost-oriented service firms'	1.29	2.24	2.53	35 (35.7%)
Cluster 3 'Resource-balancing service firms'	4.84	3.16	2.40	26 (36.7%)

Table 3. ANOVA analysis

		Sum of squares	df	Mean square	F	Sig.
R&D Investments	Between groups	241.85	2	120.92	256.89	0.00
	Within groups	43.31	92	0.47		
	Total	285.15	94			
M&A Actions	Between groups	12.42	2	6.21	4.057	0.01
	Within groups	125.12	92	0.47		
	Total	137.54	94			
Employment Initiatives	Between groups	91.96	2	45.98	46.25	0.00
	Within groups	91.47	92	0.99		
	Total	183.43	94			

Table 4. Long-term strategic orientation

	Survival	Hazard
Cluster 1 'Commitment-to-expansion' service firms	77%	23%
Cluster 2 'Cost-oriented' service firms	50%	50%
Cluster 3 'Resource-balancing' service firms	61%	39%

Table 5. Results of the Cox regression

Variables in the equation	<i>B</i>	S.E.	Wald	Sig.
Cluster (Ref: Resource-balancing)			4.80	0.09*
Commitment-to-expansion	0.85	0.38	4.80	0.02**
Cost-oriented	0.52	0.48	1.14	0.28

Notes: * indicates significance at 10%; ** at 5%; *** at 1%

Table 6. Regression analysis summary for 3-year CAGR 2008-2010

Variables	Operating profits	Market Capitalization	Net sales
Country Investment R&D	0.07	0.18	0.04
Firm Age	-0.03	-0.04	0.17*
R&D Investments	0.07	-0.06	0.02
M&A Actions	0.07	-0.18	0.04
Employment evolution	-0.03	0.00	0.15*
R^2	0.13	0.29	0.24
R^2 adjusted	0.02	0.08	0.06
F	0.23	1.30	1.07

Notes: * indicates significance at 10%; ** at 5%; *** at 1%

Table 7. Regression analysis summary for 3-year CAGR 2014-2016

Variables	Operating profits	Market capitalization	Net sales
Country Investment R&D	-0.04	0.21	-0.01
Firm Age	0.42***	0.08	0.10
R&D Investments	0.28**	0.23**	0.15*
M&A Actions	0.05	-0.09	-0.06
Employment evolution	0.23**	0.23**	0.75***
R^2	0.32	0.24	0.64
R^2 adjusted	0.23	0.11	0.60
F	3,61	1,85	16,38

