2016

The role of contingency factors in physical asset management: An empirical examination

Damjan Maletic
University of Maribor, Slovenia

Matjaz Maletic
University of Maribor, Slovenia

Basim Al-Najjar
Linnaeus University

K Gotzamani
University of Macedonia

M Gianni
University of Macedonia

See next page for additional authors

Publication Details

Maletic, D., Maletic, M., Al-Najjar, B., Gotzamani, K., Gianni, M., Kalinowski, T. B., Pacaiová, H., Nagyova, A. & Gomiscek, B. 2016, 'The role of contingency factors in physical asset management: An empirical examination', EuroMaintenance 2016: Conference Proceedings, pp. 93-98.

The role of contingency factors in physical asset management: An empirical examination

Conference Paper · May 2016


Damjan Maletič
University of Maribor

Katerina Gotzamani
University of Macedonia


Maria Gianni
University of Macedonia


Bostjan Gomiscek
University of Wollongong in Dubai

The role of contingency factors in physical asset management: An empirical examination

D. Maletič[1], M. Maletič[2], B. Al-Najjar[3], K. Gotzamani[4], M. Gianni[5], T.B. Kalinowski[6], H. Pačaiová[7], A. Nagyová[8], B. Gomišček[9]

[1]Faculty of Organizational Sciences, University of Maribor, Slovenia, damjan.maletic@fov.uni-mb.si
[2]Faculty of Organizational Sciences, University of Maribor, Slovenia, matjaz.maletic@fov.uni-mb.si
[3]School of Engineering, Linnaeus University, Sweden, basim.al-najjar@lnu.se
[4]Department of Business Administration, University of Macedonia, Greece, kgotza@uom.edu.gr
[5]Department of Business Administration, University of Macedonia, Greece, giannima@uom.edu.gr
[6]Faculty of Management, University of Lodz, Poland, tbkalinowski@uni.lodz.pl
[7]Faculty of Mechanical Engineering, Technical University of Kosice, Slovakia, hana.pacaiova@tuke.sk
[8]Faculty of Mechanical Engineering, Technical University of Kosice, Slovakia, anna.nagyova@tuke.sk
[9]Faculty of Business, University of Wollongong in Dubai, UAE, BostjanGomiscek@uowdubai.ac.ae

Keywords: Physical asset management, maintenance, uncertainty, competitiveness, empirical study

Abstract

This research presents an empirical study, which examines the role of contingency factors, i.e. uncertainty and competitiveness in relation to physical asset management (PAM) practices. The research is based on a premise that PAM, which comprises of risk management practices, performance assessment practices, life cycle management practices, policy & strategy practices, has become an indispensable element of strategic thinking of asset owners as well as maintenance and asset managers. The purpose of this study is to advance the understanding of how organizations that face high or low level of uncertainty and competitiveness respond in terms of PAM deployment.

This study employed a data set based on a large-scale survey among organizations in six European countries (i.e. Slovenia, Poland, Greece, Sweden, Turkey and Slovakia). The results show that organizations that are faced with high level of uncertainty and competitiveness are more engaged in the deployment of PAM practices. From a theoretical perspective, this study contributes to the contingency theory by providing empirical evidence whether a context-dependent approach to PAM is needed. The findings also provide insights for managers on how to respond to the competitive pressure as well as how to customize PAM practices in order to adapt to the changes in dynamic organizational environment.

1. Introduction

Success in any competitive context depends on offering higher customer value or operating with lower costs (Porter, 1985). One important way in which competitive performance could be achieved is through the effective management of physical assets (Schuman & Brent, 2005). In industrial practice the basic effort is to reduce costs and increase profit (Pacaiova, Glatz, & Kacvinsky, 2012). According to Waeyenbergh and Pintelon (2002), proper maintenance helps keeping the life cycle cost down and ensures proper operations and smooth internal logistics. In addition, Al-Najjar (2002) outlined that the role of maintenance with respect to production is to maintain the quality of all the essential elements that contribute to the production process to keep the product quality and delivery on time at a competitive price. Traditionally, maintenance, with its multifaceted activities, resources, measurement, and management, has been important to manufacturing organizations. However, in recent years, the need to manage the different aspects of maintenance more effectively has increased the importance of the role of maintenance in organizations (Simoes, Gomes, & Yasin, 2011). As such, maintenance function is becoming essential for a manufacturing organisation to maintain its competitiveness (Al-Najjar, 2007). Therefore, in order to ensure survival in the short-, medium- to long-term, profitability from assets needs to be maximised. The main challenge facing operating and production enterprises is the necessity to maintain, and often increase, operational effectiveness, revenue and customer satisfaction, while simultaneously reducing capital, operating and support costs (Mitchell, 2002).

