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Data Article

Dataset that shows organizational complexity as a key enabler for business model innovation using enterprise resource planning

Rocío Rodríguez [a,b,*], Göran Svensson [b], Francisco-José Molina-Castillo [a]

[a] Universidad de Murcia. Campus de Espinardo, 30100 Murcia, Spain
[b] Kristiania University College, 0107 Oslo, Norway

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ABSTRACT

An empirical study was conducted to find the role of the Organizational Complexity (OC) on the Business Innovation Model (BMI) when companies are using an Enterprise Resource Planning (ERP). Three different profiles were contacted in the companies (General Manager, Information Technology Manager and Purchasing Manager). A data collection process through a questionnaire survey was conducted, 132 informants participated in the study, however, 28 of them reported they were not using an ERP in their company. Valid data from 104 enterprises dealing with BMI and simultaneously had implemented an ERP software solution participated to the questionnaire. The scales used for the questionnaire of this study were previously validated in the literature and measured aspects such as the ERP use and perceived usefulness, the organizational complexity and costs and revenues of the business model innovation. All constructs accomplish the validity and reliability commonly accepted. This dataset could be specially useful for conduct multi countries studies to compare results about the impact of Organizational complexity on Business Model Innovation for those companies using and Enterprise Resource Planning (ERP).

* Corresponding author.
E-mail address: rrodriguez@um.es (R. Rodríguez).

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Specifications Table

Subject	Marketing
Specific subject area	This study focuses in ERP implementation and its impact on Business Model Innovation taking into account the Organizational Complexity
Type of data	Table Figure Raw Analyzed Filtered
Data collection	Survey (additional artifact are described). A questionnaire was used for data collection. The items used originates from validated scales in previous research. Test of validity and reliability were undertaken of used Likert scales in the questionnaire.
Data source location	Spain
Data accessibility	Repository name: Mendeley https://data.mendeley.com/datasets/j954srbjgf/1 Rodriguez, Rocio; Molina-Castillo, Francisco-Jose; Svensson, Göran (2024), "Dataset Organisational Complexity BMI ERP", Mendeley Data, V1, doi: 10.17632/wnzc4md24b.1
Related research article	Rodríguez, R., Molina-Castillo, F. J., & Svensson, G. (2020). The mediating role of organizational complexity between enterprise resource planning and business model innovation. Industrial Marketing Management, 84, 328-341. [1] https://doi.org/10.1016/j.indmarman.2019.09.007Get rights and content

1. Value of the Data

- Scholars may approach and use the data collected and reported here to illustrate:
  - the effect of an implemented ERP software solution on BMI.
  - the mediating effect of organizational complexity between ERP and BMI.
- The data collected and reported here can be useful to encourage undergraduate, graduate and doctoral students:
  - to explore related aspects in the context of ERP and BMI
  - to assess possibilities of other constructs than organizational complexity that may have an mediating effect between ERP and BMI.
- The data collected and reported here can be used:
  - to stimulate efforts of validation of the findings reported here in other studies.
  - to encourage the assessment of findings reported here in other industries and countries.
  - to enable additional data collection and a longitudinal assessment of data on the effect of ERP on BMI.
- The data reported is also relevant and valuable to other scholars:
  - being based on a rigorous data collection process.
  - scales used for each construct in the questionnaire have been validated in previous research.
  - the measurement properties of collected data demonstrate satisfactory validity and reliability.
  - The structural properties of data between constructs demonstrate satisfactory goodness of fit.
  - Could be used to carry out multi-countries analysis comparison.

2. Background

The data gathered aimed to explore the effect of firms' implementation of ERP on BMI. Previous data collections have not assessed it. In fact, there are few insights in literature on the effect of using ERP on BMI. The data gathered offers insights on the effect of organizational complexity between ERP and BMI. The data collected offers the opportunity to test the mediating effect of organizational complexity between ERP (based on perceived usefulness of technology and technological complexity) and BMI (based on innovation revenues and innovation costs). Consequently, the data gathered offer the opportunity to assess the effect of the costs and revenue related to BMI through organisational complexity and the antecedents of perceived usefulness and complexity of ERP.

3. Data Description

The data collection process is based on an online questionnaire with the multi-items measures of the constructs. It also contains an ethics and confidentiality statement for data treatment. The multi-item measures are displayed in Tables 1 and 2. All the multi-items scales used in this research were obtained or adapted from previous research as stated in Table 2. According to the measures previously obtained in the literature review using categorical variables for Q1 to Q14 (Table 1) and 7-point Likert scales [1 totally strongly disagree to 7 totally strongly agree] for questions Q15 to Q19 (Table 2). Tables 1 and 2 display each item and related coding of the multi-item measures. Each of the multi-item measures in the questionnaire originates from previous studies.

