Empirically Derived IT Competencies Profiles for Human Resource Managers: A Working HR Student's Perspective

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Information Technology (IT) competencies held by Human Resource Managers (HRM) are importance as they form one of the prerequisites to achieve business value from IT. However, little research has investigated IT competencies for HRM. We employed cluster analysis followed by discriminant analysis on two data sets from a survey of 155 working HR students in a North American Business School: one on the level of IT competencies of the respondents and another on the perceived importance of IT competencies for HRM. The results highlight a contrast with the prominence of IT for HR management as put forward by HR scholars.

INTRODUCTION

Electronic Human Resource Management (e-HRM) is defined as "the planning, implementation and application of information technology for both networking and supporting at least two individual or collective actors in their shared performing of HR" (Strohmeier, 2007, p. 20). Over the past decade or so, e-HRM has been publicized as a means of enhancing the strategic contributions of the HR function (Lengnick-Hall et al., 2003; Ulrich, 1997). However, one of the prerequisites to the realization of business value through IT is the effective collaboration between information systems (IS) and HR professionals. Furthermore, this effective collaboration could not be realized without the business competencies held by IS professionals as well as IT competencies held by HR managers (Ray, et al., 2005). Other findings which reinforce the relevance of investigating the importance of IT competencies for HR managers: 1) user competency is an antecedent to performance of IT use (Marcolin et al., 2000); 2) IT competencies are a determinant of HR competencies and job performance (Suen et al., 2011); 3) IT competencies are among the critical competencies needed by HR managers throughout the four different levels of career development: early, mid, senior, and executive (SHRM, 2012); and 4) investigation of IT competencies of non-IS professionals is rare albeit the fact that such inquiry would enhance our understanding of IT competencies beyond the bounds of IT profession, and yield meaningful directions to the development of IT curriculum for all business majors (He & Guo, 2014).

Although many studies recognize IT as one of the driving forces of change in HR management (e.g.

SHRM, 2011); few studies have specifically focused on IT competencies for HR managers. This study is first aimed at filling this gap by investigating patterns of IT competencies for HR managers as well as their patterns of perceived importance of IT competencies and how they relate to one another. Our second objective is to characterize these competencies by uncovering typical profiles or patterns of competencies. Lastly, our third objective is to determine whether the levels of competencies as well as their perceived importance are influenced by respondents' characteristics.

This research adds to the existing body of knowledge on IT competencies of business managers by providing insights from HR working students' perspectives. It constitutes a first step toward a more comprehensive answer to how IT competencies relate to the perceived importance of IT and how both constructs may relate to "championing IT" (Bassellier et.al, 2003) in the context of HR function. More specifically, the results of two clusters analyses reveal that half of the respondents with strong or fair level of IT competencies fall in the group of enthusiast or average with regard to the perceived importance of IT for HR managers. In contrast, those with weak level of IT competencies are almost equally scattered over skeptic, average and enthusiast with regard to the importance of IT competencies for HR managers.

The remainder of this paper is organized as follows. We first discuss the conceptual background, developing on the concept of competency, knowledge and experience. We then present the research method, followed by the presentation of the results and their discussion. We conclude with focus on the implications of our findings in relation to the importance of IT competencies for HR managers.

CONCEPTUAL BACKGROUND

IT function plays an important role in supporting and enabling other organizational units' activities. However, the long deep-seated idea of IT expertise confined within IS departments is only now in question as non-IS workers increasingly develop IT-related competencies that can be leveraged in carrying out their functional tasks (Davis, 2013). This phenomena leads to the rise of IT-competent employees and managers among non-IS professionals. As stated earlier, few studies have investigated IT competencies for HR managers. The studies that looked at IT competencies for HR managers have focused on the IT competencies' influence on job performance (Suen & Yang, 2013; Suen et.al, 2011). Building upon Bassellier et al. (2003)'s IT competencies framework and Ulrich, Brockbank, Johnson and Younger (2007)'s model of HR competencies, as well as Ulrich and Brockbank (2005)'s five-role model of HR professionals, Suen and Yang (2013) found that different combinations of IT and HR competencies have a different performance predictive impact on the different roles for the HR professional; whereas Suen, Hsiao, and Yang (2011) found that IT competencies for HR professionals contribute to job performance, either directly or indirectly through HR competencies.