More recently physical asset management (PAM) comes to the forefront in order to help asset and maintenance managers to exploit full potential of the companies and effectively reach their business goals. There is growing debate over the difference between asset and maintenance management. Many researchers argue that PAM is more profound than maintenance management (Amadi-Echendu et al., 2007). However, one should say that PAM could be considered as a maintenance management which has a strategic role in the organization and goes well beyond the responsibility of traditional maintenance management. An important aspect of PAM is to strike the right balance between performance, cost and risk in pursuing the enterprise goals. It supports managing investments, capacity and production in a more efficient, better quality-assured, safer and more competitive way (Emmanouilidis & Komonen, 2013).

Although there is a great body of literature covering various aspects of PAM (e.g. Emmanouilidis & Komonen, 2013; Komonen, Kortelainen, & Räikkönen, 2012; Amadi-Echendu et al., 2007; Schuman & Brent, 2005; Ratnayake, 2013; Ratnayake & Markeset, 2012), there is lack of empirical studies that would explore the PAM practices. Additionally, there is no study that provides empirical examination of the role of contingency factors (i.e. uncertainty and competitiveness) in PAM. Therefore, the purpose of this paper is to address this gap.

The paper is organized as follows. In Section 2, the theoretical background is provided. Section 3 is devoted to presentation of research methods. The research analysis and results are presented in Section 4, followed by the discussion and conclusions in Section 5

2. *Literature review*

Before discussing the literature review on the role of PAM in organization, it is necessary to define the maintenance and asset management. The scope of maintenance in a manufacturing environment is illustrated by its various definitions. The British Standards Institute defines maintenance as “A combination of all technical and associated administrative activities required to keep equipment, installations and other physical assets in the desired operating condition or restore them to this condition” (BSI, 1984). Over the time maintenance has developed a wider range, and thus maintenance management has been defined. In European Standards considering maintenance (EN 13306:2010), maintenance management is defined as all activities of the management that determine the maintenance objectives or priorities, strategies, and responsibilities and implement them by means such as maintenance planning, maintenance control and supervision, and several improving methods including economical aspects in the organization. Further, Wireman (1998), in his book “Developing Performance Indicators for Managing Maintenance” has defined maintenance management as, “The management of all assets owned by a company, based on maximizing the return on investment in the asset”. Another approach can be found in Crespo Marquez and Gupta (2006). The Authors presented a holistic framework for managing the maintenance function. They suggest that maintenance management must be aligned with actions at three levels of business activities (i.e. strategic, tactical and operational). More recently, PAM comes to the forefront. It goes well beyond the scope of maintenance management. The PAM deals with the whole life cycle of the asset, from its design to its final disposal. According to Mitchell (2002) asset management is: “A comprehensive, fully integrated strategy process and culture directed at gaining greatest lifetime effectiveness, value, profitability and return from production and manufacturing equipment assets”. Moreover, European Federation of National Maintenance Societies (EFNMS, 2009) have preferred a simple definition: “the optimal life cycle management of physical assets to sustainably achieve the stated business objectives”.

In any asset intensive industry an effective management of physical assets is crucial. Changing business environment has increased the strategic importance of PAM in companies that have significant investments in physical assets (Komonen, Kortelainen, & Räikkönen, 2012). Without proper management of physical assets serious health, safety and environment and financial consequences can occur (Ratnayake & Markeset, 2012). It is widely acknowledge that profitability increases by improving availability and preventing loss of production and loss of human or capital resources (Duijm, Fiévez, Gerbec, Hauptmanns, & Konstandinidou, 2008). This means that ineffective asset and maintenance management could be attributable to issues such as lost profit due to missing production during planned and unplanned stoppages, loss of customers, reputation and consequently loss of market share because of maintenance-related factors resulting in delivery delay and poor quality (Al-Najjar, 2007; Maletič, Maletič, Al-Najjar, & Gomišček, 2014).

