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The relationship between organisational culture, knowledge sharing, work satisfaction and knowledge management maturity

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Abstract: The extent knowledge management literature considers the influence of culture on job satisfaction and knowledge behaviour as vital to organisational performance. However, the specific relationships between these variables has not yet been described and empirically verified in a comprehensive model. This study aims to describe the detailed theoretical relationships between organisational culture job satisfaction, knowledge sharing, and knowledge management maturity and tests them empirically in a comprehensive structural equation model. To achieve this research's objective, descriptive, quantitative research was employed with the use of survey data from 306 respondents of a Brazilian public university. The results support our expectation that culture is a mayor driver of the maturity of knowledge and that this relationship is mediated by knowledge sharing and job satisfaction. We also find that culture and job satisfaction influence knowledge sharing with subsequent positive effects on knowledge management maturity. Our findings inform knowledge management theory and practice on the role of culture in enabling better results in knowledge management.

Keywords: knowledge management maturity; organisational culture; knowledge sharing; job satisfaction; public university; public management; SEM; structural equations modelling; knowledge behaviour.

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1 Introduction

A few decades ago, it was noted that organisations had undergone several changes, especially the technological evolution that affected their configurations. Knowledge has become an essential and strategic element in organisations, making it a critical challenge to understand how to effectively manage it (Naz and Muhammad, 2021; Karagoz et al., 2020; Intezari and Gressel, 2017; Intezari et al., 2017; Yin et al., 2019).

Knowledge management (KM) has been studied within the scope of public administration as an integrated method of creating, sharing, and applying knowledge

acquired internally to increase efficiency, improve quality and social effectiveness (Batista, 2012; Marques et al., 2019b). One of the problems encountered by public organisations is the loss of knowledge in transfers, staff turnover, and retirements, losing know-how and intellectual capital, since a large part of essential and often tacit knowledge is stored in the brain of organisational members (Brito et al., 2012; Intezari and Gressel, 2017, Nguyen and Malik, 2020).

In this context, several studies have tried to conjecture which variables influence knowledge and called for research on variables such as knowledge sharing, organisational learning, and knowledge creation (Heisig et al., 2016; Hussinki et al., 2017; Mariano and Awazu, 2016; Nguyen and Malik, 2020; Yao et al., 2020). Knowledge sharing, learning and knowledge creation are embedded in different cultural contexts and managers need to understand the social factors that influence KM (Hussinki et al., 2017; Intezari et al., 2017).

In addition to studies that related the aspects of KM in different cultures, job satisfaction stands out as an important factor that is associated with knowledge management processes (Almahamid et al., 2010; Kianto et al., 2016; Yao et al., 2020). Job satisfaction is especially important for knowledge sharing and can be nurtured by KM, thus promoting higher organisational performance (Kianto et al., 2016). Obtaining knowledge improves job satisfaction, as it leads to access to new knowledge that enhances efficiency in executing tasks (Kianto et al., 2016).

Organisational members may have barriers to share the tacit knowledge that is embedded in them (Lee et al., 2020; Law et al., 2017; Nguyen and Malik, 2020). Also, the authors reckon this knowledge should be more valued in organisations. For them, promoting knowledge sharing is a significant management challenge.

Previous studies dealt with the analysis of the constructs, but always adding other constructs to understand the influence of antecedents and consequences of knowledge sharing. One of the surveys analysed the influence of culture on knowledge sharing in seven service organisations in Bangladesh (Islam et al., 2011). Along the same lines, Boateng et al. (2016), investigated culture and its influence on knowledge sharing, adding the construct of transformational leadership. The influence of culture on knowledge sharing was also investigated in a Taiwanese industry, with the innovation capability being included in this investigation (Chang et al., 2017). The relationship between job satisfaction, company performance, knowledge sharing and organisational culture, perceived from the perspective of Hofstede's cultural dimensions, was conducted in the Polish construction industry (Kucharska and Bedford, 2019). This study identified the relevance of job satisfaction to the company's culture and sharing.

Tong et al. (2015) examined the effect of knowledge sharing on culture and called for an assessment of the effect on the maturity of knowledge as paths for future studies. Maturity of knowledge models aim to analyse and evaluate the evolution of an KM organisation, a concept, or an object over time as it follows a path from an initial state to the highest level of maturity, allowing the organisation to know the activities and best practices of the KM processes (Hsieh et al., 2009). Focusing our study on KM maturity helps organisations to understand which steps are crucial to implement or improve KM (Kuriakose et al., 2010) and can identify conditions required to continuously improve organisations' KM processes. It also facilitates the diagnosis of KM governance across organisations, identifying factors that can be improved (Marques et al., 2019b; Serenko et al., 2014). It is this perspective that the present study aims to extend as a critical novel contribution to the KM literature.

This research also seeks to respond to the calls to investigate impacts generated by knowledge management practices and job satisfaction (Almahamid et al., 2010; Alias et al., 2018; Islam et al., 2011; Kianto et al., 2016), culture, and the relationship with knowledge sharing and maturity (Braquehais et al., 2017; Karagoz et al., 2020; Kucharska and Bedford, 2019; Karagoz et al., 2020). Understanding the relationship of culture and job satisfaction can help understand the results of knowledge management maturity leading organisations to perform better (Marques et al., 2019b). An investigation on culture and knowledge maturity is absent in the literature. This gap in the literature is confirmed by a biometric study carried out in February 2020, using the descriptors 'Organisational Culture', 'Knowledge Sharing', 'Job Satisfaction', and 'Maturity Model', on the international databases: Scielo, Wiley, Sage, Science Direct and Emerald. No article was found that related to all four terms indicating the absence of a comprehensive model in the literature.