AMOS was the software used for assessing the measurement of multi-items scales (Q15 to Q19). Quality criteria results are shown in Table 3.

In order to evaluate the discriminant validity of the scales in essential to consider rigorous methodologies that confirm that there is no cross loading between constructs [7]. In particular, two approaches were used: the the Heterotrait-Monotrait Ratio (HTMT) and the Fornell-Larcker correlations and the square-root AVE . In Table 4 is shown the Heterotrait-Monotrait Ratio (HTMT), in the same table we show Fornell-Larcker correlations and the square-root AVE. The scales accomplish the quality criteria often accepted in literature.

The structural equation model assessed is shown in Fig. 1. Before running the structural model, it was check that there was no limitations with the sample size, nor did not appear

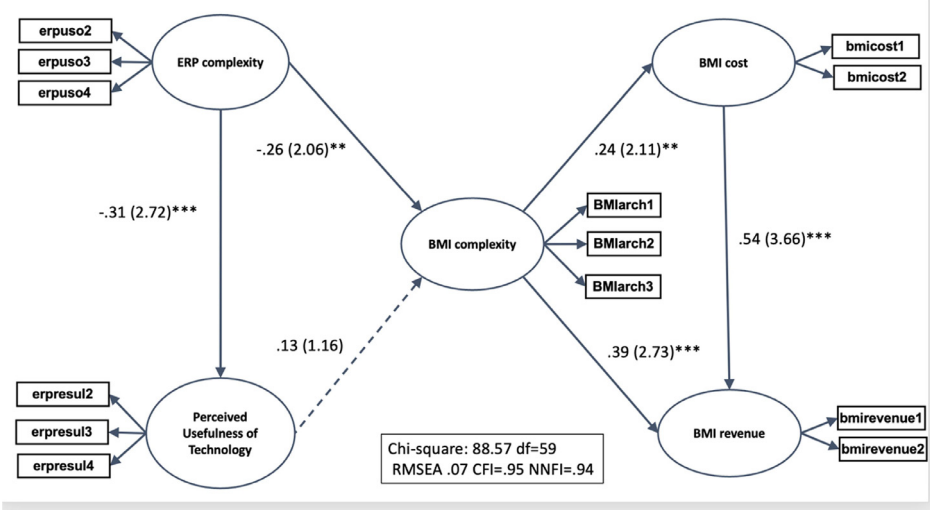

Fig. 1. Structural model.

Table 1
Demographic items.

Variables	*Question*	*Coding*
Q1	*Age*	
	25-35	*1*
	35-45	*2*
	45-55	*3*
	55-65	*4*
Q2	*Position*	
	General Manager	*1*
	IT Manager	*2*
	Purcahsing Manager	*3*
	Other	*4*
Q3	*Number of years in the same sector*	*Integer*
Q4	*Number of years in your current company*	*Integer*
Q5	*Number of years using ERP*	*Integer*
Q6	*Gender*	
	Male	*0*
	Female	*1*
Q7	*Number of Employees of your company*	*Integer*
Q8	*Number of departments of your company*	*Integer*
Q9	*Number of departments using ERP*	*Integer*
Q10	*Invoices amount in 2016*	*Integer*
Q11	*Number of product lines your company sells Integer*	
Q12	*Is your company a family business*	
	Yes	*0*
	No	*1*
Q13	*Which is the industry of your company*	
	Agri-Food	*1*
	Banking and Finance	*2*
	Construction and Roads	*3*
	Consulting and Lawyers	*4*
	Distribution	*5*
	Energy	*6*
	Pharmacy	*7*
	Industry	*8*
	Information	*9*
	Real Estate	*10*
	Environment	*11*
	Motor	*12*
	Advertising and Marketing	*13*
	Health and Beauty	*14*
	Insurance	*15*
	Services	*16*
	Technology	*17*
	Telecommunications	*18*
	Textile, fashion and clothing	*19*
	Transportation	*20*
	Tourism and leisure	*21*
Q14	*Region*	
	Andaluciá	*1*
	Aragón	*2*
	Canarias	*3*
	Cantabria	*4*
	Castilla y León	*5*
	Castilla La Mancha	*6*
	Cataluña	*7*
	Ceuta	*8*
	Comunidad de Madrid	*9*
	Comunidad Valenciana	*10*
	Extremadura	*11*
	Galicia	*12*
	Islas Baleares	*13*

(*continued on next page*)

Table 1 (*continued*)

Variables	*Question*	*Coding*
	La Rioja	*14*
	Melilla	*15*
	Navarra	*16*
	País Vasco	*17*
	Principado de Asturias	*18*
	Región de Murcia	*19*

Table 2
Multi-item measures.

