

Innovation in the aftermath of downsizing: evidence from the threat-rigidity perspective

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Abstract

Purpose

The purpose of this paper is to study how job reductions affect product innovation and marketing innovation in a sample of 2,034 Spanish manufacturing firms in the period 2007–2014.

Design/methodology/approach

Poisson and logistic regression models with random effects were used to analyse the impact of downsizing on some innovation outcomes of firms.

Findings

The results of this research show that the stressful measure of job reductions may have unexpected consequences, stimulating innovation. However downsizing combined with radical organisational changes such as new equipment, techniques or processes seems to have a negative impact on product and marketing innovation.

Originality/value

This research has two original features. First, it explores the unconventional direction of causality from the planned elimination of jobs to innovation outputs. Secondly, the paper looks at the combined effect of downsizing and other restructuring measures on different types of innovation. Following the threat-rigidity theory, we assume that this combination represents a major threat for survivors that leads to lower levels of product and marketing innovation.

Keywords: Innovation, Downsizing, Organizational restructuring, Quantitative

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1. Introduction

This article attempts to study the impact of downsizing on the innovation performance of firms. Downsizing, as a deliberate reduction in the size of a firm's workforce[1], represents a form of organisational change that threatens the employees' perception of job security.

Innovation is frequently used as an umbrella term that captures different explorative and future-oriented developmental activities as well as their novel and commercially valuable outcomes (Partanen et al., 2011). It represents a change in the organisation, whether as a response to changes in the environment, whether as a preemptive action (Damanpour, 1988). When studying the determinants of innovation, it is crucial to distinguish between its different typologies. Research has shown that there are distinct categories of innovation that could be affected by different aspects. For instance, innovation can be related to product and processes but also to marketing and organisation (Gunday et al., 2011).

Nowadays innovation is essential for the long-term survival of most companies. During the last recession, businesses heavily downsized their workforces while significantly restructuring their operations (ILO, 2013). Many firms thought that restructuring and downsizing would enhance innovation (Van Hootegeem et al., 2019). However, little is known about the combined effect of these processes on different types of organisational innovation.

The traditional view of the downsizing-innovation relationship is that job reductions are negatively related to innovation. However, when announcing layoffs, managers usually argue that desirable outcomes, such as enhanced innovation, will result from them (Long, 2013). Companies that combine downsizing with restructuring measures are also thought to improve their product development capabilities (Gregory, 1999).

In general terms, there are no clear conclusions from the study of the relationship between downsizing and innovation. In addition, a great part of the literature does not take into account that downsizing can have different consequences for different types of innovation. Several studies (Lee Marks and De Meuse, 2005) have highlighted the vision of downsizing as an opportunity to review current ways of doing things. The literature has also suggested that organisational restructuring is a facilitator of innovation (Gunday et al., 2011). Nevertheless, some consider that when management downsizes, “innovation takes a back seat” (Aalbers and Dolfsma, 2014). Within this view, job security has been considered essential to spur innovation.

In this paper we follow a stress-based view of downsizing, considering it as “a constellation of stressor events centering around pressures toward workforce reductions which place demands upon the organisation, work groups and individual employees and requires a process of coping and adaptation” (Shaw and Barrett-Power, 1997, p. 109). Our work examines how job reductions affect product and marketing innovation within the conceptual frameworks of the threat-rigidity theory (Staw et al., 1981) and the survivors' syndrome perspective (Brockner et al., 2004). The guiding idea for our study is that downsizing is a source of considerable stress for the employees who remain (Brockner, 1992; Brockner et al., 1992; Brockner et al., 2004) and, as a consequence,

organisations are less inventive. We cover a gap in the literature as the impact of downsizing on different types of innovation has not been fully conceptualised.

This paper studies the impact of downsizing on a sample of 2,034 Spanish businesses between 2007 and 2014, a period severely affected by the global economic recession. In the case of Spain, employee downsizing has been a relatively frequent phenomenon in manufacturing firms. The study assumes that survivors' collective reactions are a major determinant of the post-layoff innovation outputs of the firm (Brockner et al., 1993; Bommer and Jalajas, 1999). In this vein, negative reactions to change may have the aggregate effect of affecting the development of innovations (Sutton and D'Aunno, 1989).

Our paper makes clear contributions to the literature on the implications of downsizing for non-financial results. First of all, we show that a threatening measure such as job reductions may have the unexpected consequence of stimulating innovation. Secondly, we find that downsizing, when combined with new equipment, techniques and work processes can harm product and marketing innovation.

The study is structured as follows. After this introduction, we outline the conceptual framework for the relationship between downsizing and innovation. The methodology we use to analyse the impact of downsizing on the innovation performance of Spanish manufacturing firms is explained in Section 3. Sections 4 and 5 present and discuss the empirical results of our work. Finally, the conclusions are developed in Section 6.