2.1 Contingency theory

Much of the literature suggests that organizational practices are formulated in light of perceived environmental conditions and internal capabilities (Sila, 2007). Contingency theory assumes that organizations attain effectiveness by fitting the characteristics of the organization to contingencies that reflect the situation of the organization (Donaldson, 2001). Contingency and institutional variables have been identified in the literature as factors that influence the customization of the organizational practices as well as the relationship between these practices and performance implications (e.g. Sila, 2007; Zhang, Linderman, & Schroeder, 2012).

3. Methods

3.1 Sample and data collection

The data used in this study are obtained from a research project conducted by a team of international researchers in the field of maintenance and asset management. The target survey population consisted of international e-mail lists of managers across a wide range of functions. In total, 138 usable responses were collected during the given time window. The questionnaire was responded by organizations that are located in located in Slovenia, Poland, Greece, Sweden, Turkey and Slovakia, in portion of 31.9%, 34.1%, 16.7%, 6.5%, 5.8% and 5.1%, respectively. Primarily, the rationale for the selection of the particular countries was based on the sampling strategy to obtain a good spread of countries by geographic, economic, political and social criteria.

In terms of organizational size (following the guidelines of the Statistical Office of the Republic of Slovenia), 12.2% of the sample was composed of micro-enterprises having five or fewer employees, 17.4% were small-sized organizations employing 50 or less employees, 31.3% were medium sized organizations, employing 51–250 employees, 21.7% organizations were with 251–500 employees and 12.2% organizations were with more than 500 employees

Based upon Slovenian Standard Industrial Classification Codes (SIC), Table 1 shows the industry structure of the organisations under investigation. As shown in Table 1, most respondents (39.3%) indicate that their organization is in the ‘manufacturing’ industry.

Industry (standard industrial classification)	Share (%)
Agriculture, Forestry and Fishing	1.7
Mining and Quarrying	6
Manufacturing	39.3
Electricity, Gas, Steam and Air Conditioning Supply	2.6
Water Supply, Sewerage, Waste Management and Remediation Activities	0.9
Construction	6.8
Wholesale and Retail Trade, Repair of Motor Vehicles and Motorcycles	16.2
Transportation and Storage	5.1
Accommodation and Food Service Activities	0.9
Information and Communication	3.4
Financial and Insurance Activities	0.9
Other	16.2
Total	100

Table 1 Sample distribution by industry type

3.2 Measures

The instrument developed in this study consists of two major parts. The first part comprises four constructs measuring asset management, and the second part comprises two constructs measuring uncertainty and competitiveness. As mentioned above four constructs for measuring PAM are used in this study, namely risk management, performance assessment, life cycle management, and policy & strategy. Items for measuring these construct were derived from past studies on PAM (e.g. EFNMS - EAMC, 2012; Emmanouilidis & Komonen, 2013, Maletič, 2015). Items related to uncertainty and competitiveness were developed based on from prior empirical studies in the field of quality management (e.g. Zhang et al., 2012; Jansen, Van Den Bosch, & Volberda, 2006). The list of all items can be seen in the Appendix A.

4. Analysis and results

4.1 Measurement and validation of constructs

The scales for PAM practices were subjected to validity and reliability tests. The construct validity was assessed merely using exploratory factor analysis (EFA) based on oblique rotation (Direct Oblimin). The scale reliability was tested by calculating its Cronbach's alpha. Additionally, we performed corrected item-total correlations (CITCs) in order to strengthen validity and reliability results. The results show four factors with eigenvalues greater than one, accounting for 66.9% of the variance (K-M-O statistic 0.937; Bartlett statistic 2819.395; significance 0.000). The first factor shows the variables having a common underlying dimension of "risk management". The second factor named "performance assessment", includes the variables relating to measurement and improvement of PAM. The third factor, "life cycle management" captures the common underlying theme of managing entire life cycle of physical assets. The fourth factor is named "policy & strategy", includes variables related to the organization's activities that exemplify asset management policy and strategy formulation.