In this study, we follow Bassellier et al. (2003, p. 318) in conceptualizing competency as "a duality, including both the knowledge and the experience" of the HR manager. Knowledge refers to the understanding of fundamental IT concepts and work experience refers to "events, which are experienced by an individual which relate to the performance of some job" (Quinones et al., 1995, p. 4). Thus, work experience must be distinguished from experience in a broad sense and defined as "a person's observation of and/or interaction with objects, entities, and/or events in her/his environment" (Lombard & Snyder-Duch, 2001, p. 58-59).

Our selection of clustering variables is theory-based (Aldenderfer & Blashfield, 1984) and begins with the framework proposed by Bassellier et al. (2003). The framework is one of the most cited models of IT competencies for business managers and has been used in studies on IT competencies for HR managers (e.g. Suen & Yang, 2013; Suen et al., 2011). Bassellier et al. (2003)'s framework of IT competencies identifies five areas of IT knowledge domain (technology, applications, system development, management of IT, and access to IT knowledge) and two areas of IT experience (experience in IT project and experience in the management of IT). However, the IT domain has significantly evolved since 2003, the year of publication of this work. In this regard, the most important changes in the IT domain include the emergence and growth of the packaged software industry and specifically the popularity of enterprise systems such as ERP (Forrester Research, 2010), and the rise of social media

(Aral et al., 2013). Noting these changes, we adapted Bassellier et al. (2003)'s framework of IT competencies to take into account the evolution of information technologies. For instance, Bassellier et al. (2003) identify "knowledge of system development" as a dimension of the areas of IT knowledge. Given the increasing popularity of software packages, this dimension was substituted by two areas of IT knowledge namely: IT adoption and selection, and IT implementation.

Based on Ulrich, Younger, Brockbank and Ulrich (2013) three other domains of knowledge were added: leveraging of social media tools, connecting and motivating actors through IT, use of IT to improve organizational or HR function effectiveness and HR management domain knowledge. In fact, practitioners and scholars emphasize the potential of IT in enabling HR managers to increase the effectiveness and efficiency of the HR function and to make greater contributions in achieving strategic organizational goals (Bondarouk & Ruel, 2013). Concerning social media tools (SM), it is of interest to note that, empirical evidence reported from a survey of 527 HR professionals suggests that 98% of HR professionals recognized SM as important tools for HR management (Achievers, 2011). Table 1 provides a definition of each component and its sub-components along with supporting literature.

TABLE 1
IT COMPETENCIES DEFINITION

Area of IT knowledge	Definition	Support
Knowledge about technology	Knowledge about the current application portfolio in the organization or used by competitors	Basselier et al. (2003); Johnson, Gueutal & Marler (2012); SHRM (2012); Suen & Yang (2013)
Knowledge about basic Software	Knowledge about basic software such as the internet, e-mail, productivity software package	
Knowledge about business IT Applications	Knowledge about business IT applications used by the organization or its competitors	
Knowledge about IT Adoption and selection for HR management	Knowledge about the process of adopting and selecting a software package for HR management (defining relevant selection criteria, etc.)	Johnson, Gueutal & Marler (2012); SHRM (2012)
Knowledge about IT Implementation	Knowledge about the process of implementing a human resource information system (defining implementation objectives, selecting team members, specifying a proto-type, etc.)	
Access to IT knowledge	Knowing who to contact to obtain more information about IT—both inside and outside of the organization and secondary sources of knowledge (e.g., libraries, the Web)	Basselier et al. (2003); Suen & Yang (2013)
Area of knowledge of management of IT		
Knowledge about the management of IT for HR management	Knowledge about the management of IT for HR management (allocation of financial and human resources for IT for HR management, setting IT budget, creating IT policies, planning, etc.)	Basselier et al. (2003); Johnson, Gueutal & Marler (2012); SHRM (2012); Suen & Yang (2013)
Knowledge about the evaluation of IT benefits for HR management	Knowledge about measurement and evaluation of IT benefits in general or for HR management	