Given the exposed gap in the literature, the present study analyses the influence of organisational culture, knowledge sharing, and job satisfaction on the maturity of knowledge. We empirically examine our model in the context of public educational institutions that are strongly interested in how knowledge is generated, shared and maintained (Naz and Muhammad, 2021; Karagoz et al., 2020) in dynamic balance between mission, objectives, academic and administrative activities (Cajueiro et al., 2009; Cardoso and Machado, 2008). Several studies have pointed out the characteristics that are proper to the public sphere, such as people management (Cajueiro et al., 2009; Cardoso and Machado, 2008). The operational mode of knowledge transfer and sharing (Sandhu et al., 2011), culture (Hussinki et al., 2017; Intezari et al., 2017; Parker and Bradley, 2000), values (Molina, 2009), objectives, mission, environment, and the process (Karagoz et al., 2020) among other points covered in the literature. The relevance of research of KM in this sector is also highlighted, including the possible impact on practice (Marques et al., 2019a; Razzaq et al., 2019). Understanding the influence of culture and reflexes on the results of knowledge management are gaps indicated by several researchers (Karagoz et al., 2020), especially concerning knowledge sharing (Law et al., 2017, Nguyen and Malik, 2020; Sandhu et al., 2011), job satisfaction (Kianto et al., 2016; Marques et al., 2019a, 2019b; Vincenzo and Lombardi, 2015) and the maturity of knowledge (Marques et al., 2019a; Razzaq et al., 2019), justifying the choice of this sector for our research.

We collected data from 306 validated questionaires from a large Federal Public Educational Institution in Minas Gerais, Brazil. Using structural equation modelling, we find significant relationships between organisational culture, knowledge sharing, and job satisfaction that result in a positive effect on knowledge management maturity. Next, we outline the conceptual development of our study, the methodology and results. We conclude with a discussion of the implications of our findings for further theory development and practice.

2 Conceptual development

2.1 Background

Organisational culture has a set of basic assumptions as foundations created by a group, to learn how to deal with the problems of external adaptation and internal integration and

it can be transmitted to new members as the way to perceive and think about the organisation (Schein, 1989). Organisational culture is related to the history and tradition of an organisation and is by its nature, collective, shared, and refers to intersubjective values, beliefs, and norms (Hofstede et al., 1990). In the definition of organisational culture, we included the influence of the construction of the identity of organisational members and individual adaptation to the demands of groups (Cheung et al., 2011; Resende and Paula, 2011) and the impact on the knowledge transfer and capacity for innovation, as it plays a central role in the conduct of organisational members and the interaction between them (Liao et al., 2013; Wiewiora et al., 2013).

Knowledge sharing has been defined as sharing information, ideas, suggestions, and organisationally relevant experiences of an individual with others (Bartol and Srivastava, 2002; Ipe, 2003). The authors state that this is a critical construct for linking the individual with the organisation, moving the knowledge that resides in the individual to the organisational level.

Knowledge sharing is the behaviour of disseminating and assimilating knowledge that has been acquired with other members of the organisation, consisting of a people-to-people process and one of the knowledge management processes (Islam et al., 2011; Tonet and Paz, 2006). Such sharing would always transfer valuable facts, beliefs, perspectives, concepts learned through study, observation, or personal experience of the connoisseur to knowledge. Employees can raise their status in companies and improve performance (Odongo et al., 2018; Anand and Walsh, 2016; Sandhu et al., 2011).

KM deals with various knowledge processes, with the literature addressing, for example, measurement, accumulation, capture, organisation, evaluation, coding, creation, sharing, internalisation, use, exploration, among others (Interazi and Gressel, 2017). According to Wu and Lee (2017), fact effectively promoting knowledge sharing is one of the essential issues in KM. If employees do not desire to share knowledge, companies cannot benefit from it – the creation of acquired knowledge.

Investigations on knowledge maturity are not new (Karagoz et al., 2020; Intezari and Gressel, 2017; Marques et al., 2019a; Razzaq et al., 2019). The maturity level is related to the need to manage knowledge, even if more effective practical actions are not observed in a public or private organisation (Balbino et al., 2016; Souza et al., 2018). Marques et al. (2019b) followed this fact in the work when verifying the maturity level and existence according to knowledge management practices in some organisation areas.

2.2 Hypotheses development

2.2.1 Organisational culture and knowledge sharing

For knowledge to be shared within organisations, there needs to be a culture of knowledge sharing, which encourages employees to participate in this process, with culture as a possible driver in successfully implementing KM (Karagoz et al., 2020; Islam et al., 2011; Intezari et al., 2017). Singh and Sharma (2011) found a relationship between organisational culture and KM. They stated that an organisation should focus on the culture of openness, confrontation, trust, authenticity, proactivity, autonomy, collaboration, and experimentation, to make the implementation of KM successful. The organisation's structure, context, and culture were also indicated as relevant to knowledge sharing (Almeida et al., 2016; Chang et al., 2017; Karagoz et al., 2020; Yao et al., 2020).

For Arif et al. (2017), it is essential to incorporate cultural aspects in knowledge sharing to incorporate culture-specific assessment parameters. Therefore, we propose the following hypothesis:

H1: Organisational culture positively influences knowledge sharing.

2.2.2 Organisational culture and job satisfaction

Recently, research has sought to understand the relationship of human behaviour in the work environment, with emphasis on the emotional aspect, the satisfaction that employees have in their activities resulting from the dynamic interaction of general living conditions, work relationships, the process of work and the control that the workers themselves have (Marqueze and Moreno, 2005).

To assess how much the returns offered by the company in the form of wages and promotion, how much the coexistence with colleagues and managers, and how much the accomplishment of the tasks provide the employee with gratifying or pleasurable feelings, Siqueira (2008) defined the concept in dimensions, namely: salary, colleagues, management, promotions and the work itself. These dimensions that the author called the job satisfaction scale (JSS), which is a multidimensional measure composed of 25 items to assess the employee's level of satisfaction.

The job satisfaction construct has been the object of interest in several studies, which related to other variables, such as stress (Almeida et al., 2017; Almeida et al., 2018), culture (Andrade et al., 2013; Silva et al., 2018), commitment (Cappi and Araujo, 2015; Lizote et al., 2017).