Variables	*Questions*	*Coding*
Q15. ERP complexity	*Technological Complexity [2](p.132). Using the ERP system in my job:*	
erpuso2	*… is difficult to understand what is going on*	*Likert (1-7)*
erpuso3	*… involves much time doing mechanical operations*	*Likert (1-7)*
erpuso4	*…takes too long to learn how to use it*	*Likert (1-7)*
Q16. Perceived Usefulness of Technology	*Perceived Usefulness of Technology [3](p.324) Using the ERP system in my job*	
erpresul2	*…increases my productivity*	*Likert (1-7)*
erpresul3	*…enhances my effectiveness*	*Likert (1-7)*
erpresul4	*…is very useful*	*Likert (1-7)*
Q17. BMI complexity	*Organizational Complexity [4] (p.196) During the last year, your organization has made changes in its business model that:*	
BMIarch1	*…have not been implemented before by competitors.*	*Likert (1-7)*
BMIarch2	*…transform the way to interact with clients.*	*Likert (1-7)*
BMIarch3	*…modify the way to organize the relationships with clients.*	*Likert (1-7)*
Q18. BMI cost	*Cost of innovation [5](p.2) During the last year, your organization has made changes in its business model to:*	
bmicost1	*…introduced new ways to reduce fixed costs*	*Likert (1-7)*
bmicost2	*…introduced new ways to reduce variable costs*	*Likert (1-7)*
Q19. BMI revenue	*Revenue of innovation [6](p.67) During the last year, your organization has made changes in its business model that:*	
bmirevenue1	*…introduced new ways to be profitable*	*Likert (1-7)*
bmirevenue2	*…introduced new pricing mechanisms*	*Likert (1-7)*

Table 3
Confirmatory factor analysis.

Variables	Loading	SCR	AVE
Q15. ERP complexity			
erpuso2	.76 (7.23)	.73	.50
erpuso3	.54 (5.16)		
erpuso4	.76 (7.28)		
Q16. Perceived Usefulness of Technology			
erpresul2	.90 (11.61)	.94	.84
erpresul3	.58 (13.22)		
erpresul4	.88 (11.13)		
Q17. BMI complexity			
BMIarch1	.57 (6.04)	.84	.65
BMIarch2	.94 (11.42)		
BMIarch3	.86 (10.18)		
Q18. BMI cost			
bmicost1	.87 (9.43)	.90	.81
bmicost2	.94 (10.21)		
Q19. BMI revenue			
bmirevenue1	.56 (5.08)	.70	.50
bmirevenue2	.72 (6.13)		
Overall adjustment T-value in brackets	Chi-square (55)=83.76 CFI=.95 NNFI=.93 RMSEA=.07		

Table 4
HTMT criterion, correlations and square-root AVE.

AVE Correlation Comparison	SCR	AVE	Q15	Q16	Q17	Q18	Q19
Q15	.73	.50	.71				
Q16	.94	.84	-.31***	.91			
Q17	.84	.65	.30***	.21**	.81		
Q18	.90	.81	.04	.07	.25***	.90	
Q19	.70	.50	-.10	.05	.51***	.64***	.71
HTMT Test			Q15	Q16	Q17	Q18	Q19
Q15							
Q16			.62				
Q17			.03	.26			
Q18			.17	.12	.28		
Q19			.11	.17	.72	.63	

SCR= Scale compose reliability, AVE= Average Variance Extracted
Elements in the main diagonal are the square root of the AVE
Levels of significance: *** p<.01 ** <.05

during model optimisation. The software used was AMOS with similar results as informed in the paper previously published. The use of AMOS when testing the impact of Business Model Innovation has employed previously by other researchers [8].