Knowledge about leveraging social media for HR management	Knowledge about how to leverage social media for business purposes	Ulrich, Younger, Brockbank, Ulrich (2013)
Knowledge about connecting and motivating actors through IT	Knowledge about how to use technology to motivate and help people stay connected with each other	Ulrich, Younger, Brockbank, Ulrich (2013)
Vision of IT for HR management	Setting HR management technology strategy (e.g. seeing IT as a tool either to *automate*, *informate* or *transform* the HR function)	Basselier et al. (2003); Chatterjee, Richardson, Zmud (2001); Mooney, Gurbaxani, & Kraemer (1996); SHRM (2012); Zuboff (1988)
HR management domain knowledge		
HR management domain knowledge	Mastering of HR management specific and activities within and outside the HR function, within and outside the organization	Ulrich, Younger, Brockbank, Ulrich (2013); Suen &Yang (2013)
Area of IT experience		
Experience of personal use of computer and productivity software	Experience of personal use of a computer and productivity software package	Basselier et al. (2003); Johnson, Gueutal and Marler (2012); SHRM (2012); Suen & Yang (2013)
Experience in adoption, selection, implementation or outsourcing of IT for HR management	Experience of involvement in human resource information system adoption, selection, implementation or outsourcing processes	
Experience in professional use of social media	Experience in the use of social media for professional purposes	Ulrich, Younger, Brockbank, Ulrich (2013)
Experience in the management of IT for HR management	Experience of management of IT for HR management	Basselier et al. (2003); Suen &Yang (2013)
Experience in the use of IT to improve organizational or HR function effectiveness	Experience in improving efficiency and effectiveness of HR management systems through technology	Ulrich, Younger, Brockbank, Ulrich (2013); Suen & Yang (2013)
Experience in the evaluation of IT benefits	Experience in the measurement and evaluation of IT benefits in general or for HR management	Basselier et al. (2003); SHRM (2012); Suen & Yang (2013)

METHODS

This study employs the configurational approach to understand the importance of IT competencies for HR managers. This approach suggests that organizational phenomena are best understood "as clusters of interconnected structures and practices, rather than as modular or loosely coupled entities whose components can be understood in isolation" (Fiss, 2007, p. 1180).

The data on the level and the importance of IT competencies for HR managers were directly collected during the first session of the semester, from working senior undergraduate students at the Business School of a North American University. The students we surveyed were enrolled in four sections of two different courses that totaled 202 registrations. During this data collection period, 155 students were present in the classes and available to participate in the study. The four courses were selected based on

students' HR specialization. We used a paper-based survey. In each section, the research project was presented to students prior to the beginning of the class.

We followed the same procedure when collecting data in the four sections of the two selected courses. After the presentation of the research project, all students who were present willingly accepted to fill out the questionnaire and some students asked to be sent the research report when it was completed. The Ethical Committee of the University approved the research project.

In total, 150 and 136 out of 155 usable questionnaires related to the level of IT competencies and the importance of IT competencies respectively were included in the research. Here, it is important to remember that, students' samples are befit for study guided by well-defined theory and when students possess the "knowledge to respond adequately to the experimental treatments or survey questions" (Bello et al., 2009, p. 363). Hence, given that a well-defined theoretical framework guides this study and all respondents have a professional experience, we consider the senior undergraduate students sample appropriate for this exploratory study.

Of note is the fact that HR senior undergraduate students are within a few months of undertaking a professional responsibility in a HR department in an organizational setting. Table 2 presents some demographics of the sample.

TABLE 2
DEMOGRAPHICS OF THE SAMPLE

N= 155	Freq.	% (computed for specified values)
Gender		
Male	23	15
Female	132	85
Age (Year)		
< 23	59	38
23-24	49	32
> 24	46	30
Not specified	1	-
Professional experience		
Yes	155	100
No	0	0
Currently working		
Yes	125	81
No	30	19
Length of professional experience in HR (Year)		
None	95	62
< 1	30	20
1-3	13	8
> 3	16	10
Not specified	1	-
Length of experience of use of a business solution (Year)		
None	93	61
< = 2	33	22
> 2	25	17
Not specified	4	
Length of experience of use of HRIS (Year)		
None	117	75
< =1	18	12
>1	20	13
Attended IT training before		
Yes	46	30
No	109	70

In total, 38% of the respondents have a professional experience in HR management while 25% have an experience in the use of Human Resource Information Systems (HRIS); 50% have more than one year of professional experience and 30% have attended an IT training. The majority was female (85%).