2. Theoretical framework

2.1 Research on the impact of downsizing on innovation

In the 1990s, Dougherty and Bowman (1995) and Amabile and Conti (1999) raised the question of whether firms can downsize and innovate at the same time. Since then, research on the relationship between downsizing and innovation outputs has been characterised by conflicting findings. Some studies argue for a negative relationship between the two. In this group of works, Dougherty and Bowman (1995) showed that downsizing hinders product innovation by breaking the network of informal relationships. Cheng and Kesner (1997) argued that downsizing leads to an increase in workloads, which affects the time and effort employees spend on innovation activities. Amabile and Conti (1999) also noted that during downsizing, changes in the work environment can affect creativity, which is the main source of innovation. The study by Bommer and Jalajas (1999) concluded that downsizing compromises the innovation potential of research and development (R&D) professionals.

Some works have related staff reductions to the level of organisational slack. This is the case for Love and Nohria (2005) who found that the lower levels of surplus resources after downsizing disrupt innovation projects. In the same line, the study by Mellahi and Wilkinson (2010) shows that a high reduction in slack as a result of a high-level downsizing hinders experimentation and prevents the allocation of resources to innovation projects. The idea that people respond to job security with discretionary efforts such as innovation behaviour has also been analysed in the literature (Bos-Nehles and Veenedaal, 2017). In this area, Díaz-Fernández et al. (2017) note that employment security positively affects innovation over time. From a different point of view, Van Hootegem et al. (2019) find that job insecurity impairs employees' innovativeness through increased irritation and decreased concentration. Other studies bring new perspectives. For

example, Marqués et al. (2014) find an indirect negative effect of job insecurity on innovation behaviour through organisational commitment. Sheikh (2017) shows that the threat of termination has a negative impact on innovation in high-tech firms, measured by the number of patents and citations. Tsai and Yen (2018) noted that downsizing and job insecurity lead to reduced job satisfaction, less organisational commitment and decreased innovation.

Several avenues of research suggest that downsizing is gaining legitimacy as a reorganisation strategy. For instance, Gianetti and Madia (2013) consider that a larger inflow of new human capital after downsizing may enrich the pool of innovative ideas. The work of Knudsen and Lien (2015) points out that firms emphasizing exploration and innovation are more likely to combine the accumulation of human capital with hiring and firing. Downsizing has also been associated to several benefits such as quicker decision-making (Richnér and Ahlström, 2006) and increased social interaction (Mellahi and Wilkinson, 2010).

2.2 The threat-rigidity theory and the survivors' syndrome perspective: a combined explanation for innovation outputs

Employees who survive job reduction processes may experience anxiety because a combination of guilt and job insecurity (Brockner et al., 1987). Authors such as Marqués et al. (2011) have noted that employee perception of job insecurity following downsizing represents a threat that may have a negative impact on their innovation behaviour. In the line of this thought, we assume that companies that threaten job security through job reductions and restructuring have a lower level of product and marketing innovation. Our work is based in the threat-rigidity theory and the survivors' syndrome perspective as conceptual frameworks that suggest that high levels of stress have an adverse effect on the innovation results of the organisations.

The field and laboratory studies developed by Brockner and his team (Brockner et al., 1987; Brockner, 1992; Brockner et al., 1992; Brockner et al., 1993; Brockner et al., 2004) reveal that the reactions of the employees who remain after downsizing determine the effectiveness of organisations. Downsizing has the effect of making unclear the future prospects of survivors. They can perceive the post-job reduction environment as stressful (Brockner et al., 2004). The model of downsizing stress by Devine et al. (2003), describes downsizing as a stressor that produces different levels of stress perceptions that result in physical and psychological strain for all employees. Cavanaugh et al. (2000) consider that concerns about job security represent a "hindrance stressor" that thwart goal attainment and trigger a passive style of coping. LePine et al. (2005) note that hindrance stressors are associated with low motivation because people are likely to believe that a reasonable level of effort will not be adequate to meet the demands.

The conceptual framework of the threat-rigidity theory (Staw et al., 1981) explains how rigidity emerges as a non-adaptive response to threats. Downsizing has been repeatedly found to result in subsequent employee perceptions of job insecurity. Perceived job insecurity provokes multiple stress reactions and reflects the degree of the appraised threat associated with future job losses (Armstrong-Stassen and Schlosser, 2008). Lazarus' theory of stress (Lazarus and Folkman, 1984) points out that stress is jointly determined by the perception of threat and the perception of control. When downsizing occurs, survivors consider the potential threat of downsizing through primary appraisal. Then, they evaluate their capacity to cope with it through secondary appraisal. The combination of high threat and low control to counteract job loss provokes rigidity in the behaviour of individuals, groups and organisations (Greenhalgh and Rosenblatt, 1984).

The threat perceived by employees causes three types of rigidities: restriction of information processing, reduction of control and conservation of resources (Sutton and D'Aunno, 1989). In a threatening environment, workers reduce information processing and follow standard operating procedures. With the reduction of control, individuals tend to emit well-learned habitual responses that reinforce centralisation and inhibit innovation. Downsizing thus represents a threat to jobs that has a clear influence in the performance of survivors and organisations (Ugboro, 2003). According to the framework of the threat-rigidity theory, this kind of threat to surviving employees reduces organisational innovation due to the restriction of information and low control.