Management must recognise the dimensions of its culture and its impact on variables such as job satisfaction since few empirical studies have examined this relationship (Daulatram, 2003). Job satisfaction is a relevant factor for efficiency and productivity in organisations, with culture in 2011. Culture also works in conjunction with knowledge management, enhancing job satisfaction (Singh and Sharma, 2011; Tong et al., 2015; Trivellas et al., 2015). Results-oriented, poorly controlled, and work-oriented cultures will improve the effectiveness of the KM process and, consequently, increase employee satisfaction and willingness to remain in the organisation (Chang and Lin, 2015), second hypothesis:

H2: Organisational culture positively influences job satisfaction.

2.2.3 Knowledge sharing and job satisfaction

Employees who learn new knowledge and skills are more likely to adapt to changes in the business environment, which would result in increased job satisfaction of organisational members (Almahamid et al., 2010). Singh and Sharma (2011) proposed a research structure regarding the factors that could affect job satisfaction with respect to knowledge management. One of their results pointed out that sharing knowledge improves job satisfaction.

General competencies have a mediating effect on the relationship between the culture of knowledge sharing and job satisfaction, and employees in a knowledge-sharing work environment are associated with job satisfaction (Hussin and Mokhtar, 2018; Kucharska

and Bedford, 2019; Trivellas et al., 2015). Therefore, we propose the following hypothesis:

H3: Knowledge sharing positively influences employees' job satisfaction.

2.2.4 Knowledge sharing and knowledge maturity

Knowledge sharing is a significant challenge for organisations. There is a need to understand the main factors that affect this sharing so that it is possible to retain knowledge effectively, being related to the level of knowledge maturity of an organisation (Arif et al., 2017; Marques et al., 2019a; Oliveira et al., 2011; Szabó and Csepregi, 2015) as well as the results of the organisation (Lee et al., 2020). Hence, we hypothesise:

H4: Knowledge sharing positively influences the knowledge maturity.

2.2.5 Job satisfaction and knowledge maturity

The more satisfied organisational members are, the higher their productivity, and the higher the productivity, the greater the impact on the level of knowledge maturity of an organisation (Giugliani et al., 2018; Intezari and Gressel, 2017). Job satisfaction can thus be considered a motivational factor for knowledge sharing (Law et al., 2017). Therefore, we hypothesise:

H5: Job satisfaction positively influences the knowledge maturity.

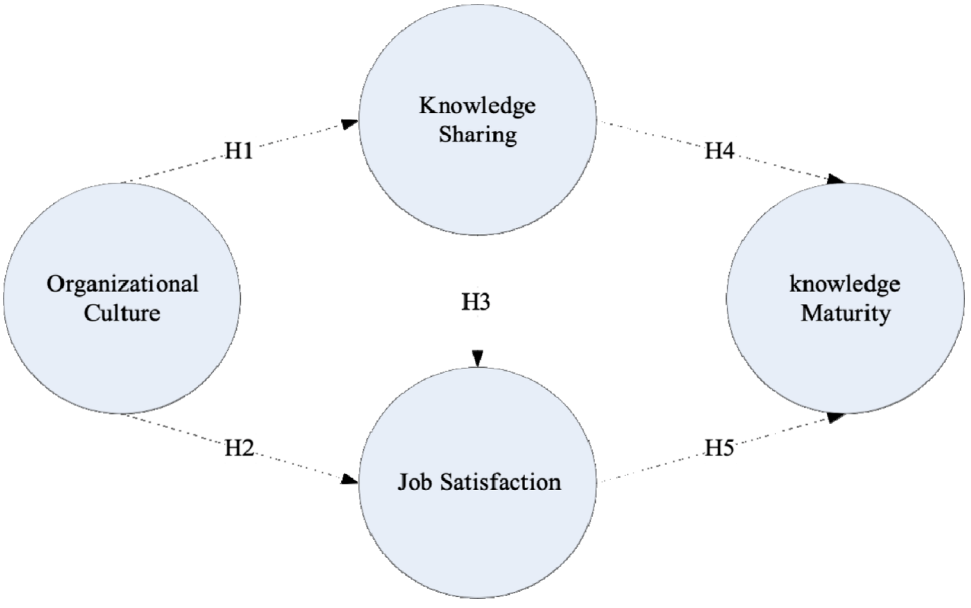
Table 1 Hypotheses list and authors

Relations	*Hypotheses*	*Authors*
Organisational culture and knowledge sharing	H1: The organisational culture positively influences knowledge sharing.	Arif et al. (2017), Chang and Lin (2015), Chang et al. (2017), Intezari et al. (2017), Karagoz et al. (2020), Kianto et al. (2016), Islam et al. (2011), Singh and Sharma (2011), Yao et al. (2020)
Organisational culture and job satisfaction	H2: Organisational culture positively influences job satisfaction	Brandão and Reyes (2011), Chang and Lin (2015), Daulatram (2003), Singh and Sharma (2011), Tong et al. (2015), Trivellas et al. (2015)
Knowledge sharing and job satisfaction	H3: Knowledge sharing has a positive influence on employee job satisfaction.	Almahamid et al. (2010), Kianto et al. (2016), Hussin and Mokhtar (2018), Kucharska and Bedford (2019), Malik and Kanwal (2018), Singh and Sharma (2011), Trivellas et al. (2015)
Knowledge sharing and knowledge maturity	H4: Knowledge sharing positively influences knowledge maturity	Arif et al. (2017), Intezari and Gressel (2017), Marques et al. (2019b), Oliveira et al. (2011), Lee et al. (2020), Szabó and Csepregi (2015)
Job satisfaction and knowledge maturity	H5: Job satisfaction positively influences the knowledge maturity	Bayasgalan and Chantsaldulam (2017), Giugliani et al. (2018), Law et al. (2017)

Source: Developed by the authors

Table 1 shows the main authors who supported the relationships between the variables that constitute the model. The theoretical model is presented in Figure 1 to graphically demonstrate the proposed relationships between organisational culture, knowledge sharing, employee satisfaction and knowledge maturity.