The survey instrument included measures adapted from Bassellier et al. (2003) that were developed to assess IT competencies of business managers in general. After initial development of the instrument, two steps were taken to ensure its quality and accuracy. First, two researcher team members who were not involved in the preparation of the initial version of the survey critically reviewed the instrument for content validity as well as the wording of the draft survey items for precision and clarity. Then, the instrument was pre-tested with five HR students. The five students were not part of the sample. Based on the feedback we received, several items of the questionnaire were modified. To assess the level of IT competencies and the importance of IT competencies, survey respondents were first asked to self-rate their level of IT competencies then indicate the importance of each IT competency for HR managers as perceived by them. We used a five-point Likert type scale ranging from 1=weak to 5= strong and 1=low to 5= high for the level of IT competencies and the perceived importance of IT competencies for HR managers respectively. The instrument was composed of 52 statements grouped into 13 categories.

RESULTS

To develop further understanding of IT competencies, cluster analysis was used to group respondents on the basis of their self-rated competencies and perceived importance of IT competencies for HR managers. It is of interest here to comment on whether our sample was large enough to address the goals of the inquiry. In this regard it is important to recall, "Cluster analysis does not have 'hard' sample size rules because it is a data mining technique that does not need to satisfy parametric or even nonparametric statistical test assumptions" (Lowry et al., 2013, p. a200). Given the exploratory nature of this study: it is one of the first to cluster analyze the perceived importance of IT competencies for HR managers and the self-rated IT competencies of HR students, the sample size (N=150 and N=136) is deemed appropriate for each data set.

Factor Analysis
Before conducting the cluster analysis, factor analysis was performed to identify the underlying dimensions of IT competencies and then to identify dimensions of importance of IT competencies for HR managers. The Kaiser-Meyer-Olin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity validated the usefulness of performing a factor analysis for each category of the instrument composed of more than two statements. For each dimension, the Bartlett′s Test of Sphericity was highly significant (below 0.001), indicating that the correlation matrix was not an identity matrix as factor analysis would be meaningless with an identity matrix. Only dimensions for which the KMO was above 0.6 were considered adequate for factor analysis (Kaiser, 1974). For each of these dimensions, the principal components analysis method was used with Varimax rotation to reduce the number of categories. (See Table 3)

TABLE 3
FACTOR ANALYSIS RESULT AND RELIABILITY

Level of IT competencies		
Factors	**Items**	**Cronbach's alpha**
Knowledge about Technology and Applications		
FA1: knowledge about technology	4	0.89
FA2: knowledge about business IT applications	5	0.84
FA3: Knowledge about basic software (email, internet, productivity software)	4	0.72

Knowledge about adoption and selection		
FA4: knowledge about adoption and selection of IT for HR management	NA	NA
Knowledge about implementation		
FA5: knowledge about implementation of IT for HR management	3	0.93
Knowledge about the use and management of IT for HR management		
FA6: knowledge of management of HRIS	2	0.78
FA7: knowledge about evaluation of IT benefits for HR management	2	0.92
FA8: knowledge about leveraging social media for HR management	2	0.78
FA9: Knowledge about accessing IT knowledge	3	0.80
FA12: Knowledge about communicating with and connecting and motivating actors through IT	3	0.94
FA13: knowledge about use of IT for organizational and HR effectiveness	2	0.84
Experience		
FA10: experience in HRIS lifecycle management (adoption and implementation of IT for HR management, outsourcing, evaluation of benefits, budgeting, maintenance)	7	0.95
FA11: experience in the professional use of basic IT (productivity software package) and social media	3	0.50
Vision		
FA15: vision of IT for HR	8	0.95
HR Management domain Knowledge		
FA14: mastering of HR management activities	3	0.82
Perceived importance of IT for HR managers		
Factors	**Items**	**Cronbach's alpha**
Knowledge about Technology and Applications		
FB1: knowledge about technology	4	0.90
FB3: Knowledge about basic software	4	0.89
FB2: knowledge about business IT applications	5	0.83
Knowledge about adoption and selection		
FB4: knowledge about adoption and selection of IT for HR management	NA	NA
FB5: knowledge about implementation of IT for HR management	3	0.86
FB6: knowledge about management of IT for HR management	2	0.78
FB7: knowledge about evaluation of IT benefits for HR management	2	0.88
FB8: knowledge about leveraging social media for HR management	2	0.84
FB9: knowledge about accessing IT knowledge	3	0.85
Experience		
FB10: experience in HRIS lifecycle management (evaluation of benefits, budgeting, maintenance, use of IT for organizational and HR effectiveness)	4	0.88