4.2 Descriptive statistics

The results presented in Table 2 include means, standard deviations, and bivariate correlations for all composite variables in this research. As can be seen from the Table 1 the highest mean value corresponds to the life cycle management (mean 3.93, s.d. 0.73), while the lowest value corresponds to the business performance (mean 3.15, s.d. 0.95). Further, the results of the t-tests show that there is significant difference between mean values for the risk management and the performance assessment ($t = 2.801$, $p < 0.01$) as well as between mean values for the performance assessment and the life cycle management ($t = -4.636$, $p < 0.01$). The results also support significant difference between mean values for the policy and the life cycle management ($t = -2.730$, $p < 0.01$).

	Mean	SD	(1)	(2)	(3)	(4)	(5)
(1) Physical asset *Management*	3.57	.73					
(2) *Risk Management*	3,60	.86	.887**				
(3) *Performance assessment*	3.43	.87	.862**	.659**			
(4) *Life cycle management*	3.72	.81	.862**	.701**	.658**		
(5) *Policy & strategy*	3.54	.82	.868**	.698**	.663**	.644**	-

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 Means, standard deviations and correlations

As can be seen from the Table 2 all correlation coefficients are statistically significant and range from 0.64 to 0.88 ($p < 0.01$).

4.3 Difference of means (t-test)

T-test was used to examine whether there is significant difference PAM practices implementation considering the two groups for each corresponding construct: low level and high level of uncertainty and competitiveness (Table 3). A score of 4 and above was treated as high, and a score of 3 or below was treated as low level group.

Construct	Groups	Mean	Std. Deviation	Std. Error	t
Uncertainty					
Physical asset management	Low level (N=37)	3.36	0.737	0.121	-2.014*
	High level (N=101)	3.64	0.717	0.071	
Competitiveness					
Physical asset management	Low level (N=35)	3.35	0.782	0.132	-2.109*
	High level (N=103)	3.64	0.700	0.069	

*P < 0.05

Table 3 Summary of the results of the t-test

The results show that there are significant differences between the mean values of the PAM concerning the low and high levels of uncertainty and competitiveness ($t= -2.014$, $p < 0.05$, $t= -2.109$, $p < 0.05$, respectively).

5. Discussion and conclusion

This paper contributes to the literature on contingency theory by developing a better understanding of contingency factors (i.e. uncertainty and competitiveness) regarding the deploying of PAM practices. The results of t-test show that when organizations are faced with high levels of uncertainty they are putting more effort in PAM practices. In particular, the results of this study indicate that high levels of competitiveness seem to stimulate the organizations to deploy PAM to a greater extent than organizations that are faced with low levels of competitiveness. As such, these findings contribute to the discussion in the literature concerning the role of contextual factors such as uncertainty (Zhang et al., 2012) and competitiveness (Jansen et al., 2006).

The main theoretical implication of this study is the development of an empirically based and testable framework of PAM practices, which integrates the literature exploring PAM practices (e.g. EFNMS – EAMC, 2012). We used exploratory factor analysis, corrected item-total correlations and reliability estimation using Cronbach's alpha to confirm whether the scales have a factor structure that depicts the theoretical dimensionality of their setting. Our results indicated that PAM comprises of four constructs, namely risk management, performance assessment, life cycle management and policy & strategy. Our findings underpin previous studies (e.g. Emmanouilidis & Komonen, 2013) that have examined the role of PAM practices in industrial sector. Further, our study support the view of researchers who argue that holistic views of PAM reflect the general movement in engineering circles to emphasize the importance of PAM and to focus on the bigger picture of life cycle asset assessment, including strategy, risk measurement, safety and environment and human factors (Amadi-Echendu et al., 2007).

From a managerial perspective, the study emphasizes the need to recognize the different dimensions of PAM practices. In addition, important information for managers is also to perceive how organizations responded to different environmental conditions (i.e. uncertainty and competitiveness).

Despite the overall findings produced in this study, we believe that this topic still opens opportunities for further studies. Future studies could focus on the relationship between PAM practices and organizational performance.

6. References

Al-Najjar, B. (2002). Company´s business and competitiveness enhancement: A model of integrated vibration-based maintenance impact on company´s effectiveness. In Proceedings of COMADEM 2002: *15th International Congress on Condition Monitoring and Diagnostic Engineering Management. Paper presented at Condition monitoring and diagnostic engineering management (COMADEM 2002)*, Sep.2-4, 2002 Birmingham, UK (pp. 238-248).