Figure 1 A model to verify the relationship between organisational culture in knowledge sharing, employee satisfaction and knowledge maturity (see online version for colours)



Source: Prepared by the authors

3 Methodology

This work is characterised as descriptive, field, and quantitative research, building on previously validated constructs. It was carried out at a Federal Public Educational Institution of the Minas Gerais State, in Brazil, whose studied population is 1103 teachers and 674 administrative technicians, data collected in December 2019. This organisation acts in Belo Horizonte, Leopoldina, Araxá, Divinópolis, Timóteo, Varginha, Nepomuceno, Curvelo and Contagem. The questionnaire was sent to all professors and administrative technicians using the Survey Monkey tool and physically printed by the researchers. Of the 357 respondents that participated in the research respondents, 306 were useful questionnaires due to critical omissions in the response.

Before its application, the questionnaire, along with the project and the Free and Informed Consent Term (TCLE), passed the approval of Plataforma Brasil, having the number 07931319.7.0000.5155 as CAAE (Certificate of Presentation for Ethical Appreciation), and by the director research organisation, so that only then it could be passed on to workers. The terms of agreement indicated the research objective to allow the person being invited to participate in understanding the procedures, risks, discomforts, benefits, and rights involved to allow an autonomous decision of the respondents.

Ferreira et al. (2002) developed an organisational culture model adapted to Brazil's culture, which will be used in the present research, known as the Brazilian Instrument for the Evaluation of Organizational Culture (IBACO). This model's study was adapted from international models developed by Calori and Sarnin (1991), Cameron and Quinn (1999), with the questionnaire aiming to evaluate the organisational culture through the values and practices that typify it, according to the perception of its members. The IBACO model the organisational culture evaluate according to the perception of its members 6 dimensions of organisational culture: cooperative professionalism, competitive professionalism, employee satisfaction and well-being, external integration, reward and training and interpersonal relationship promotion.

The questionnaire contained 12 questions regarding the participants' demographic data, 30 questions related to organisational culture according to the Brazilian Instrument for Assessment of Organizational Culture (IBACO) (Ferreira et al., 2002) that consists of 6 dimensions Cooperative, Competitive professionalism, Employee satisfaction and well-being, External Integration, Reward and training and promotion of interpersonal relationships, 11 questions concerning knowledge sharing analysed professionalism based on the model proposed by Sandhu et al. (2011) with 3 criteria overviews for knowledge sharing, visions for the existence of a knowledge sharing strategy, visions for donating knowledge and receiving knowledge, 25 questions about employee satisfaction at work through a questionnaire adapted to the Brazilian context proposed by Siqueira (2008) called the Work Satisfaction Scale (EST) that consists of 5 dimensions Satisfaction with colleagues, Satisfaction with salary, Satisfaction with the boss, Satisfaction with the nature of my work and Satisfaction with promotions, and finally, 42 questions regarding the maturity of knowledge opted based on the model proposed by Batista (2016), the Instrument for the Assessment of Knowledge Management in Public Administration (IAGCAP), which contains seven criteria: leadership in KM; process; people; technology; knowledge processes; learning and innovation; and KM results. All instruments had 5-point Likert-type scales.

After data collection, the hypotheses were tested by bootstrapping methodology and confidence intervals as suggested by Hair et al. (2014a). Data were analysed by structural equations modelling (SEM) to investigate the influence while controlling on the influence of other variables in the model. Hair et al. (2014a) pointed out that multivariate techniques, such as multiple regression, factor analysis, multivariate analysis of variance, and discriminant analysis, provide the researcher with efficient tools to solve many administrative and theoretical issues. However, they can only examine one relationship at a time. Therefore, according to the authors, when the researcher is faced with more than one interrelated question, these multivariate techniques do not allow to test the simulteneous relationships of a comprehensive model with all available information. For that specific problem structural equation modelling (SEM) technique is used, which allows for empirically examining multiple simultaneous dependency relationships.

Self-reported biasness may cause common method variance which could result in inflated relationships between variables (Conway and Lance, 2010). This extent of common method bias was first assessed with Harman's one-factor test by entering all the principal constructs into a principal components factor analysis (Podsakoff and Organ, 1986). The Harman one-factor test evaluates the amount of biasness inherent in the variance proportion distribution of items (Yeap et al., 2016). The evidence for common method bias exists when a general construct accounts for the majority of the covariance among all constructs. The unrotated 1st factor variance should be less than 50% on all the

observed indicators (including the dependent variable) as this indicates that common method bias is not a problem. Furthermore, following Tabachnick and Fidel (2007) we applied exploratory analysis using SPSS 25 and SMARTPLS to examine the patterns of the data and check compliance with the assumptions of the analysis as suggested by the literature (Kline, 2005; Tabachnick and Fidel, 2007; Hair et al., 2014a).

Knowledge management maturity can be considered a second-order construct (Marques et al., 2019a; Razzaq et al., 2019). Therefore, two-step tests and confirmatory factorial analysis (Chin and Dibbern, 2010) were applied. Organisational culture, knowledge sharing, and job satisfaction were analysed by examining the quality and validity of the constructs, employing tests of dimensionality, reliability, and convergent validity. We followed the assumptions and criteria suggested by Fornell and Larcker (1981) for convergent validity, and also the criteria listed by Nunnally and Bernstein (1994), Chin and Dibbern (2010) for the analysis of Average Variance Extracted (AVE). To verify the convergent validity, we used the criterion proposed by Fornell and Larcker (1981) that the percentage of shared variance between the latent construct and its items are greater than 50%. The reliability was assessed by using the Cronbach's alpha (CA) and composite reliability (CR) (Chin and Dibbern, 2010) following the minimum criteria of 0.70 for CA and CR (Hair et al., 2014a).

