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The effect of IT tools on knowledge management practices in Carnival Cruise Lines: Moderating role of job position

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Abstract:

Rapid development of technology, and dynamic surroundings created a need for a organizational strategy based on knowledge management and usage of IT tools, which can create organizational knowledge that will further positively impact organizational performances. Therefore, this study was conducted with the aim of examining the relationship between IT tools (basic and advanced) and knowledge management (KM) in Carnival Cruise Lines company. And analysing how job position as a moderator variabile, affects the relation between IT tools and KM. The primary data were collected through a questionnaire survey from 247 participants employed on board three Carnival Cruise Lines ships. The questionnaire was developed based on past research. The collected data was processed using the PLS-SEM software. The results showed that IT tools (basic and advanced) have a statistically significant and positive influence on KM. Futheremore, it was found that job position does not moderating the relationship between IT basic tools and KM. On the other side, results suggesting that the relationship between IT advanced tools and KM is moderated by the categorical variable job position. However, the research is limited to Carnival Cruise Lines in Miami, FL, USA, only. Future research may examine studied variables in another industry, context.

Keywords: Information Technology (IT), IT tools, Knowledge Management, PLS-SEM, Moderating effect.

1. Introduction

In today's technological and knowledge-driven economy, knowledge management (KM) and IT tools have been acknowledged as a most valuable resources in addition to other resources for the survival and competitive advantage of organizations [1]. An organization's capability of creating organizational values depends on its ability to acquire, store, transfer, and use knowledge, which can increase organizational performance and competition. Many companies in developed countries, such as USA have accepted this new way of doing business, and investing in information technology (IT) and knowledge management (KM) to improve their competitive position. Knowledge management processes is an integrated process that collects, stores, disseminates and applies knowledge in an organization. The use of information technology (IT) in supporting knowledge management (KM) is considered as an valuable tool that supports discovery of new knowledge, storage, sharing and usage of existing knowledge. IT tools such as intranet-based systems allow people to work together and collaborate interactively. Organizations should particularly emphasize the sharing and application of knowledge gained through internal and external resources among their staff [2]. The main limitation in knowledge sharing can be the fear of employees to share their knowledge because they believe that sharing knowledge with others reduces their level of power [3]. The process of knowledge sharing and application has many forms and can be accomplished without relying on the presence of technology in some situations, such as direct communication that occurs between individuals at conferences, meetings, training workshops, dialogue sessions, exchange of ideas and methods, and is the acquisition of tacit knowledge that exists in the minds of individuals, and facilitates sharing and application of it [4]. However, technology plays a catalyst that enables and facilitates the process of knowledge sharing through the Internet. It is a tool that improves the mechanism of information exchange and the dissemination of knowledge, supports cooperation and interconnection between parts of the organization, increases the efficiency of coordination and access to information better and faster and facilitates the practice of E-mentality storms, exchange of dialogues and electronic discussions inside and outside the organization [5]. Finally, the database will be required to store acquired knowledge and to request specific queries and a filter series, resulting on the application and use of knowledge in the organization. Furthermore, individual knowledge is thus converted into organizational knowledge through knowledge sharing, storage and usage with the help of IT tools. In that sense, this study aims to analyze the connection between these two variables, IT tools and knowledge management (KM).

Most specifically, the present paper intends to fill in the gap in the current literature by analysing model of IT basic and IT advanced tools, as an independent variables, influencing on knowledge management practice, adding categorical variable, job position, as a moderating factor in the relationship between IT basic tools and KM, as well as, in the relationship between IT advanced tools and knowledge management (KM). Therefore, first, this research intends to study and examinate the

relationship between IT tools (basic and advanced) and knowledge management in Carnival Cruise Lines Company. And, second objective is to analysing how job position as a categorical variabile, the moderator, affects the relation between an exogenous variable (IT tools) and an endogenous variable (KM).

2. Materials and Methods

This section deals with the literature review, development of hypotheses and conceptual model.