FB11: experience in adoption, implementation, and outsourcing of IT for HR management	3	0.89
FB11: experience in the professional use of basic IT (productivity software package) and social media	3	0.63
FB13: Knowledge about communicating with and connecting and motivating actors through IT	3	0.93
FB14: experience in use of IT for organizational and HR effectiveness	2	0.83
Vision		
FB16: vision of IT for HR	8	0.93
HR Management domain Knowledge		
FB15: mastering of HR management activities	3	0.80

Most Strongly Held and Most Important IT Competencies

The five most important IT competencies for HR managers as perceived by respondents of the survey are related to knowledge of basic software (productivity software, email, intranet, and the Internet). The sixth most important competency is related to the knowledge of Human Resource Information Systems. Interestingly, the four next deal with the vision of IT for HR management and more specifically: knowledge of how to use IT to facilitate the circulation of data/information between the HR function and management; knowledge of how to use IT to provide data/information to empower management and employees; knowledge of how to use IT to facilitate the circulation of data/information within the HR function; knowledge of how to use IT to facilitate the circulation of data/information between the HR function and external partner such as candidates and government agencies.

By contrast, the five least important competencies as perceived by respondents are: knowledge of outsourcing of Human Resource Information Systems; knowledge of management and maintenance of an operational Human Resource Information System; experience of personal use of social media; experience of outsourcing of Human Resource Information Systems; and knowledge of prototyping of Human Resource Information Systems.

When compared to the 10 first ranked competencies held by the respondents, only five out of these ten are among the ten most important IT competencies for HR managers and they are all related to knowledge or experience of basic software. However, when matching the five least important IT competencies for HR managers with the five least competencies held by the respondents, only two competencies match the two lists: knowledge of outsourcing of Human Resource Information Systems and experience of outsourcing of Human Resource Information Systems.

Cluster Analysis

We conducted two different cluster analyses, one on the level of IT competencies of the respondents and another on the perceived importance of IT competencies for HR managers. To distinguish the clusters in each analysis, we followed a two-step procedure recommended by methodologists (Ketchen & Shook, 1996; Balijepally et al., 2011).

We first inspected the Euclidean distances across the clusters in the two dendrograms produced by Ward's Hierarchical Clustering Method that included two-, three-, four-, and five-cluster solutions. The results of this procedure suggested a three-cluster solution for both cluster analyses and there were five outliers among the observations of the first data set (self-rated level of IT competencies). For all alternative solutions, either the discriminatory power was relatively weaker or the clusters produced were less meaningful. Second, in order to evaluate the robustness of this solution, the centroids were later used as initial seeds for nonhierarchical clustering (Ketchen & Shook, 1996).

We generated two-, three-, four-, and five-cluster solutions by using the K-means clustering algorithm, after the outliers were deleted because they "were not representative of any observations in the

population" (Hair et al., 2010, p. 67). Thus 150 observations were included in the subsequent analysis of first data set. In addition for each solution, the performance of the cluster analysis methods was evaluated by cross-tabulation of the selected cluster solution derived from Ward's method and the predetermined cluster membership resulting from K-means method (Clatworthy et.al, 2007). The value of Kappa was above 0.8 for the two 3-cluster solutions, the configuration of the level of IT competencies and the configuration of the perceived importance of IT for HR managers. Hence, the strength of the agreement was "almost perfect" for the two 3-cluster solutions (Landis & Koch, 1977, p. 165). The 3-cluster solution was confirmed as the most optimum solution in both cases.

To further ensure the stability of the solution, we replicated the two-stage clustering procedure on half of the sample selected with SPSS random selection procedures. The same three-cluster pattern emerged from the two cluster analyses, providing support for the stability of the 3-cluster solutions for the two clustering results. Moreover, groups within each 3-cluster solution were compared with one-way analysis of variance (ANOVA) followed by Tamhane's T2 post-hoc pairwise comparisons test to identify significant differences between the means for each factor (Hochberg and Tamhane, 1987).