Al-Najjar, B. (2007). The lack of maintenance and not maintenance which costs: A model to describe and quantify the impact of vibration-based maintenance on company's business. *International Journal of Production Economics*, 107(1), 260–273. doi:10.1016/j.ijpe.2006.09.005

Amadi-Echendu, J. E., Willett, R. J., Brown, K. A., Lee , J., Mathew, J., Vyas, N., & Yang, B.-S. (2007). What is engineering asset management? In *Proceedings 2nd World Congress on Engineering Asset Management and the 4th International Conference on Condition Monitoring*, pp. 116–129.

BSI (1984). *Glossary of maintenance terms in Terotechnology*. British Standard Institution (BSI), London; BS 3811.

Crespo Marquez, A., & Gupta, J. N. D., (2006). Contemporary maintenance management: process, framework and supporting pillars. *Omega*, 34(3), 313–326. doi:10.1016/j.omega.2004.11.003

Donaldson, L., 2001. *The Contingency Theory of Organisation*. Sage, Thousand Oaks.

Duijm, J. N., Fiévez, C., Gerbec, M., Hauptmanns, U., & Konstandinidou, M. (2008). Management of health, safety and environment in process industry. *Safety Science*, 46(6), 908–290. doi:10.1016/j.ssci.2007.11.003

EFNMS (2009). *A Definition of Asset Management*. Minutes of the meeting. European Federation of National Maintenance Societies. Trondheim. Norway

EFNMS-EAMC (2012). *How organizations manage their physical assets in practice*, EFNMS Asset Management Survey (EFNMS). Retrieved from http://www.hmsgr.eu/t/files/EAMCSurvey2011ReportFinal02122012.pdf

Emmanouilidis, C., & Komonen, K. (2013). Physical asset management practices in industry: comparisons between Greece and other EU countries. In V. Prabhu, M. Taisch, D. Kiritsis (Eds.), *Advances in production management systems. Sustainable production and service supply chains, IFIP advances in information and communication technology* (pp. 509–516). New York, Springer.

EN 13306:2010. (2010). *Maintenance Terminology. European Standard. CEN* (European Committee for Standardization), Brussels.

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *Management Science*, 52(11), 1661–1674. doi:http://dx.doi.org/10.1287/mnsc.1060.0576

Komonen, K., Kortelainen, H., & Räikkönen, M. (2012). Corporate Asset Management for Industrial Companies: An Integrated Business-Driven Approach. In: Van der Lei, T., Herder, P. & Wijnia, Y. (Eds.), *Asset Management: State of the Art in Europe from a Life Cycle Perspective* (pp. 47-63). Springer Science, Business Media B. V.

Maletič, D. (2015*). Interaction between Quality Management*, Production and Maintenance Performance, PhD thesis, Faculty of Organizational Sciences, University of Maribor, Kranj.

Maletič, D., Maletič, M., Al-Najjar, B., & Gomišček, B. (2014). The role of maintenance in improving company's competitiveness and profitability: A case study in a textile company. *Journal of Manufacturing Technology Management*, 25(4), 441–456. Doi:10.1108/JMTM-04-2013-0033

Mitchell, J.S. (2002).*Physical Asset Management Handbook*, 3rd ed., Clarion Technical Publishers, Houston, TX.

Pacaiova, H., Glatz, J.,& Kacvinsky, S. (2012). Positive and negative aspect in application of maintenance management philosophy. *Journal of Applied Engineering Science*, 10(2): 99-105

Porter, M. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. Free Press, New York.

Ratnayake, R. M. C. (2013). Sustainable Asset Performance: The Role of PAS 55 1&2 and Human Factors. *International Journal of Sustainable Engineering*, 6(3), no.1, 198-211. doi:10.1080/19397038.2012.756074

Ratnayake, R. M. C., & Markeset, T. (2012). Asset Integrity Management for Sustainable Industrial Operations: Measuring the Performance. *International Journal of Sustainable Engineering*, 5(2), 145–158. doi:10.1080/19397038.2011.581391

Schuman, C. A., & Brent, A. C. (2005). Asset life cycle management: towards improving physical asset performance in the process industry. *International Journal of Operations & Production Management*, 25(6), 566 – 579. doi:http://dx.doi.org/10.1108/01443570510599728