2.1. Literature review and hypothesis

Knowledge can be referred as information processed by comprehension and the individual's experiences [6]. It contains information that is available and can be used in making decisions and actions [7]. According to Bolisani & Bratianu (2018), knowledge is an abstract concept free from the tangible world and has two forms: explicit knowledge and tacit knowledge [8]. Is suggested that knowledge is tacit if it is tied to the senses, experiences and intuition [9]. Explicit knowledge is characterized as transmittable in formal language and can be stored in information systems [10], it is any knowledge that can be codified, verbalized, transferred, and articulated. In reference to Drucker (1995), the most vital resource for achieving competitive advantage is knowledge [11]. In regard of that, knowledge management (KM) has received attention in management circles, as its capabile to provide organizations with strategic outcomes related to profitability, competitiveness, and capacity development [12]. The main objective of KM is to ensure vital information (knowledge) is properly identified, selected, organized, shared and applied to help a firm to perform its operations and achieve its objectives [13]. Even though the definitions of KM may vary, KM is seen as a set of processes, which allows an application of knowledge as the main determinant to add value for the firm [14].

Effectiveness of KM is closely linked with the information and communication technologies, resulting in many positive organizational outcomes, such as higher employee participation, improved communication, efficient problem solving, better team performance, and improved financial performance [15]. Technology refers to the infrastructure of knowledge, tools, processes, methods, systems, platforms and automated solutions that enhances development, application and distribution of knowledge [16] used to produce goods and offer services [17]. Therefore, information technology (IT) is considered as an valuable tool that supports discovery of useful knowledge [18]. Knowledge is transmitted within an organization with the use of technological infrastructure [19]. The IT infrastructure supports the transfer of tacit knowledge to explicit knowledge [15]. It also allows explicit knowledge to be stored and recorded in official documents in order to facilitate knowledge retrieval [20]. In organizations, there are several mechanisms through which knowledge could be discovered, gathered, and disseminated. Some of the well-known IT tools/techniques, which are often used are: internet, software browsers, e-mail, e-learning, (chat) chat, Voice and VOIP [21]. IT applications and techniques are key elements of an effective knowledge process, because it accelerates the collection, storage and exchange of knowledge [22]. Daft (2001) have identified the following mechanisms as a driving force for effective explicit knowledge management, such as: Data warehousing, Data mining, Knowledge Mapping, and Electronic Libraries [23]. The effective use of IT ensures timely access and exchange of knowledge so as to facilitate the decision-making process [18, 24]. Swift & Hwang (2013) indicate that the employee's knowledge increases his value, so if the organization wants to encourage employees to share that knowledge, they must provide the technological infrastructure and necessary IT tools for the smooth storage, sharing and usage of knowledge [25]. Several researchers Ho et al. (2012); Ryan et al. (2010); Harrison & Daly (2009); Abouzeedan & Hedner (2012); Zhang & Jasimuddin (2012), emphasize on technology infrastructure as a crucial element to the knowledge sharing in organizations [18, 19, 24, 26, 27]. Through knowledge sharing with the help of IT, individual knowledge is converted into organizational knowledge [19]. On the other hand, shared knowledge need to be acomulated and stored in a organizational warehouses in order to become organizational knowledge. In addition, development of information systems may support efficient data integration, sharing, and management [28]. This view is in aligns with Alavi & Leidner (2001) assertion that organizational memory resides in various forms, such as electronic databases, written documents, codified knowledge in expert systems, organizational procedures and processes, and tacit knowledge which is located in individuals' brain [15]. Keeping knowledge is so important that if not done adequately, an organization can fall into a competitive crisis as a result of a lack of knowledge [29]. By having an efficient knowledge storage system and distribution process, the organization employees can learn from the individuals and groups working in the organization. Successful implementation of knowledge warehousing improves rapid access to knowledge. Furthermore, the study carried by Skyrme (2001) pointed that through the adoption of knowledge storage process, members of an organization enjoy quick access to organizational knowledge needed for problem solving; which then result in better performance [30]. Based on the relevant literature, the following research hypotheses were developed:

H1. IT basic tools have a positive impact on knowledge management (KM).

H2. IT advanced tools have a positive impact on knowledge management (KM).

H3a. Job position moderates the relationship between IT basic tools and KM.

H3b. Job position moderates the relationship between IT advanced tools and KM.

2.2. Conceptual Model, and Data Sample

As existing empirical and conceptual evidence allows for the conclusion that IT tools (basic and advanced) can affects knowledge management (KM) practice, and according to above proposed hypotheses, conceptual model was developed, as showen in Figure 1.