As indicated by Table 4 and 5 one-way ANOVA indicates that the three means differ significantly in the two 3-cluster solutions (except for one factor in the perceived importance of IT competencies series - knowledge of basic software) and pairwise comparisons tests revealed highly significant differences between the means for all factors in the two sets of 3-cluster solution. The two tables also present the results of the grading of the group means as "high" (H), "moderate" (M), and "low" (L).

TABLE 4
CLUSTER RESULTS AND INTERPRETATION FOR LEVELS OF IT COMPETENCIES

	Weak n=58 (39%)	Fair n=51 (34%)	Strong n=41 (27%)	Anova F
	Mean	Mean	Mean	
Knowledge about Technology and Applications	**L**	**M**	**H**	
Knowledge about technology	0.89_c	1.91_b	3.22_a	86.10***
Knowledge about business IT Applications	1.32_c	2.45_b	3.49_a	81.42***
Knowledge about basic Software	4.02_b	4.27_b	4.58_a	12.07***
Knowledge about adoption and selection	**L**	**M**	**H**	
Knowledge about adoption and selection of IT for HR management	0.62_c	1.57_b	3.12_a	64.87***
Knowledge about implementation	**L**	**M**	**H**	
Knowledge about Implementation of IT for HR management	0.37_c	0.94_b	2.86_a	148.62***
Knowledge about the use and management of IT for HR management	**L**	**M**	**H**	
Knowledge about management of IT for HR Management	0.39_c	1.13_b	2.93_a	135.56***

Knowledge about evaluation of IT benefits for HR management	0.41_c	1.25_b	3.24_a	157.82***
Knowledge about leveraging Social Media for HR management	2.28_c	3.43_b	4.17_a	45.44***
Knowledge about connecting and motivating actors through IT	0.33_c	1.93_b	3.71_a	134.80***
Knowledge about access to IT knowledge	1.59_c	3.03_b	3.25_a	55.97***
Knowledge about use of IT for organizational and HR effectiveness	0.43_c	2.08_b	3.11_a	100.89***
Experience	**L**	**M**	**H**	
Experience in information systems adoption, implementation, outsourcing for HR management	0.30_c	1.18_b	2.65_a	137.34***
Experience in professional use of basic IT	3.21_b	3.95_a	4.24_a	20.50***
Vision	**L**	**M**	**H**	
Vision of IT for HR Management	1.39_c	2.49_b	3.38_a	50.29***
HR Management domain Knowledge	**L**	**M**	**H**	
Mastering of HR Management activities	1.20_c	2.58_b	3.38_a	88.86***

a, b, c within rows, different subscripts indicate significant ($p < 0.05$) pair-wise differences between means on Tamhane's T2 (post hoc) test. H (High), M (Moderate), and L (Low) indicate relative magnitude of the group means on each variable across the three clusters.
***$p<0.001$

TABLE 5
**CLUSTER RESULTS AND INTERPRETATION FOR IMPORTANCE OF IT COMPETENCIES FOR HR MANAGERS**

	Skeptic n=26 (19%)	Average n=56 (41%)	Enthusiast n=54 (40%)	Anova F
	Mean	Mean	Mean	
Knowledge about technology and applications	**L**	**M**	**H**	
Knowledge about technology	3.50_b	3.98_b	4.33_a	10.67***
Knowledge about business IT applications	3.69_b	4.31_a	4.48_a	22.26***
Knowledge about basic Software	4.51	4.71	4.69	2.17
Knowledge about IT adoption and selection	**L**	**M**	**H**	