Note: * indicates significance at 10%; ** at 5%; *** at 1%

FIGURES

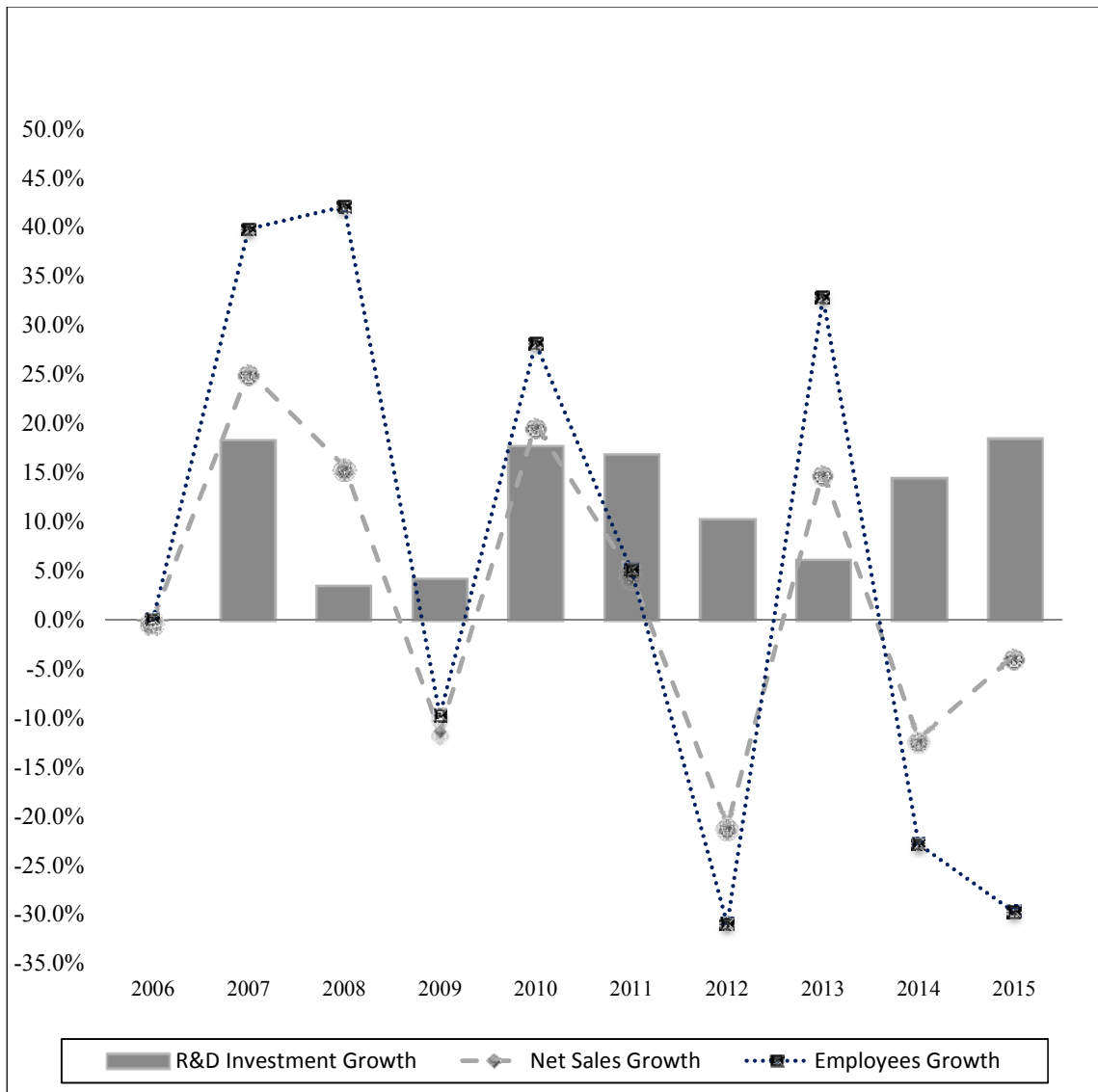


Figure 1. One-year R&D investment, net sales and employment growth by leading E.U. service firms (2006-2011).

Source: E.U. R&D Scoreboard

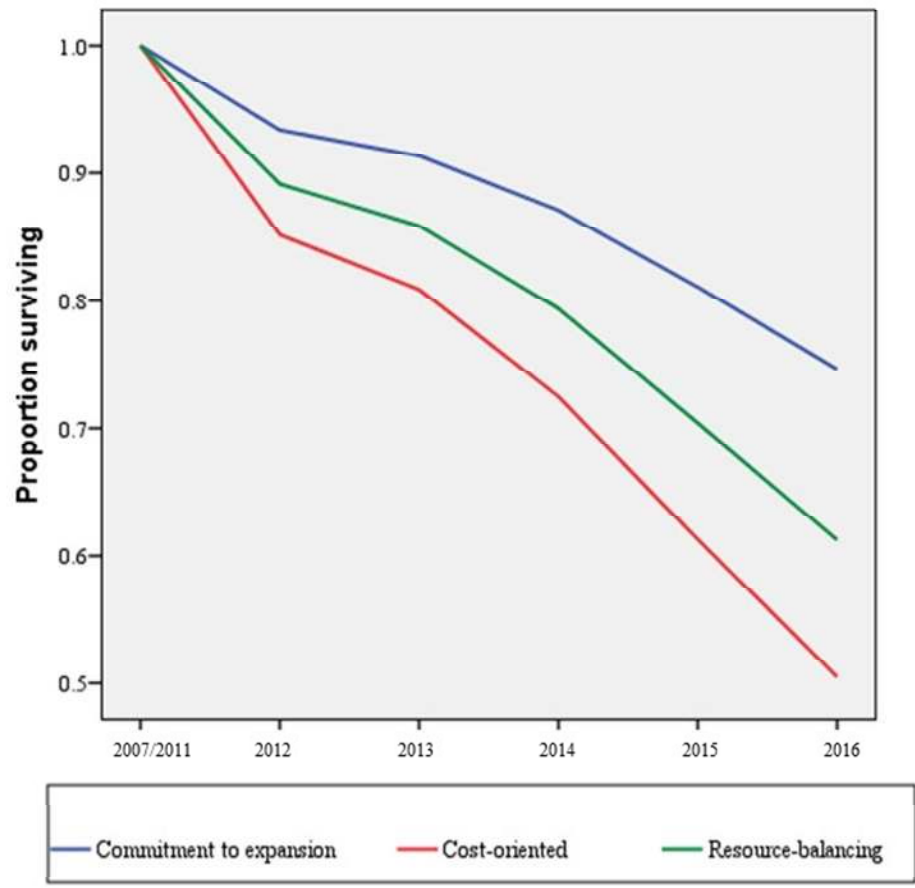


Figure 2. Survival rates for strategic renewal patterns