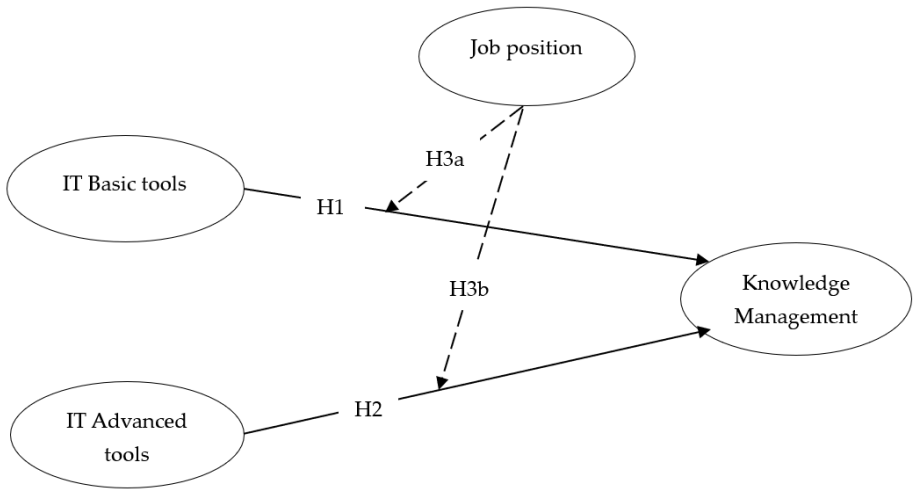


Figure 1. Conceptual model

In the conceptual model there are two independent latent variables: IT basic tools (ITb) and IT advanced tools (ITa), and one dependent latent variable, knowledge management (KM). In model is added one categorical moderating variable, job position (JP).

Research employed quantitative research design and primary data were collected through a questionnaire survey on board three Carnival Cruise Lines ships: Carnival Pride, Carnival Vista, and Carnival Venezia, during the year 2023. The sample size used for the analysis consists of 247 participants employeed on different hierarchical level in Carnival Cruise Lines company. The survey covered a total of 259 employees; however, 247 questionnaires were properly completed. The demographic characteristics of the sample are described in Table 1. Partial Least Squares Structural Equation Modeling (PLS-SEM) technique is adopted to explore relationships among variables. In addition, the moderation analysis was performed to investigate the moderating effect of categorical variable, job position, in the relationship between IT tools (basic and advanced) and knowledge management (KM).

Table 1. Demographic characteristics of the sample (n=247).

Variables	Category	Frequency	Share (%)
Job position	Management	154	62.3
	Employees	93	37.7
School education	Elementary	8	3.2
	High	87	35.2
	Collage	78	31.6
	University	74	30
Age	≤ 29	49	19.8
	30-44	146	59.1
	45-54	43	17.4
	≥55	9	3.7
Gender	Male	139	56.3
	Female	108	43.7
Years of employment	≤5	53	21.5
	6-15	119	48.2
	16-25	68	27.5
	≥26	7	2.8

The initial questionnaire contained 22 questions, after pilot testing was conducted with 40 participants on board Carnival Pride, to be seen the understanding of the questionnaire, as well as after conducting the factor analysis, 18 questions were included in the model. The first 5 questions focused on the general characteristics of respondents (position, age, gender, education and working experience). The remaining 13 questions were divided into three groups: IT basic tools (ITb) was measured using 3 items, IT advanced tools (ITa) were evaluated by 4 items, while knowledge management (KM) was assessed by 6 items. The questionnaire was designed based on the questionnaire from similar studie [20], as described in Table 2. A five-point Likert scale was used to evaluate the respondents' answers, and the answers could range from 1 (completely disagree) to 5 (completely agree).

Table 2. Questionnaire items and factor loadings

Group	Variables	Element of influence	Factor loadings		
IT Basic tools	ITb1	The Internet is used to support KM practice.	0.895		
	ITb2	E-mail is used to support KM practice.	0.772		
	ITb3	Document management system (DMS) is used to support KM practice.	0.800		