|			
Knowledge about adoption and selection of IT for HR management	2.88c	4.02$_b$	4.48$_a$	33.47***
Knowledge about implementation of IT for HR management	**L**	**M**	**H**	
Knowledge about implementation of IT for HR management	2.04$_c$	3.60$_b$	4.28$_a$	91.23***
Knowledge about the use and management of IT for HR management	**L**	**M**	**H**	
Knowledge about the management of IT for HR management	2.54$_c$	3.73$_b$	4.29$_a$	42.36***
Knowledge about the evaluation of IT benefits for HR management	2.96$_c$	3.79$_b$	4.51$_a$	44.56***
Knowledge about leveraging social media for HR management	3.79$_b$	4.07$_b$	4.66a	13.34***
Knowledge about access to IT knowledge	3.51$_c$	4.05$_b$	4.61$_a$	37.65***
Knowledge about connecting and motivating actors through IT	3.63 $_b$	3.93$_b$	4.69 $_a$	27.07***
Knowledge about the use of IT for organizational and HR effectiveness	3.90 $_b$	4.16 $_b$	4.75$_a$	19.15***
Experience	**L**	**M**	**H**	
Experience in evaluation of IT benefits for HR management	2.96$_c$	3.60$_b$	4.43$_a$	40.51***
Experience in adoption, implementation, outsourcing of IT for HR management	2.55$_c$	3.60$_b$	4.32$_a$	49.08***
Experience in the professional use of social media	3.59$_c$	3.77$_b$	4.43$_a$	8.66***
Vision	**L**	**M**	**H**	
Vision of IT for HR	2.97$_c$	3.37$_b$	3.79$_a$	18.18***
HR domain Knowledge	**L**	**M**	**H**	
Mastering of HR Management activities	3.55$_c$	4.14$_b$	4.60$_a$	26.39***
a, b, c within rows, different subscripts indicate significant ($p < 0.05$) pair-wise differences between means on Tamhane's T2 (post hoc) test. H (High), M (Moderate), and L (Low) indicate relative magnitude of the group means on each variable across the three clusters. ***$p<0.001$				

The characteristics of the two sets of three clusters can be visualized in their graphical form by 2-D column charts (figures 1 and 2) which reveals separate and distinct patterns of level of self-rated IT competencies and the perceived importance of IT competencies in our two data sets. The two sets of three

clusters have consistent values across all clustering dimensions: the strong group and the enthusiast group take only high values across all seven clustering dimensions whereas the fair group and the average group take only medium values, while the weak group and the skeptic group take only low values.

FIGURE 1
PATTERNS OF IT COMPETENCIES HELD BY RESPONDENTS
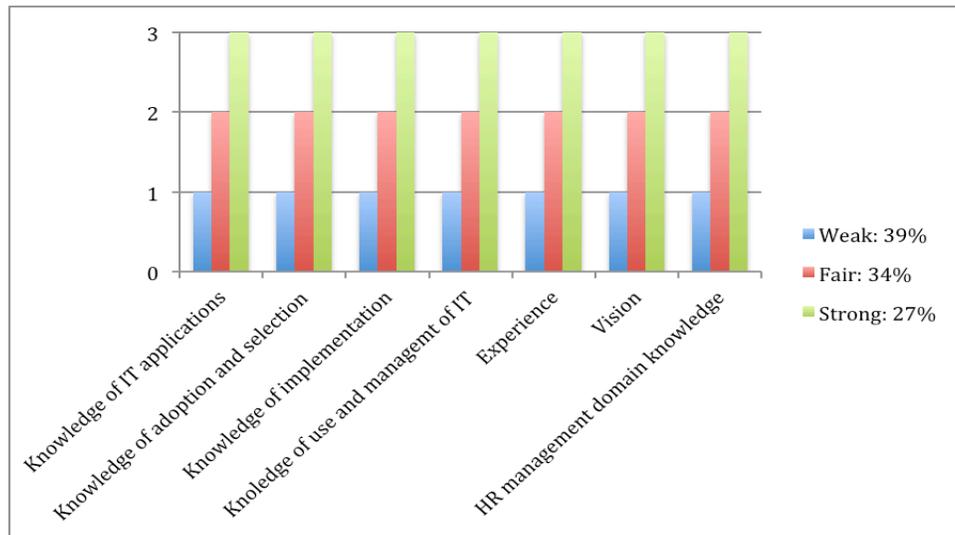
FIGURE 2
PATTERNS OF PERCEIVED IMPORTANCE OF IT COMPETENCIES FOR HR MANAGERS
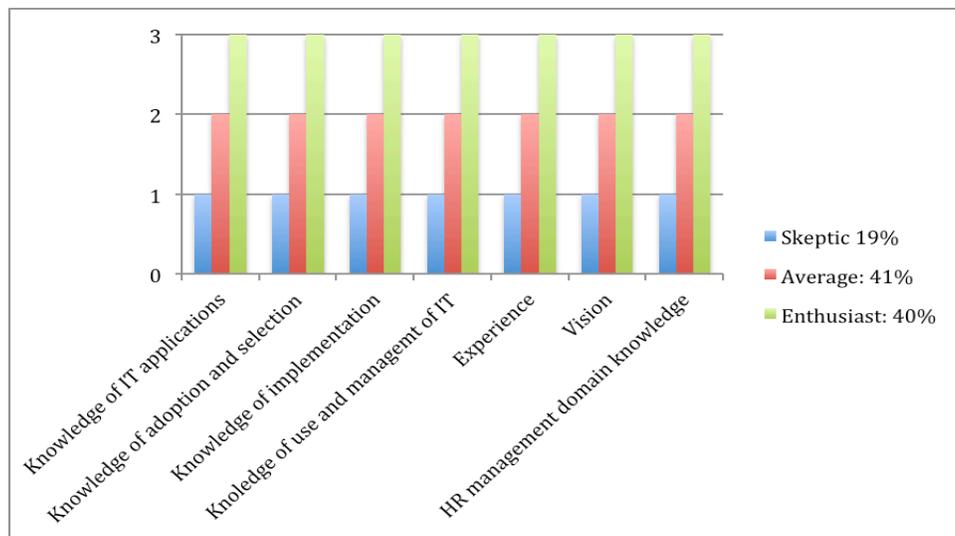
In addition we validated the cluster solution using discriminant function analysis (Ketchen & Shook, 1996; Punj & Stewart, 1983). The effectiveness of the discriminant functions in predicting the classification is provided by the Hit ratio that is the percentage of respondents correctly predicted by the discriminant functions. Following Hair et al. (2010), we adopted the cross-validation approach. The total sample of each data set was randomly split into two subsamples, the analysis sample and the holdout sample. For each data set, our analysis and holdout samples accounted for about 60% and 40%