It is important to consider that the influence of downsizing on innovation is not independent of types of innovation. Damanpour (1987) emphasized that not all innovations relate equally to the same organisational factors. As is well known, several typologies of innovation have been proposed: technical-administrative (Daft, 1978), radical-incremental (Ettlie et al., 1984), etc. The Oslo Manual (OECD, 2005) defines the most accepted classification distinguishing between product innovation, process innovation, marketing innovation and organisational innovation. Our research is focussed on product and marketing innovation.

3. Hypotheses

In this article, we first test the independent effects of downsizing on product and marketing innovation. Since many companies undertake downsizing and restructuring concurrently, we also study the combined effect of these phenomena on both types of innovation.

The threat-rigidity theory and the survivor' syndrome perspective provide a rational explanation for the negative impact of downsizing on innovation performance. In the post-layoff environment, those who remain respond to stress with negative attitudes. This has different implications in terms of product and marketing innovation.

Regarding product innovation, it is possible to say that downsizing processes have a clear influence on work environment dimensions such as trust, support and autonomy. Thamhain (2003) found that job security, team spirit and low conflict are factors that support the innovative performance of R&D teams. The ability to create a sense of community in the workplace is then crucial for new product development projects (Cormican and O'Sullivan, 2004). However the threat provoked by workforce reduction diminishes survivors' morale and creativity (Tsai et al., 2007). The lower levels of trust may prevent innovation (Curado, 2018). For instance, when perceived threat is high and perceived control is low, fewer ideas are generated (Ren and Zhang, 2015) and implemented (Niesen et al., 2018). In addition, people involved in idea selection may be less open to novel and risky products (Dul and Ceylan, 2014). Communication and decision-making in new product development teams are also affected. The members of the teams have less autonomy and are reluctant to take risks (Ahmed, 1998) since failed products are less tolerated. Job reductions therefore create a threatening social context in the organization that has detrimental effects for product innovation.

The process of marketing innovation is also altered when downsizing takes place. As Levitt (1960) noted, new ideas are persistently abstract in the marketing area. Marketing forces should be free to consider ways in which the distribution channels might be altered. The ability to come

up with new marketing programs requires a great focus on external information from customers, competitors and suppliers. However, job reductions limit marketing capabilities and change customer-connecting processes. The ability to sense and respond to market inputs diminishes in threatening situations (Naidoo, 2010). This happens because workers concentrate their effort on surviving and pay less attention to non-threat-related information (Van Hootehem et al., 2019). As a consequence, customer requirements are not identified. The screening of new activities and marketing procedures is also affected. With a lower market orientation approach, it is difficult for survivors to develop programs of communication; branding and promotion deviated from common marketing practices (Verhoef and Leeflang, 2009).

For these reasons, downsizing represents a threat expected to stifle product and marketing innovation.

H1. Downsizing has a negative impact on firm's innovation.

H1a. Downsizing has a negative impact on product innovation.

H1b. Downsizing has a negative impact on marketing innovation.

Downsizing and restructuring offer opportunities to organise tasks in new ways or to substitute labour for capital. It may be that organisations that combine job cuts with planned redesigns of the work reduce their post-downsizing performance (Chadwick et al., 2004). Survivors react negatively when changes in working conditions are experienced as threats (Rondeau and Wagar, 2003). Radical changes require new flexible responses (Plotnick et al., 2009). However, the rigidity in response impedes creative problem-solving. As we have mentioned above, massive restructurings combined with layoffs leave survivors uncertain about their future (Brockner, 1992). The loss of co-workers can produce a significant increase in anxiety amongst employees. Employees devote time to estimate the likelihood of being affected by the changes and generate fewer ideas (Van Hootehem et al., 2019). Organisational change can also increase workloads, reducing the time and effort people spend on innovation activities. Some authors such as Gregory (1999) note that product quality may also suffer when people are working under greater stress. The anxiety provoked by the introduction of new equipment, techniques and work processes can hinder the individual's capacity for rational reasoning (Sarkar and Osiyevskyy, 2018). Restructuring demands greater work intensity and restricts the level of discretion of the surviving workforce (Brockner et al., 2004). Survivors may perceive that future goals will be difficult to achieve, reducing the sense of control over their work environment (Maertz et al., 2010). Following the model of Lazarus and Folkman (1984), it is possible to say that the restructuring of work in a post-downsizing environment increases the perception of greater threat and lower control. Thus, we can hypothesise that downsizing combined with restructuring can damage other innovation outputs such as product and marketing innovation:

H2. When downsizing is combined with the introduction of other stressful measures such as new equipment, techniques or work processes, it has a more negative impact on innovation performance.