IT Advanced tools	ITa1	Data and knowledge mining techniques are used to support KM practice.		0.708	
	ITa2	Video conference is used to support KM practice.		0.927	
	ITa3	Database management system (DBMS) is used to support KM practice.		0.883	
	ITa4	Knowledge management system (KMS) is used to support KM practice.		0.925	
KM	KM1	Useful ideas and new knowledge are stored and updated periodically.			0.833
	KM2	Different sources and types of knowledge are managed effectively.			0.858
	KM3	Knowledge is shared among the team members.			0.818
	KM4	Members of different departments cooperate with others to obtain new knowledge, methods, and inventions.			0.765
	KM5	The team members utilized knowledge to solve problems and make work more efficient.			0.763
	KM6	The knowledge is utilized into practice.			0.794

3. Results

Measurement model assessment, first included establishing construct reliability (consistency) and validity (correctness) of the scale tool [31]. The construct reliability and convergent validity of the measurement model are assessed using Cronbach's alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE), which are presented in Table 3.

Table 3. Construct reliability and validity

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
IT Basic Tools	0.765	0.785	0.863	0.679
IT Advanced Tools	0.884	0.896	0.922	0.750
Knowledge Management	0.892	0.894	0.917	0.649

The CA and CR values for all the constructs were much higher than the recommended value of 0.70, and they indicate excellent internal consistency. Some authors argue that values for CR and CA above 0.90 are not satisfying because they imply that all the indicator variables are measuring the same phenomenon and are hence unlikely to be a valid measure of the construct. However, when a construct does not contain semantically redundant items but rather items that assess quite diverse measures of the construct domain (as in this case), the high-reliability concerns are unjustified [32]. The Average Variance Extracted (AVE) for the constructs is higher than 0.50, indicating that the construct explains more than half of the variance of its indicators. In that way, convergent validity is also confirmed [32].

Besides convergent validity, the discriminant validity was assessed using AVE as suggested by Fornell & Larcker (1981), ensuring that one construct is truly distinct from other constructs [33]. According to Henseler et al. (2015), the usage of the Fornell-Larcker criterion and Cross-loadings do not reliably detect the lack of discriminant validity in common research situations [34]. So, they proposed the heterotrait-monotrait ratio of correlations (HTMT), which performs better than the other two. Kline (2011), suggested a threshold of 0.85 or less, while other authors, Franke & Sarstedt (2019), proposed a threshold of 0.90 or less [35, 36].

Table 4. Discriminant validity - Heterotrait-monotrait ratio (HTMT) – Matrix

Variables	IT Advanced Tools	IT Basic Tools	Job positio n	Knowledge Management	Job position x IT Basic Tools
IT Advanced Tools					
IT Basic Tools	0.739				
Job position	0.708	0.666			
Knowledge Management	0.623	0.562	0.686		
Job position x IT Basic Tools	0.659	0.689	0.820	0.562	
Job position x IT Advanced Tools	0.759	0.472	0.608	0.387	0.648

Table 4 shows that the HTMT ratio for each pair of constructs is below the recommended threshold of 0.85, which finally supports discriminant validity.

Once the reliability and validity of the measurement models are established, hypothesized causal relationships within the inner model can be evaluated using PLS-SEM. This step enabled the researcher to generate path coefficients to determine the relationships between exogenous and endogenous constructs of the study. The bootstrapping was perfomed to generate the *t*-value to test the significance of the relationship. There are various suggestions about how bootstrapping can be run. This

study adhered to the recommendation of Hair et al. (2014) by using 5000 [37], and the results of the structural model based on the direct relationships between the predictors and criterion variables of this study are presented in Table 5 and Figure 2 below.

Table 5. Bootstrapping data group: Path coefficients- STDEV, T values, *p* values (complete)

Hypotheses	*β*	STDEV	*t* value	*p* value	Results
H1. IT Basic Tools -> Knowledge Management	0.219	0.092	2.377	0.017	Confirmed
H2. IT Advanced Tools -> Knowledge Management	0.436	0.074	5.860	0.000	Confirmed

β – path coefficient, STDEV – standard deviation, *p* – level of significance lower than 0.05