About factorial analysis, the dimensionality of the constructs, the acceleration factor (AF) was verified as indicated by Netemeyer et al. (2003), observing the number of factors, adequacy of the constructs, the Kaiser-Meyer-Olkin (KMO) sample adequacy measure. The measurement model and the structural equation model were examined using the PLS (Partial Least Square) method. In the model tests, the convergent validity (Hair et al., 2014b), the discriminant validity (Malhotra and Birks, 2007; Netemeyer et al., 2003), and the dimensions reliability and constructs (Fornell and Larcker, 1981) were analysed.

The model's test has its importance based on examining the simultaneous dependencies for several variables. Finally, the fit quality, R^2, and GoF were checked. The R^2 is represented on a scale from 0 to 100 and explains the relationship between the endogenous and exogenous variables. The GoF is a geometric mean of the AVE constructs, also measured from 0 to 100, average with the R^2 mean of the model. In both cases, the closer to 100, the better the fit (Hair et al., 2014a).

4 Results and analysis

The sample profile results indicate that 48% of respondents are female and 52% male, with a more significant share of respondents between the age ranges between 26 and 55 years, with 18% of respondents aged between 31 and 35 years and 21.6% between 36 and 40 years. Most respondents are married (56.4%), while 27.5% are single. As for the highest achieved education, 41.5% have a Master's Degree, 30.4% have a Bachelor's Degree, and 26.5% have a Doctorate, showing that there is a high level of qualification among the organisational members.

Most respondents live in Belo Horizonte (29.1%), followed by Araxá (16.3%) and Curvelo (12.1%). As for the position, 51% of respondents are professors, and 49.0% are administrative technicians. Most respondents have worked for the organisation for more than 3 and less than 15 years, with 30.4% from 3 to 5 years, 21.2% from 6 to 10 years,

and 14.7% from 11 to 15 years. However, it has a higher percentage of organisational members over 20 than 16 to 20 years, indicating that the group of respondents includes members with sufficient variation in experience.

Regarding the organisational culture construct, it can be seen that cooperative professionalism had the highest average, 3.4, compared to competitive professionalism, 2.2, indicating that employees are more willing to work with a spirit of collaboration to achieve goals in their institutions (Ferreira et al., 2002).

Hair et al. (2014a) stated that outliers could change the study's estimates since they may have different response patterns in the variables. It is crucial to evaluate and treat these cases before starting the analysis (Kline, 2005). Thus, it was investigated whether some answers came from individuals who did not belong to the population of interest in the research or if they belonged to non-significant groups (Tabachnick and Fidell, 2007). For this, an estimate with a Z value between ±2.58 was used.

This followed the identification of multivariate cases, using the Mahalanobis distance method (D2) divided by the number of degrees of freedom (equal to the number of variables in the multivariate regression). According to this distance, the data can be pointed out as multivariate outliers, if the Mahalanobis method ratio is greater than 2.5 (Hair et al., 2014a). In this study, multivariate outliers were not found.

There is a premise that the variables follow a normal distribution, in which the data would have a tendency to present the majority of the values concentrated around its mean, mode, and median. In contrast, the more distant values of this central tendency would be less common. Hair et al. (2014) propose that it is necessary to verify whether the data under study follows the theoretical distribution studied. Of the total of 108 variables, 31 showed significant asymmetry (with high means), with 11 values with asymmetry outside the ±1 limit, being considered a considerable deviation in this parameter (Muthen and Kaplan, 1992). Out of a total of 108 variables, 76 showed negative asymmetry and 32 positive asymmetries.

Within the values presented in kurtosis, 12 showed significant kurtosis, and 11 indicators were outside the limits of ±1 sd. Concerning the Jarque-Bera test of normality, it was observed that 47 variables were significant (43.5%), demonstrating a systematic deviation from the normality of the indicators. Therefore, the analysis of the normal parameters of asymmetry and kurtosis in the previous table indicates that a significant part of the variables presents deviations from normality. Thus, the deviations suggest that the data require a robust estimation method such as PLS estimation.

The techniques used for the correlation analyses are based on the premise that the relationship between the variables is linear, considering the Pearson coefficient as an index of the degree of linear adjustment between the variables. We test the linearity of the indicators' relationships through the significance of the Pearson estimate. In the matrix that contained 5778 non-redundant correlations, a total of 5004 (87%) of the estimates were positive, significant, and greater than 0.11. Another 38 (0.66%) were negative, significant, and less than –0.11. Therefore, a total of 5042 correlations, that is, 87% of them were significant at the level of 5% two-tailed, which suggests considerable adherence to the linearity of the proposed indicators.

According to Kline (2005), there is a potential for repetition in the database when there are high correlations between variables. To avoid such repetition, it is necessary to

analyse whether there are correlations above 0.90 in absolute terms. Multicollinearity did not present inflation variance measures (tolerance and VIF) higher than the limits of 10.

The Harman one-factor test's results the cumulative percentage of variance explained for one factor is 26,09%, which indicates that common method bias is not a problem. The quality of the measurement was verified by assessing the dimensionality of the measurements. Applying the criterion suggested by Gerbing and Anderson (1988), by applying the evaluation of exploratory factor analysis with extraction by main components. The rule was applied that the number of factors extracted with eigenvalues greater than 1 corresponds to the number of existing dimensions on a scale.

A single dimension was obtained for almost all constructs, except for knowledge maturity – technology, knowledge sharing – visions for knowledge donation and receipt of knowledge, knowledge sharing – general views for knowledge sharing. Other criteria were analysed to verify the quality of the solution, namely: Kaiser-Meyer-Olkin measure (KMO) greater than 0.70 (with an acceptable minimum of 0.60), extracted variance (VE) greater than 50% (the desirable level greater than 60%), and communalities exceeding the 0.40 mark.

The scales were adequate for the analysis, with explained variance, KMO, and commonalities above the minimum desirable, which demonstrate the existence of favourable conditions for the application of Exploratory Factor Analysis (AFE) (Tabachnick and Fidell, 2007). The dimensions of the model obtained an extracted variance greater than the minimum acceptable (50%).