H2a. When downsizing is combined with the introduction of other stressful measures such as new equipment, techniques or work processes, it has a more negative impact on product innovation.

H2b. When downsizing is combined with the introduction of other stressful measures such as new equipment, techniques or work processes, it has a more negative impact on marketing innovation.

4. Method

4.1 Sample

In this work, we use data on Spanish firms that stems from the Survey on Business Strategy[2] (ESEE, Encuesta sobre Estrategias Empresariales). This is a panel survey carried out by the State Industrial Ownership Corporation Foundation (a public foundation that reports to the Spanish government). The ESEE records, on a yearly basis, a huge amount of information about firms' strategies and financial data for over 5,000 Spanish manufacturing firms.

We use data from 2007 to 2014. After discarding observations with missing values and cleansing the data, we end with a total number of 10,835 observations corresponding to 2,304 different firms.

4.2 Variables

4.2.1 Dependent variables

We use two different dependent variables in our regression models. The first one is the number of product innovations (NPI) developed by the firm each year. This variable captures the results of the innovation efforts of the organisation. In keeping with our hypotheses, this will depend on downsizing. NPI takes integer values and is a count variable, so the natural way to model it is by using a Poisson regression model. The development of a new product is usually a rather complex task that requires a certain amount of time to be accomplished, so the explanatory variables will not have an immediate effect on the NPI. Hence, in the regression models we have assumed that the values of NPI have a one year lag relative to the rest of the variables (i.e. in relation to the independent variables).

The second dependent variable (MKI) indicates whether the firm has made marketing innovations throughout the year or not. According to the Oslo Manual (OECD, 2005), a marketing innovation is the implementation of a new marketing method involving significant changes in product design, product placement, product promotion or pricing. This is recorded in a dichotomous variable that only takes the values YES or NOT, so it has been modelled with logistic regressions. Just like NPI, the variable MKI is lagged one year relative to the independent variables.

Table I shows the distribution of the NPI and MKI variables, as the number of observations (firms) with 0, 1, 2, etc., product innovations developed in the year (as a per cent of the total number of observations), for NPI and as the per cent of firms that implement marketing innovations, for MKI.

Table I Distribution of the dependent variable NPI

NPI	0	1	2	3	4	5	≥6
% of firms	83.00	6.40	3.85	1.90	1.19	1.23	2.43
MKI	NO: 80.48%; YES: 19.52%						

4.2.2 Independent variables

Independent variables are those whose effect on NPI is of immediate interest according to our hypotheses, namely, downsizing and the other stressful measures involving new equipment, techniques or work processes.

We measure downsizing by the relative variation in the total number of employees (RVNUMEMP), which is the ratio of the change in the number of employees between the previous year and the present year over the number of employees in the previous year. The more negative this figure, the greater the downsizing.

As for new equipment, techniques or work practices, these are measured with the variables Process Innovation by Introduction of New Machinery and Equipment (PRINME), Process Innovation by Introduction of New Techniques and Methods (PRINTM) and Innovation in Work Practices and Methods (IWPM). All of these are dichotomous variables that take the value YES if the corresponding type of innovation has come into play and NO if it has not.

Table II shows some descriptive statistics for the independent variables.

Table II Descriptive statistics of the independent variables

RVNUMEMP	Min. -0.909; median -0.014; mean -0.020; max. 2.250; std. dev. 0.19
PRINME	NO: 74.91%; YES: 25.09%
PRINTM	NO: 80.95%; YES: 19.05%
IWPM	NO: 78.20%; YES: 21.80%

The dichotomous variables PRINME, PRINTM and IWPM are strongly “correlated” or “associated” with each other. This means that the different kinds of innovation, namely, new machinery, techniques or work practices, tend to occur simultaneously. If one is present in a given year, the others tend to be also present in that year. This may lead to some collinearity problems. If the three variables were to be introduced at once in a regression model, this could mask their individual effects, mistakenly making them seem non-significant because the model cannot clearly attribute the effect on the response to any of them, given their similarity.

In order to prevent this from taking place we have introduced the three regressors PRINME, PRINTM and IWPM one at a time, so instead of having one model with the three variables we have three models, each with one of the variables. This does not pose a problem in this case because we are not really interested in the specific effect of, e.g. PRINME, as an effect that is different and clearly distinguishable from that of PRINTM or IWPM, but rather we want to identify the effect of stressful measures in conjunction with downsizing.

4.2.3 Control variables

As for the control variables included in the models, these are as follows:

RDIE: internal R&D expenditure, scaled to have a mean of zero and standard deviation of one to ensure the convergence of the models. This variable controls for the effect of R&D carried out by the firm on the innovations it produces.

NUMPRO: Number of products manufactured by the firm. As a purely quantitative effect, the NPI tends to increase with the size of the firm's product portfolio.