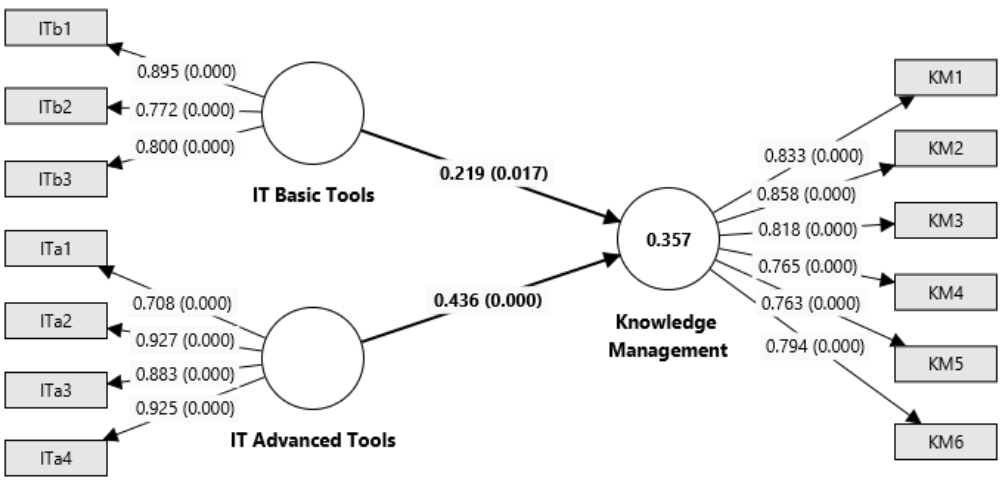


Figure 2. PLS–SEM Structural model

The second step was bootstrapping multigroup analysis which allows to determine the significance of differences in group-specific parameter estimates. The results of both groups of categorical moderating variable, job position: employees vs management, are presented in Table 6 below. These results were interpreted using the coefficients *(β)* of the path relationship, the standard deviation (SDEV), *t*-value (T Statistics) and *p*-value.

Table 6. Path coefficients – Bootstrapping multigroup analysis (Employees vs Management)

Hypotheses	*β* (Empl.)	*β* (Mgmt.)	STDEV (Empl.)	STDEV (Mgmt.)	*t* value (Empl.)	*t* value (Mgmt.)	*p* value (Empl.)	*p* value (Mgmt.)	Results
H3a. ITb -> KM	-0.002	0.210	0.122	0.236	0.014	0.892	0.989	0.373	Not confirmed
H3b. ITa-> KM	0.383	-0.287	0.079	0.088	4.827	3.265	0.000	0.001	Confirmed

β – path coefficient, STDEV – standard deviation, *p* – level of significance lower than 0.05

In the third step of research, in the the structural model was added categorical moderator variable, job position, to test the moderating effect on the relationship between IT basic tools and knowledge management (KM), as well as on the relationship between IT advanced tools and KM. The results are presented in Figure 3 and Table 7 below.