Sila, I. (2007). Examining the effects of contextual factors on TQM and performance through the lens of organizational theories: an empirical study. *Journal of Operations Management*, 25(1), 83-109. doi:10.1016/j.jom.2006.02.003

Simoes, J. M., Gomes, C. F., & Yasin, M. M. (2011). A literature review of maintenance performance measurement: a conceptual framework and directions for future research. *Journal of Quality in Maintenance Engineering*, 17(2), 116-37. doi:http://dx.doi.org/10.1108/13552511111134565

Waeyenbergh, G., &Pintelon, L. (2002). A framework for maintenance concept development. *International Journal of Production Economics*, 77(3), 299–313. doi:10.1016/S0925-5273(01)00156-6

Wireman, T. (1998). *Developing Performance Indicators for Managing Maintenance*. New York: Industrial Press.

Zhang, D, Linderman, K., & Schroeder, R. G. (2012). The moderating role of contextual factors on quality management practices. *Journal of Operations Management*, 30(1-2), 12-23. doi:10.1016/j.jom.2011.05.001

APPENDIX A: Measurement scales

The value in parenthesis for each retained item indicates the standardized factor loadings.

Risk Management
Respondents were asked to indicate how much emphasis is placed on each of the following

activities where 1 means totally disagree and 5 means totally agree.

RM1: We embed risk into all activities which could affect assets performance (0.947)
RM2: We analyse IT-system, business system, human resources, competence, etc. and address risk (0.799)
RM3: We analyse operation, production, quality and logistic process and address risk (0.792)
RM4: We perform risk assessment in order to minimize business losses (0.767)
RM5: Risk management is an integrated part of asset management strategy (0.756)
RM6: We analyse equipment failure causes and effects to address risk (0.657)

Performance Assessment
Respondents were asked to indicate how much emphasis is placed on each of the following activities where 1 means totally disagree and 5 means totally agree.

PA1: We exploit asset history to enhance asset knowledge (0.848)
PA2: We regularly review overall effectiveness of asset management activities (0.830)
PA3: We undertake benchmarking to support asset management activities (0.813)
PA4: We monitor key performance indicators (KPIs) to verify the achievement of organization's asset management goals (0.812)
PA5: We proactively pursue continuous improvement of asset management activities (0.721)
PA6: Company collects and analyses data related to asset management activities (0.681)
PA7: We regularly review overall efficiency of asset management activities (0.673)
PA8: We exploit information systems to support asset management activities (ERP, CMMS, AMS, or similar ones) (0.584)
PA9: We monitor condition of critical assets (0.567)

Life cycle Management
Respondents were asked to indicate how much emphasis is placed on each of the following activities where 1 means totally disagree and 5 means totally agree.

LM1: We continuously modernise our assets in accordance with our renewing/revision plans (0.874)
LM2: We continuously rationalise our assets to reduce production cost (0.866)
LM3: We assure quality of our assets during the whole life cycle phases (0.582)
LM4: We assure execution of maintenance processes within all assets' life cycle phases (0.581)
LM5: We execute disposal of assets in accordance with the asset management plan (0.573)

Policy & Strategy
Respondents were asked to indicate how much emphasis is placed on each of the following activities where 1 means totally disagree and 5 means totally agree.

PS1: We execute asset management strategy (0.624)
PS2: We undertake analyses of asset management policy to determine future production capacity (0.468)
PS3: We apply asset management policy (0.822)
PS4: We develop asset management objectives (0.463)

Uncertainty
Respondents were asked to indicate their level of agreement with the following statements on a scale from 1 to 5, where 1 means totally disagree and 5 means totally agree.

UN1: Demand for our organization's products and services is unstable and difficult to predict (0. 980)
UN2: Our organization must frequently improve its products and practices to keep up with competitors (0. 802)
UN3: Products/services quickly become obsolete in our industry (0.786)

Competitiveness
Respondents were asked to indicate their level of agreement with the following statements on a scale from 1 to 5, where 1 means totally disagree and 5 means totally agree.

CO1: Organization is faced with high competitive pressures in global markets (0. 773)
CO2: Competition in our local markets is intense (0.766)
CO3: Our local markets are characterized by a strong price competition (0.761)