AGE: Logarithm of the age of the firm in years (from its incorporation to the current year). The literature that has studied the impact of firm age on innovation performance (Coad et al., 2016) has found both positive and negative values for the sign of this impact. Two main and opposite effects have been identified that explain the relationship between firm age and innovation: learning (it takes time to develop innovative routines and this favours more mature firms) and obsolescence/inertia (younger firms tend to be more dynamic and older ones lack the ability to make changes and adjust to environmental dynamism). The relative strength of these effects remains unclear.

PGWF: Proportion of graduates in the workforce, scaled to have a mean of zero and standard deviation of one.

WFRD: Fraction of the workforce assigned to R&D activities. This variable is also scaled in order to ensure the convergence of the models. Innovation is a very complex and demanding task that requires and is entrusted to highly skilled personnel. The WFRD and PGWF variables account for the presence of such skilled personnel who engage in innovation activities, or who, given their qualifications, could eventually be involved in them.

CLSALES: Cost of labour over total sales. This is a measure of labour intensity. One could expect very labour-intensive manufacturing firms to be less prone to innovate, unless highly skilled personnel are a prominent component of their workforce (this would be reflected in the PGWF and WFRD variables).

SECTOR: This is the main industry in which the firm operates. The ESEE uses its in-house classification of business sectors with 20 levels based on NACE-Rev.2[3].

YEAR: Categorical variable that contains the year corresponding to each observation. It captures the evolution of global trends in innovation intensity that affect the whole economy and are not attributable to individual firms.

Table III contains descriptive statistics for the variables RDIE, NUMPRO, AGE, PGWF, WFRD and CLSALES. The table refers to the real values of the AGE variable, not to the logged version used in the regressions. A similar caveat applies to the variables RDIE, PGWF and WFRD. The values in the table correspond to their real values, not to their scaled versions.

Table III Descriptive statistics of control variables

	Min.	1st Qu	Median	Mean	3rd Qu.	Max.	SD
RDIE (€)	0	0	0	229759	45380	9367667	863779
NUMPRO	0	0	1	0.744	1	6	0.663
Age (years)	0.00	16.00	24.00	29.33	37.00	175.00	19.74
PGWF (%)	0.00	0.00	4.20	6.34	9.10	73.70	7.78
WFRD (%)	0.00	0.00	0.00	2.15	1.60	64.52	5.55
CLSALES	0.008	0.167	0.260	0.304	0.395	3.585	0.20

The data form a panel, with observations gathered from a set of firms surveyed over a number of years. The observations for each specific firm form a group and are naturally correlated, not independent, so the regression models have to reflect this correlated structure of the data. This

is done by using regression models with random effects. In each model, the random effect is in fact a random intercept, i.e. a random variable normally distributed with a zero mean that varies randomly from one group to another, and whose value – which is of no specific interest – is added to the intercept of the model.

5. Results

Different models have been estimated, each with one of the variables PRINME, PRINTM or IWPM. For each of these variables there are two versions of the model: with and without the term for the interaction between the variable and RVNUMEMP. Tables IV and V show the results of the estimations with NPI and MKI, respectively, as dependent variables. Given that YEAR and SECTOR are relatively uninteresting control variables detailed results for them have been omitted from the tables to keep their dimensions within reasonable limits. The bottom lines of the tables contain, for each model, the AIC, log likelihood, number of firms and number of observations used to estimate it and, lastly, the estimated variance of the random effect (the random intercept in the models).

Table IV Poisson regression models for the NPI variable

	PRINME	PRINTM	IWPM			
	Without	With	Without	With	Without	With
	interaction	interaction	interaction	interaction	interaction	interaction
Intercept	-3.47876*** (0.48383)	-3.28363*** (0.47998)	-3.13477*** (0.47421)	-3.18945*** (0.47518)	-3.22889*** (0.48094)	-3.29655*** (0.48084)
RVNUMEMP	-0.27043*** (0.07999)	-0.44161*** (0.12226)	-0.25615** (0.07948)	-0.43455*** (0.11512)	-0.24801** (0.07960)	-0.60314*** (0.11821)
PRINMEYES	0.15456*** (0.03815)	0.16241*** (0.03821)				
PRINTMYES			0.23157*** (0.03913)	0.23647*** (0.03916)		
IWPMYES					0.09629* (0.03841)	0.11263** (0.03847)
RDIE	0.07506*** (0.01747)	0.08257*** (0.01732)	0.07497*** (0.01757)	0.08144*** (0.01734)	0.07673*** (0.01753)	0.08312*** (0.01730)
NUMPRO	-0.06234 (0.04529)	-0.06652 (0.04530)	-0.06161 (0.04497)	-0.07331 (0.04491)	-0.03087 (0.04489)	-0.05139 (0.04512)
Age	0.38239*** (0.09669)	0.34293*** (0.09632)	0.30432** (0.09527)	0.32974*** (0.09550)	0.31746** (0.09649)	0.35593*** (0.09655)
PGWF	0.01089 (0.03375)	0.02111 (0.03374)	0.02486 (0.03366)	0.03072 (0.03369)	0.01239 (0.03379)	0.04096 (0.03381)
WFRD	0.08456*** (0.02463)	0.07364** (0.02459)	0.07487** (0.02456)	0.08020** (0.02460)	0.08561*** (0.02465)	0.07831** (0.02468)
CLSALES	-0.81932*** (0.23377)	-0.95573*** (0.23571)	-0.94146*** (0.23428)	-0.95613*** (0.23451)	-0.94571*** (0.23490)	-0.92114*** (0.23475)
Sector	significant					
Year	significant					
RVNUMEMP:PRINMEYES		0.32351*				