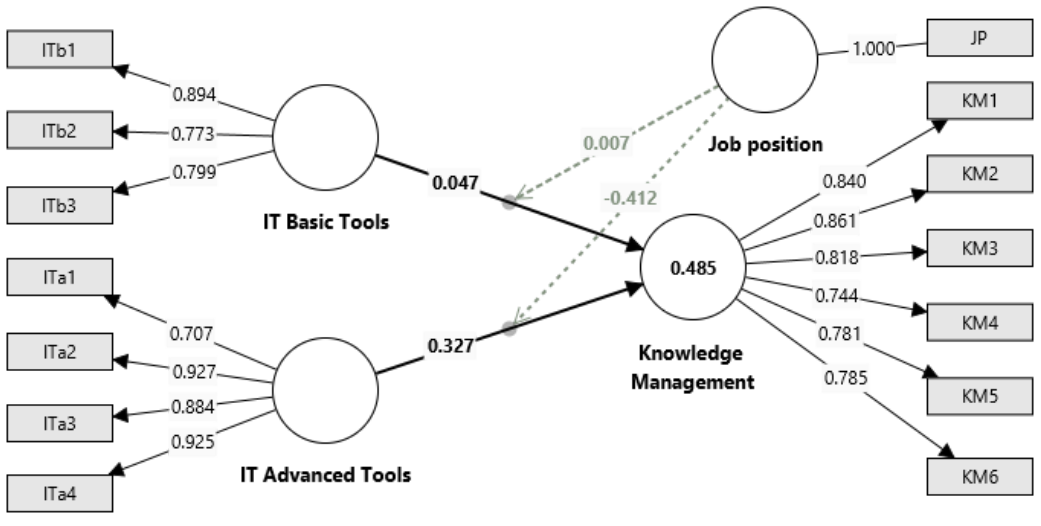


Figure 3. PLS–SEM Modereted structural model

Table 7. Modereted structural model results

Hypotheses	*β*	STDEV	*t* value	*p* value	Results
H1. IT Basic Tools -> Knowledge Management	0.047	0.100	0.470	0.638	Not confirmed
H2. IT Advanced Tools -> Knowledge Management	0.327	0.103	3.167	0.002	Confirmed
H3a. JP x IT Basic Tools -> Knowledge Management	0.007	0.132	0.054	0.957	Not confirmed
H3b. JP x IT Advanced Tools -> Knowledge Management	-0.412	0.107	3.841	0.000	Confirmed

β – path coefficient, STDEV – standard deviation, *p* – level of significance lower than 0.05

In PLS-SEM analysis, moderating effect exists if the interaction path is significant which means that the t-statistics of interaction effect must be 1.64 or 1.96 and above to be significant [38]. Therefore, the results showed the significant impact of IT basic tools on knowledge management practice (β = 0.219, p = 0.017), as well of IT advanced tools on KM practice (β = 0.436, p = 0.000), indicating a positive relationship between these variables without considering the moderator. When moderator variable, job position, was included, moderating effect showed low and statistically insignificant (β = 0.007, p = 0.957) in the relationship between IT basic tools and knowledge management (KM), showing that there is no moderating effecat of job position in relationship between IT basic tools and knowledge management (KM), indicate that hypotheses H1 and H3a should be rejected. On the other side, relationship between IT advanced tools and knowledge management (KM) remain statistically significant and positive (β = 0.327, p = 0.002), suggesting that the relationship between these two variables is moderated by the categorical variable, job position, (β = - 0.417 , p = 0.000), and was furthere explained by simple slope analysis, in the following figures 4 and 5.

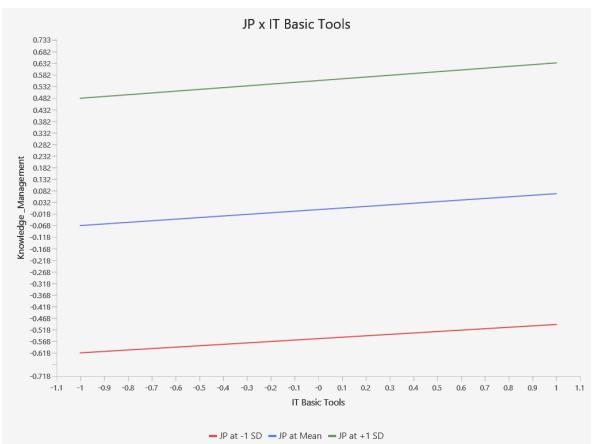


Figure 4. Simple slope analysis JP x ITb -> KM

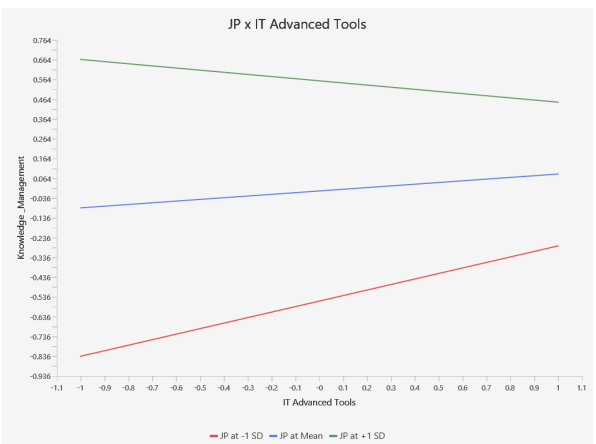


Figure 5. Simple slope analysis JP x ITa -> KM

In Figure 4 is showed that there is no moderating effect made by job position in the relationship between IT basic tools and KM, because all three lines: mean, blue line; +1 standard deviation, green line; and -1 standard deviation, red line are parallel [39].

In Figure 5 is showed how categorical variable, job position, moderating the relationship between IT advanced tools and KM. Job position at +1 standard deviation; green line, gives a weaker relationship, relationship decreases between IT advanced tools and KM than when we have job position at -1 standard deviation; red line [39].

Finally, the evaluation of obtained R^2 (the coefficient of determination) and f^2 (the effect sizes of the paths) supplement the previous analysis (Table 8).