4. Experimental design, materials and methods

The data collected is quantitative and based on a deductive approach in Spain. This type of single-country analysis allows for reducing bias and focusing on the proposed relationships. The selection of this country is also justified as the enterprises that were targeted have a tradition of implementing an ERP [9] and have engaged with BMI [10]. The contextual bias is reduced by addressing a technological tool often referred to as ERP [11]. A principal reason to focus on ERP instead of any other technological software solution is that it covers the whole organisation and assists firms in operating appropriately [12]. The focus is on one ERP system. It allows to monitor the research design. It also allows us to avoid product-related biases. The focus of the research design has been to reduce the likelihood of unsatisfactory validity. A cross-industry selection of firms with experience implementing an ERP system has been targeted.

The sample selection process was aleatory and representative of the population. The type of the company responding to this questionnaire is characterized mainly for two indicators : i) being small and medium size companies, related to number of employees (less than 250), this size of company is the most common one in Spain. ii) using ERP system. Companies interviewed come from all industries. By the other side, profiles interviewed were the Chief of Information Officer (CIO) and the Chief Executive Officer (CEO). All of them were men. CIO were between 40 and 50 years old, and CEO between 45 and 60 years old. In the case of CIO, everyone had bachelor, in the case of CEO profile, everyone had a master degree, although not necessarily a bachelor.

An email was sent to identified and targeted executives. Informants were asked to assess the questionnaire survey through a hyperlink and to fill it in online. A pre-study was conducted with semi-structured and in-depth interviews with four firms with the Chief Executive Office (CEO) and the Chief of Information Officer (CIO). It was very useful that managers' perceptions about the variables were according to expectations. The procedure to collect perceptions from managers is generally accepted in the literature. Previous researchers have suggested that collecting this information from highly knowledgeable company employees is the correct approach to evaluate variables [13].

As part of the data collection process, informants were informed that the data collected would only be used for research and informants were ensured to remain anonymous (Cascio et al. 2010). In addition, before data collection a pre-test was conducted with several managers and academics. The data collection process achieved 132 responses from informants. However, 28 responses were omitted because the informants' enterprises did not have any ERP software solution implemented. Consequently, the database consists of 104 filled-in questionnaires.

After potential biases in the data and data collection process had been assessed and clarified, a confirmatory factor analysis of the multi-item measures was undertaken using SPSS and AMOS software. As a result, convergent validity was confirmed. All items were significant and with t-values above the recommended cut-off points. The reliability of multi-item measures [14] was assessed satisfactorily and the average variance extracted [15] and met the threshold values of -60 and .50, respectively.

The techniques of the square root of AVE with correlations [15] and confidence intervals [16] are commonly used in many studies. There are other recent techniques that assess potential measurement problems with multi-item measures. [17] undertook an in-depth analysis of the various techniques applied in research to assess discriminant validity, proposing the estimate of hetero trait-monotrait (HTMT) test. The assessment of the data collected is in line with the recommended thresholds. All ratios were below the recommended cut-off point of .90. Consequently, the multi-item measures applied meet the convergent or discriminant validity criteria. The reliability estimates of multi-item measures also meet the criteria recommended and are displayed in Table 3. In conclusion, the findings reported suggest that organizational complexity is a key enabler for business model innovation using enterprise resource planning.

Limitations

One limitation of the data collected is that it originates from one country (Spain). It is possible that data collected in another national setting may indicate a different outcome of the research model. However, the result may also be the same. The data collected is also limited to a cross-industry sample. Specific industries may indicate different results. Both limitations are relevant to remember as organisational complexity is related to the corporate culture and possibly the national culture. Therefore, the limitations to one country and sample characteristics are relevant shortcomings to be considered in future research. However, this also entails an opportunity to carry out multi-country comparison of the results obtained with this dataset. There are also variables other than ERP complexity, and ERP perceived usefulness that may indicate an effect on BMI. Further research may, therefore, address this shortcoming with other constructs. For example, it could be interesting to explore how this complexity and innovation is perceived by customers [18] or other demand-side inertia factors [19].

Ethics Statement

All authors comply with the ethics procedure of the University of Murcia and Kristiania University College. All respondents were thoroughly informed about the content and the scope of the study before participation. Participation was completely voluntary and participants cannot be identified. An ethics approval from an IRB was not required.

Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

English Dataset OC BMI ERP Codebook and Questionnaire (Original data) (Mendeley Data).

CRediT Author Statement

Rocío Rodríguez: Conceptualization, Methodology, Data curation, Formal analysis, Writing – original draft, Supervision; **Göran Svensson:** Writing – review & editing; **Francisco-José Molina-Castillo:** Software, Data curation, Writing – original draft.

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