	PRINME Without interaction	PRINTM With interaction	IWPM Without interaction	With interaction	Without interaction	With interaction
		(0.15605)				
RVNUMEMP:PRINTMYES				0.40374**		
				(0.15542)		
RVNUMEMP:IWPMYES						0.78298***
						(0.16130)
AIC	12233.5911	12230.8861	12215.4646	12209.7010	12245.0280	12222.2784
Log likelihood	-6081.7955	-6079.4430	-6072.7323	-6068.8505	-6087.5140	-6075.1392
Num. obs.	10835	10835	10835	10835	10835	10835
Num. groups	2304	2304	2304	2304	2304	2304
Variance of the intercept	5.5347	5.5060	5.3690	5.3803	5.5401	5.5187

Note(s): * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, + $p < 0.1$

Table V

Logistic regression models for the MKI variable

	PRINME Without interaction	PRINTM With interaction	IWPM Without interaction	With interaction	Without interaction	With interaction
Intercept	-3.21789***	-3.21902***	-2.76815***	-2.75831***	-2.93421***	-2.79389***
	(0.51961)	(0.53381)	(0.50423)	(0.49947)	(0.48897)	(0.49254)
RVNUMEMP	0.18653	-0.00451	0.27300	0.06706	0.24611	0.03207
	(0.17795)	(0.21536)	(0.17505)	(0.20382)	(0.17335)	(0.21348)
PRINMEYES	0.78758***	0.75410***				
	(0.09151)	(0.09256)				
PRINTMYES			1.14283***	1.12785***		
			(0.10160)	(0.10123)		
IWPMYES					1.23449***	1.17995***
					(0.09323)	(0.09375)
RDIE	0.10483*	0.13757**	0.13457**	0.13863**	0.13710**	0.13266**
	(0.04307)	(0.04611)	(0.04399)	(0.04416)	(0.04472)	(0.04451)
NUMPRO	0.11809	0.08322	0.09850	0.08230	0.10666	0.17040
	(0.10783)	(0.10985)	(0.10689)	(0.10640)	(0.10546)	(0.10540)
Age	0.39104***	0.38735***	0.30368**	0.29053**	0.36748***	0.30970**
	(0.10930)	(0.11206)	(0.10670)	(0.10555)	(0.10353)	(0.10409)
PGWF	0.14640*	0.13885*	0.11137+	0.12972*	0.12771*	0.11550+
	(0.06208)	(0.06330)	(0.06162)	(0.06117)	(0.06030)	(0.06077)
WFRD	0.01000	0.05787	0.00778	0.04471	0.04567	0.04235
	(0.05644)	(0.05689)	(0.05577)	(0.05510)	(0.05446)	(0.05480)
CLSALES	-1.21414***	-1.13357**	-1.27251***	-1.21747***	-1.28815***	-1.34502***
	(0.36411)	(0.36805)	(0.36055)	(0.35615)	(0.35468)	(0.35750)
Sector	significant					
Year	significant					
RVNUMEMP:PRINMEYES		0.97279*				
		(0.40492)				