Table 8. R^2 and f^2 values

Predictor	Outcome	R^2	f^2
IT basic tools	Knowledge Management	0.485	0.002
IT advanced tools			0.067
Job position x IT basic tools			0.000
Job position x IT advanced tools			0.032

R^2 has been used to determine the explained variance of the latent dependent variable in relation to the overall variance. The cutoff R^2 values suggested by Chin (2009) are as follows: 0.190 weak, 0.333 moderate, and 0.670 substantial [40]. According to the results in Table 8, it can be said that the model has a moderate predictive value (0.485).

Value f^2 measures the strength of each predictor variable in explaining endogenous variables. An f^2 value from 0.02 to 0.149 is considered small, from 0.15 to 0.35 is considered medium, and higher than 0.35 is considered large, according to Cohen (1988) [41]. Considering mention thresholds, it can be concluded that the relationship between IT advanced tools and knowledge management has a small effect size (0.067). Small effects are made, also, by moderating variable job position in relationship between ITa and KM (0.032). On the other hand, no effect was recorded in the relationship between ITb and KM (0.002), as well as, on the moderating influence between the relationship of ITb and KM (0.000).

4. Discussion

Knowledge Management has gained considerable attention from the business sector in the last couple of decades. They understand very well the true value of knowledge. Effective KM practice with usage of information technology help organizations in achieving and keeping a competitive advantage. Many companies in developed countries, such is USA have accepted this new way of doing business to improve their competitive position.

Many researchers have found that IT is one of the three most important components of KM. According to Hajimohammadi & Vafaei (2019); Soto-Acosta & Cegarra-Navarro (2016); Okumus (2013), technology enable the process of knowledge formalization, its storing and easy distribution [42-44]. In addition, the general impression is that the usage of IT has many positive organizational outcomes, better communication, efficient problem-solving, and better team performance. In general, the findings suggest that an open innovation culture with usage of information technology is more likely to increase the efficiency of knowledge management practice.In this research, the IT tools (basic and advanced) were studied and analyzed to assess their impact on knowledge management.

The obtained results in this study support primary assumptions, and it was found, that IT tools have a statistically significant and positive influence on knowledge management (KM), which is confirmed in many previous studies researchers [18, 19, 24, 26, 27]. However, once the moderator variable was included, the relationship between IT basic tools and KM become statistically insignificant. Futheremore, it was found that categorical variable, job position, does not moderating the relationship between IT basic tools and knowledge management (KM), which can be interprate that different hiyararhical level of employees use equaly basic IT tools. On the other side, relationship between IT advanced tools and KM it is been moderated by job position, which shows that 37.7% of crew as participant in company Carnival Cruise Lines survey, do not really understand usage of IT advanced tools in the day-to-day operation.

5. Conclusions

This research contributes to filling the existing gaps of the relationship between IT tools towards knowledge management, moderated by categorical variable, job position. This conceptual paper gives a broad understanding on the information technology tools and knowledge management. Accordingly, this study explores deep understanding about the impact of IT towards knowledge management from different research reviews. From this review we understood that if there is knowledge supported by IT tools there is good KM practice. However, the current study has shown also that not all employees in the company, use IT advanced tools in the practice, and studied organization is not in line with KM practice and need to be improved and encouraged KM practice. Management should motivate and training their employees to use more IT advanced tools and to acquire more knowledge from different sources, which if practiced successfully, will support the organizational learning environment.

Therefore, further research should be conducted in order to enhance the understanding of the concepts and the effect of IT tools towards KM by taking job position as a moderator variable.

The results obtained from this research can be used for comparative analysis with the results of research obtained from other organizations. In this way, it would be possible to establish universally valid connections that would contribute to the development of the concept of knowledge management. In addition, this study is only able to focus on the service sector in Carnival Cruise lines due to the lack of time and limited financial resources. Therefore, it is recommended for future research to be investigated in other countries and sectors to provide more valuable findings.

This research is not without limitations and open questions for future research. There are several limitations to consider. First, the research is based on the subjective assessment of the respondents and scale was based on respondents' perceptions and evaluations, which may be subject to bias and measurement error. The second limitation is the small sample size and the fact that data refer to only one company. Further research should be conducted on these findings and try to cover all these limitations. Future research may examine studied variables in another industry, context.

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