Given the results above, we conclude that the conditions for the application of the EFA were acceptable, with a considerable percentage of variance extracted from the constructs, which reinforces the unidimensionality of the measures. This step aims to analyse the degree to which the estimates are free from systematic errors, attesting whether the researcher's measurements match the desired construct (Churchill, 2005).

The convergent validity assessment method suggested by Bagozzi et al. (1991) was also performed. This assessment seeks to verify the convergent validity by inspecting the significance of the factorial loads of the constructs at the level of 1%. In addition, it was possible to confirm whether the indicators can explain at least 40% of the variance of the indicators so that a minimum value of 0.63 should be obtained for the square of the standardised factor loads.

To test the model, robust PLS estimation was used (Hair et al., 2014b). It is also noteworthy that the constructs, whose dimensionality indicated two factors, were operationalised as second-order factors (Chin and Dibbern, 2010). In this approach, the indicators of the dimensions of a second-order factor are inserted as indicators of the higher-order construct (second-order).

Compose reliability and Cronbach's Alpha are measurement quality measures and reflect how much of the construct's variability is free of random errors. The cutoff point is at least 0.60 for composite reliability (CR), 0.50 for explained variance percentage (AVE), and 0.60 for Cronbach's alpha (CA) (Hair et al., 2014a). However, the discriminant validity is invalidated if the construct explains another construct's variability more than of itself ($R2 > \text{AVE}$), except for second-order factors and subdimensions. As this was not observed, we conclude that evidence of discriminant validity was obtained for all the main factors, as can be observed in Table 2.

Table 2 Reliability, convergent validity, and dimensionality

Constructs	*Items*	*AVE*[1]	*A.C.*[2]	*C.C.*[3]	*KMO*[4]	*Dim.*[5]
Leadership in KM	6	0.62	0.88	0.91	0.82	1
Process	6	0.66	0.90	0.92	0.84	1
People	6	0.65	0.86	0.90	0.77	1
Technology	6	0.59	0.80	0.85	0.71	2
Knowledge processes	6	0.64	0.89	0.91	0.84	1
Learning and innovation	6	0.60	0.86	0.90	0.83	1
KM results	6	0.71	0.92	0.94	0.84	1
Culture organisation	30	0.52	0.82	0.87	0.90	6
Job Satisfaction	25	0.51	0.76	0.84	0.89	5
Knowledge sharing	11	0.58	0.64	0.91	0.71	1

[1]Extraction Variance; [2]Cronbach's alpha; [3]Composite reliability; [4]Measurement of suitability of the Kaiser-Meyer-Olkin sample; [5]Dimensionality.

Source: Developed by the authors

Table 3 Convergent validity of indicator averages

Indicators	*Loadings*	*Error*	*T value*
mean_strategy ← 02 – knowledge sharing	0.81	0.03	31.09
mean _general vision ← 02 – knowledge sharing	0.81	0.02	34.66
mean _donation and receiving ← 02 – knowledge sharing	0.66	0.05	14.60
mean _competition ← 01 – organisational culture	0.60	0.05	12.76
mean _cooperation ← 01 – organisational culture	0.71	0.03	21.95
mean _external integration ← 01 – organisational culture	0.81	0.02	42.97
mean_interpessoal relation ← 01 – organisational culture	0.69	0.03	19.92
mean_reward ← 01 – organisational culture	0.66	0.05	13.84
mean_satisfaction and well being ← 01 – organisational culture	0.84	0.02	49.14
mean_knowledge processo ← 04 – knowledge maturity	0.78	0.02	32.26
mean_learning and innovation ← 04 – knowledge maturity	0.83	0.02	41.62
mean_ leadership in km ← 04 – knowledge maturity	0.82	0.02	39.16
mean_people ← 04 – knowledge maturity	0.76	0.03	23.83
mean_process ← 04 – knowledge maturity	0.82	0.02	38.96
mean_results ← 04 – knowledge maturity	0.82	0.02	37.78
mean_technology ← 04 – knowledge maturity	0.46	0.05	9.27
mean_chief satisfaction ← 03 – work satisfaction	0.79	0.02	33.34
mean_colegues satisfaction ← 03 – work satisfaction	0.69	0.04	19.57
mean_promotion satisfaction ← 03 – work satisfaction	0.71	0.04	17.90
mean_payroll satisfaction ← 03 – work satisfaction	0.62	0.06	10.51
mean_work satisfaction ← 03 – work satisfaction	0.76	0.04	20.26

Observations: 1) factor regression weight for the construct; 2) Estimate error; 3) *t* value of the regression estimate.