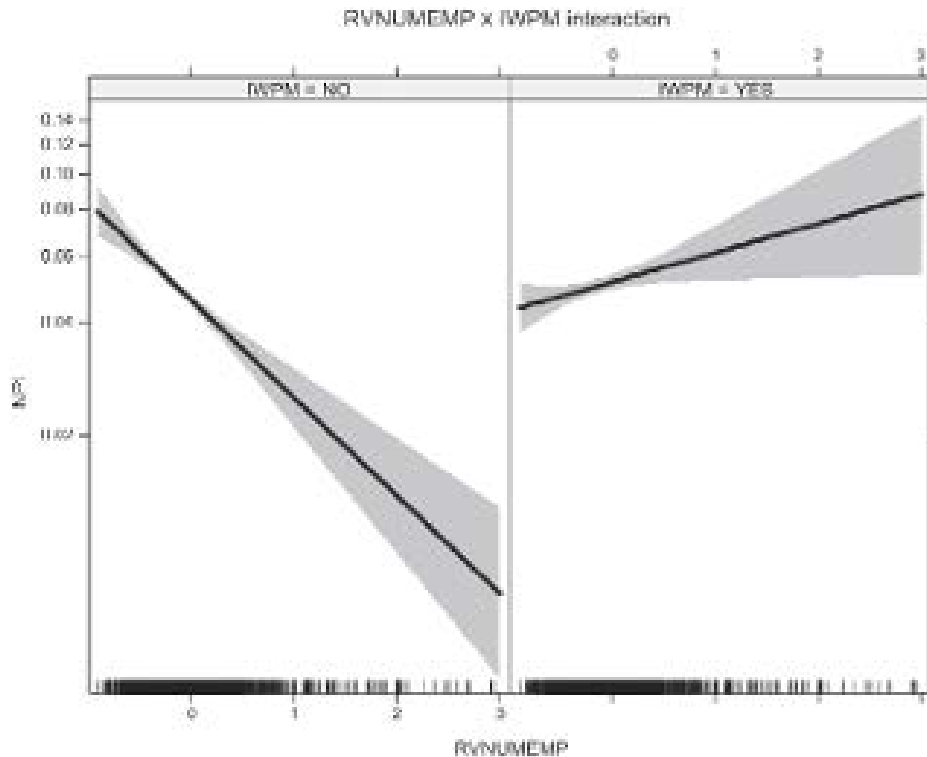
	PRINME Without interaction	PRINTM With interaction	IWPM Without interaction	With interaction	Without interaction	With interaction
RVNUMEMP:PRINTMYES				0.38767 (0.39928)		
RVNUMEMP:IWPMYES						0.62944+ (0.37399)
AIC	8107.3772	8099.3523	8054.7970	8057.8056	8000.6771	8002.2347
Log likelihood	-4018.6886	-4013.6762	-3992.3985	-3992.9028	-3965.3385	-3965.1173
Num. obs.	10900	10900	10900	10900	10900	10900
Num. groups	2304	2304	2304	2304	2304	2304
Variance of the intercept	6.08351	6.53012	5.74290	5.63215	5.25701	5.37608

Note(s): * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, + $p < 0.1$

In relation to our first hypotheses, that downsizing has a negative impact on product innovation and marketing innovation, we can see in Table IV that the coefficient of the variable RVNUMEMP is negative and significant in all models. This means that an increase in the workforce (RVNUMEMP>0) reduces the probability of developing new products, or, conversely, that a reduction in the number of employees (RVNUMEMP<0) leads to an increase in the mean NPI (the mean number that is, in fact, the figure estimated under a Poisson regression model). In consequence, H1a is rejected. As for H1b, the coefficients of RVNUMEMP in Table V, although mostly positive, are all non-significant. Thus, there is no evidence of any kind of effect of downsizing on the probability of marketing innovations and H1b must be also rejected.

Our second hypotheses states that the effect of downsizing interacts with other stressful measures such as the ones indicated by the variables PRINME, PRINTM and IWPM. In their presence, the effect of downsizing on product and marketing innovation becomes more negative (or less positive) than when downsizing acts alone. The models confirm this second hypothesis, notably in the case of product innovation. This can be seen by looking at the coefficients of the interaction terms between RVNUMEMP and each of PRINME, PRINTM and IWPM in Table IV. All the coefficients are significant and have a positive sign. This means that the effect of the interaction opposes the main effect of RVNUMEMP (main effect represented by the negative sign of the coefficient of RVNUMEMP). Figure 1 graphically depicts the interaction between RVNUMEMP and, e.g., IWPM (similar results could be obtained for the interactions with PRINME and PRINTM). The left panel shows the effect of RVNUMEMP on NPI when IWPM = NO. In this situation, downsizing (indicated by negative values of RVNUMEMP) has a positive effect on the number of innovations. However, the opposite is true when IWPM = YES, i.e. when the firm is engaged in a process of innovation in work practices and methods. This is shown in the right panel of Figure 1, where the slope of the relationship between RVNUMEMP and NPI – depicted with a 5 per cent confidence band around it – becomes positive (or, in general, less negative). Although both downsizing and IWPM (and PRINME and PRINTM) have a positive effect on innovation when acting separately, their “combination” is not so fruitful. In the presence of IWPM, PRINME or PRINTM, the effect of downsizing on product innovation becomes negative or at least less positive than if downsizing were the only source of stress in the organisation. This confirms H2a.

Figure 1 Interaction between downsizing (RVNUMEMP) and innovation in work practices and methods (IWPM)



In the case of marketing innovations, these results keep up partially. The coefficients of the interaction terms between RVNUMEMP, on one side, and PRINME, PRINTM and IWPM, on the other hand, are all positive, statistically significant for PRINME and IWPM and non-significant for PRINTM. This gives reasonable support for the idea of the more negative effect on marketing innovation of downsizing when combined with other stressful measures. H2b is confirmed then.

6. Discussion

Can downsizing help innovation? Does employment stability improve organisational innovativeness? The evidence concerning the effects of downsizing is unclear. In general terms, the findings of this study do not support the view that job security is imperative for innovation outputs. The literature on restructuring is dominated by a focus on the negative consequences of downsizing for the organisation (Armstrong-Stassen and Schlosser, 2008). A number of papers indicate that practices that foster employee commitment and intrinsic motivation are conducive to innovation (Seeck and Diehl, 2017). However, our findings reject H1 and make it clear that reducing the number of employees does not necessarily harm product and marketing innovation. This result raises the intriguing possibility that downsizing leads to greater innovation. Other studies have found similar results. For instance, Niesen et al. (2018) show that there is no direct link between job insecurity and the generation and implementation of ideas, which are the two sub-dimensions of innovative work behaviour.