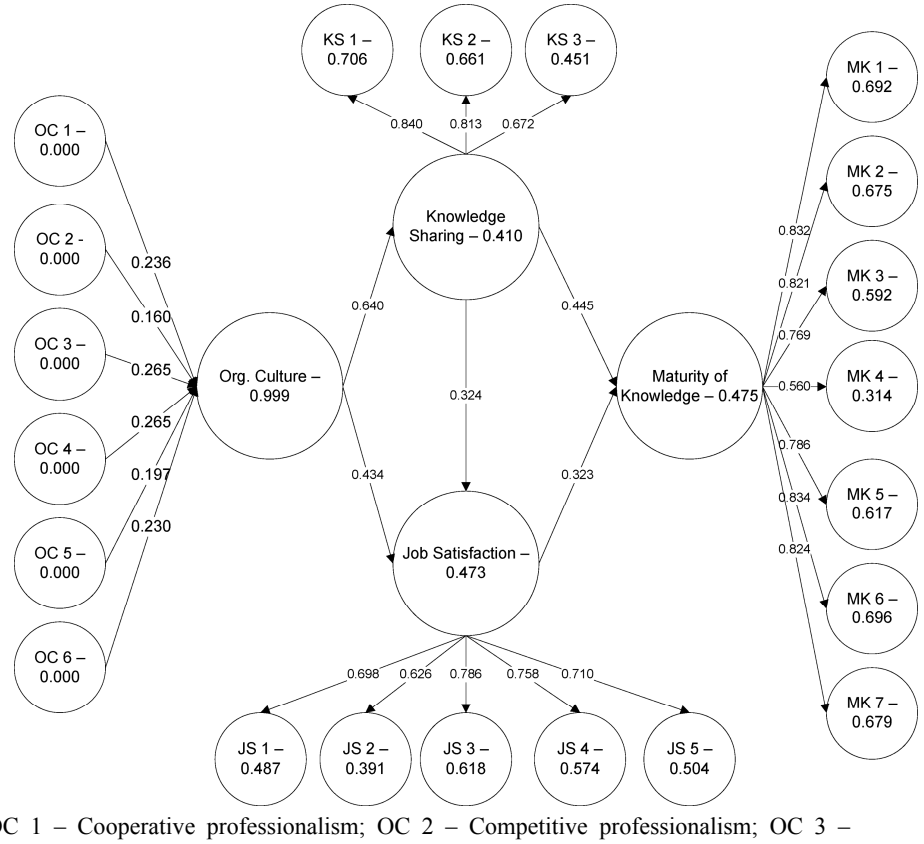
Table 4 The measurement model validation

Dimensions/constructs	*Items*	*A.C.*[1]	*C.C.*[2]	*Dim.*[3]	*AVE*[4]	*VMC*[5]
Culture organisation	30	0.82	0.87	6	0.52	0.44
Job satisfaction	25	0.76	0.84	5	0.51	0.41
Knowledge sharing	11	0.64	0.81	1	0.58	0.41
Knowledge management maturity	42	0.88	0.91	7	0.59	0.44

[1]Cronbach's alpha, [2]Composite reliability, [3]Dimensionality, [4]Variance extracted; [5]Maximum share variance.

Source: Developed by the authors

Figure 2 Main model estimated in PLS: standardised weights and *R*2



OC 1 – Cooperative professionalism; OC 2 – Competitive professionalism; OC 3 – Employee satisfaction and well-being; OC 4 – External integration; OC 5 – Reward and training; OC 6 – Promotion of interpersonal relationships; KS 1 – Overviews for knowledge sharing; KS 2 – Visions for the existence of a knowledge sharing strategy; KS 3 – Visions for donating knowledge and receiving knowledge; JS 1 – Satisfaction with colleagues; JS 2 – Satisfaction with salary; JS 3 – Satisfaction with the boss; JS 4 – Satisfaction with the nature of my work; JS 5 – Satisfaction with promotions, MK 1 – Leadership in knowledge management; MK 2 – Process; MK 3 – People; MK 4 – Technology, MK 5 – Knowledge processes; MK 6 – Learning and innovation and MK 7 – Knowledge management results.

Source: Research data

In the above measurement quality measures, the AVE indicates how much each construct explains the variability of its indicators. *R*2 was positioned below the AVE line and shows how much one construct explains the other related construct.

The convergent validity (Table 3), discriminant validity, dimensionality and reliability dimensions, and the measurement model constructs analysis presented in Table 4 were evaluated. Since CA and CR are above 0.70, the constructs are considered reliable.

The test of the structural model of the study is presented below, which was done here by applying the structural equation modelling technique, given the potential to test models for measuring interrelationships between constructs in just one approach, in addition to considering the impact of measurement error on estimates (Fornell and Larcker, 1981; Podsakoff et al., 2003).

In terms of the tested hypotheses, weights, standard error, T-tests, significance, and results of the hypothesis tests are presented in sequence (Figure 2).

We observed consistent with H1 that the organisational culture positively influences knowledge sharing ($\beta = 0.64$: C.I. [0.61; 0.67]). This corroborates Arif et al. (2017), Chang and Lin (2015), Chang, Liao and Wu, (2017) that the organisational culture influences the KM organisation process and is extremely important to facilitate both the creation, storage, sharing and application of knowledge. Besides, the authors claimed that some types of culture could improve the effectiveness of the KM process and increase employee satisfaction and willingness to remain in the organisation. This highlights the importance of managing organisational culture to enhance knowledge management, directly affecting sharing.

All hypotheses were supported by the SEM model (Tables 5 and 6).

Table 5 The structural model results

Exogenous	*Endogens*	*β*	*T*	*I.C.-95%*[1]	*E.P.(β)*[2]	*Valor-p*	R^2
Knowledge sharing	Organisational culture	0.64	19.03	0.03	0.61;0.67	0.00	0.41
Job satisfaction	Organisational culture	0.43	7.90	0.05	0.38; 0.49	0.00	0.47
Job satisfaction	Knowledge sharing	0.32	6.33	0.05	0.27; 0.38	0.00	0.47
Knowledge management maturity	Knowledge sharing	0.44	7.89	0.06	0.39; 0.5	0.00	0.48
Knowledge management maturity	Job satisfaction	0.32	5.50	0.06	0.26; 0.38	0.00	0.48

[1]β is the standardised weight; [2]*T* is the value of *t*; [3]E.P. (β) is the standard error; [4]I.C.-95% is the confidence interval given by $\beta \pm 1.96$ * E.P. (β); [5]*P*-value is the significance of *T* for the sample of 306 cases, for a two-tailed test and 6 RS is the *R* squared.

Source: Prepared by the authors

Table 6 Result of the hypotheses of the proposed model

H	*Relations*	*Result*
H1	Organisational culture positively influences knowledge sharing	Confirmed
H2	Organisational culture positively influences job satisfaction	Confirmed
H3	Knowledge sharing positively influences employee job satisfaction	Confirmed
H4	Knowledge sharing positively influences knowledge maturity	Confirmed
H5	Job satisfaction positively influences knowledge maturity	Confirmed

Source: Research data

The positive influence of organisational culture on job satisfaction (H2) was also supported by the model estimates ($\beta = 0.43$: C.I. [0.38, 0.49]). The improvement of the organisational culture mechanism will increase knowledge workers' satisfaction (Singh and Sharma, 2011; Tong et al., 2015) and are related to promotion, relationship with superiors, colleagues, and recognition (Brandão and Reyes, 2011).