Our results are unexpected and connect with the idea that downsizing can be used for regeneration purposes. There is a wide range of explanations for this finding. For instance, the threat-rigidity effects of downsizing could be mitigated in our sample because firms develop human resource management practices that retain valuable human capital (Chadwick et al.,

2004). Another possible explanation is that downsizing can contribute to the sorting and selection of employees, improving the potential for innovation (Frederiksen and Takáts, 2006). In this vein, Gregory (1999) notes that the disruption to the innovation process only takes place if the company does not have the right people in the right positions. Perhaps, the most plausible explanation in the case of Spanish companies is that survivors work harder under the threat of downsizing (Sarkar and Osiyevskyy, 2018). The idea of downsizing as a stimulus to greater effort was already mentioned by the pioneer works of Greenhalgh and Rosenblatt (1984) and Brockner et al. (1993). More recently, Harney et al. (2018) have found that employee perceptions of restructuring and downsizing lead to increased work intensity. To the extent that our field study takes place in Spain, we must remember that job reductions have been frequently used as a disciplinary measure during economic recessions in this country.

When the reduction in personnel is combined with other stressful measures, such as the introduction of new equipment, techniques or work practices (H2), firms face a negative impact on product and marketing innovation results. Lazarus and Folkman's idea of control in the post-downsizing environment can shed light on this result. The introduction of new working conditions (new machines, new techniques and new work processes) may create a situation where lack of control heightens the threat to survivors. In short, organisational restructuring produces a combination of high threat and low control, which exacerbates the negative effects of downsizing on innovation. This finding contrasts with the arguments put forward by Germain (1996) and Gunday et al. (2011). According to these authors uncertainty and organisational restructuring make firms more oriented towards the future facilitating the development of product innovation. Gunday et al. (2011) also note that changes in processes and structure can lead to a higher level of marketing innovation.

In general terms, the results of the present study seem to lend support to the idea that moderate levels of stress provoked by downsizing can be a motivator (De Frank and Ivancevich, 1998). However, when downsizing is combined with restructuring based on new equipment, techniques and work processes the stress becomes excessive. This result is supported by the literature that distinguishes between “good stress” and “bad stress”. For instance, Plotnick et al. (2009) find that while a certain amount of stress is beneficial for cognitive absorption, stress at a high level leads to less innovation.

Our work has notable implications for scholars, practitioners and society in general. The academic community must explore the idea that downsizing may be compatible with the development of knowledge creating capabilities such as innovation. Functional managers must be aware that a shrinking workforce is not necessarily an insurmountable barrier for the development of both product and marketing innovation. However, practitioners should be conscious as well that there could be a “too-much-of-a-bad-thing-effect” when the stress resulting from downsizing is combined with new threatening changes such as new equipment, techniques or work processes. Social bodies and policy-makers involved in the promotion of innovative firms must highlight the dangers that could be caused by radical processes organisational change.

Our study has clear areas of potential improvement. Firstly, we do not have data to take into account the management of the downsizing process. The results of this process could be conditioned by its implementation. At the same time, the fairness of the job reduction is an important antecedent of the threat perceived by employees during organisational change (Fugate et al., 2012).

Second, to assess the implications of downsizing it is necessary to take into account the characteristics of the employees that are doing the work. Our data do not identify the specific units affected by downsizing. Similarly, we do not have information about how individuals were chosen for downsizing. It is well known that not every survivor reacts to job insecurity in the same way.

Finally, our study is carried out in a single country. This limits its generalisability as downsizing strategies are difficult to isolate from their contextual environment.

7. Conclusions

The consequences of downsizing in terms of organisational innovation are under discussion. This paper has presented two seemingly unexpected results. Our first finding suggests that a reduction in the size of the workforce in Spanish manufacturing companies is not incompatible with the objective of developing product and marketing innovation. The second finding shows that the combination of job reductions with radical organisational change (new equipment, techniques or work processes) seems to have a negative impact on product and marketing innovation. This detrimental effect could be attributed to the higher level of threat and stress. These results confirm the idea that the degree to which job reductions can affect innovation will be contingent on the conditions under which they occur.

Notes

1. According to Cascio (1993), downsizing is the planned elimination of positions and jobs. It is important to take into account that it is not equivalent to dismissals and can adopt the form of early retirement, voluntary redundancies or a freeze on recruitment.

2. <https://www.fundacionsepi.es/investigacion/esee/en/spresentacion.asp>

3. https://www.fundacionsepi.es/investigacion/esee/en/svariables/Cambio_clasificacion_sectorial_ESEE.asp

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