Regarding the influence of knowledge sharing on job satisfaction (H3), we find a significant (p-value = 0.00) and positive influence ($\beta = 0.32$: C.I. [0.27; 0.38]), consistent with previous findings reported in the literature (Kianto et al., 2016). The value indicates an impact of knowledge sharing on satisfaction, in line with the findings of Almahamid et al. (2010), Trivellas et al. (2015), who also showed that knowledge sharing significantly affects job satisfaction. However, the value found suggests that another variable may explain the relationship in conjunction with knowledge sharing, which is a point for future research. In the work of Koseoglu et al. (2010), the influence of knowledge sharing on job satisfaction has not been supported. The different results suggest that the relationship needs to be further studied.

Our findings also support the influence of knowledge sharing on the maturity of knowledge (H4) with a highly significant (p-value = 0.00) and positive ($\beta = 0.44$: C.I. [0.39; 0.5]) estimate. The result supports the propositions of Arif et al. (2017) and Marques et al. (2019b), who proposed that greater knowledge sharing leads to greater KM maturity.

In the final hypothesis (H5), where the influence of job satisfaction on the maturity of knowledge was tested, we find a significant (p-value = 0.00) and positive ($\beta = 0.32$: C.I. [0.26; 0.38]) estimate. The increase in productivity affects the 'results' factor of the knowledge maturity model, and, taking into account that the more satisfied the employees are, the greater their productivity, it can be said that the higher the productivity, the greater the result factor which impacts the level of knowledge maturity of a company (Giugliani et al., 2018).

In relation to the model as a whole, the indicator of the general predictive power of the model stands out. The GoF (goodness-of-fit) measure was calculated, which indicated that 53% of the general variability of the data is explained by the proposed predictive model. This indicates that the model can explain 47% of the variation of the maturity of knowledge. Therefore, organisational culture, knowledge sharing and job satisfaction substantially influence the level of knowledge maturity in our study. These results show the importance and attention that is required in the KM of organisational culture and job satisfaction for the sharing of knowledge and for the maturity of KM.

5 Discussion

The results of our study make it possible to list our theoretical and practical contributions to the KM literature. Concerning the first, the research contributes to the investigation of variables that influence results in the maturity of KM, with influences from organisational culture, knowledge sharing, and job satisfaction. This research was not described in the literature but indicated by Alias et al. (2018), Kianto et al., (2016), Marques et al., (2019b), Vincenzo and Lombardi (2015). The study also provides evidence of the context of public and higher education institutions, where the results for knowledge management are underdeveloped, especially with respect to satisfaction (Alias et al., 2018; Almahamid et al., 2010; Kianto et al., 2016; Islam et al., 2011), culture, knowledge sharing (Braquehais et al., 2017; Karagoz et al., 2020; Kucharska and Bedford, 2019) KM satisfaction and maturity (Marques et al., 2019a). Because of the gap described, significant relationships can be inferred for knowledge management actions and people and culture management actions. In all relationships, the results obtained showed significant and positive effects that strongly support our theoretical model.

Results like these can contribute to the practice of more attentive KM of the dimensions of culture and values that can drive the improvement of knowledge sharing and KM maturity. Managers also need to be aware of the relationship with job satisfaction, which indicates the need for constant diagnosis to reflect good people management practices to keep employees satisfied as this study showed a substantial and significant effect on the maturity of knowledge management. In this perspective, monitoring the relationship between the manager and the organisational members, promotions, relationships, and the sense of the task are necessary to guarantee and maintain job satisfaction.

Knowledge sharing was also found to be relevant to the result of KM, especially for measurement through the maturity of KM, which is not evidenced in prior research and which offers an important diagnosis tool for KM practitioners.

In the context of a public organisation focused on teaching, this study shows the relevance of integrated management between different areas, culture, job satisfaction, and knowledge management to guarantee the quality of services provided to society.

The final conclusions and limitations of this study will be outlined below.

6 Conclusion

This paper investigates the relationship between organisational culture, knowledge sharing, work satisfaction, and knowledge management maturity at a Brazilian public university. As a methodological framework, the modelling of structural equations using PLS were performed.

With the results, it was possible to reveal substantial and significant relationships between organisational culture, knowledge sharing, and job satisfaction, resulting in a positive and substantial positive effect on KM maturity. The results also showed the influence of knowledge transfer. However, due to the values, it is estimated that other variables also influence knowledge satisfaction and this requires further investigation, especially those that may impact improving knowledge management maturity.

As a synthesis of academic contributions, significant relationships were found that impact the result of knowledge management, as suggested by previous studies (Alias

et al., 2018), Kianto et al. (2016), Marques et al. (2019b), Vincenzo and Lombardi (2015).

When interpreting the results, this study has several limitations due to the choices made. In the first place, the setting of this study is a public higher education organisation. The results may be weaker or different in less knowledge intensive organisations. The validation of this study in other organisations can help understand the relationships studied in other organisational contexts. Secondly, our study uses single informant self reported data. Future research could further validate our model by using multiple informant data from different actors in the organisation. Finally, our study is limited by the number of respondents. Future research could validate our results by collecting more data from a larger group of respondents.

As suggestions for new studies guided by the need to understand the reflexes of these relationships in other variables, it is suggested to relate the effects of knowledge sharing and the maturity of KM in the processes and performance of innovations, since they can help both public and private organisations in the leverage performance and productivity. In this sense, the relationship between maturity and productivity is also a research opportunity. In the field of organisational behaviour and the relationship with knowledge sharing, understanding behaviours that prevent sharing can also help reveal these relationships to improve knowledge management.

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