respectively. For the 3-cluster solution related to the level of IT competencies, the hit ratios were 97.80% and 93.40% for the analysis sample and holdout sample respectively. Whereas for the perceived importance of IT competencies for HR managers, the hit ratios were 90.5% and 88.10% for the analysis sample and holdout sample respectively.

To assess the group membership prediction accuracy, we employed two statistics: the proportional chance criterion and the Press's Q (Hair et al., 2010). The proportional chance criterion is the sum of squared proportion of respondents in each group. It is equal to 0.34= (0.39²+0.34²+0.27²) and 0.36= (0.19²+0.41²+0.40²) for the level of IT competencies and the perceived importance of IT competencies for HR managers respectively. The classification accuracy should be at least one-fourth greater than that obtained by chance (Hair et al., 2010). Using the proportional chance criteria, the adequate classification accuracy should be at least 0.43= (1.25*0.34) or 43% for the level of IT competencies, and at least 0.45= (1.25*0.36) or 45% for the perceived importance of IT competencies.

For the level of IT competencies, the overall classification accuracy for the analysis and the holdout subsamples 97.80% and 93.40% respectively. The two exceeded the threshold of 43% indicating that classification results were better than chance. It is important to note that, the percent of respondents correctly classified into each one of the three clusters was also better than chance (> 43%). In the same manner, for the level of IT competencies, the overall classification accuracy for the analysis and the holdout subsamples were 90.5% and 88.10% respectively. Again, the two exceeded the threshold of 45% indicating that classification results were better than chance. Here too, the percent of respondents correctly classified into each one of the three clusters was also better than chance (> 43%).

A summary of the above results indicates that each cluster reflects a different configuration or pattern with regard to IT knowledge, experience, management and vision of IT for HR management. The clusters are labelled according to their means in comparison to each other. In the results of the first clustering process, that is related to the level of IT competencies, cluster 1, is labelled the "weak group" and comprised of respondents who self-rated their level of IT competencies as weak. This group is the largest and includes 39% of the sample (n=58). For its part, cluster 2 is labelled "fair group" and made up of respondents who self-rated their level of IT competencies as fair. In size, it is the second largest group and includes 34% of the sample (n=51).

Finally, cluster 3 is labelled "strong group", and is composed of respondents who self-rated the level of their IT competencies as strong, but in size, is the smallest group and contain 27% of the sample (n=41). In the same manner, the results in the second clustering process, which is related to the perceived importance of IT competencies for HR managers, cluster 1 is labelled the "skeptic group" and comprised of respondents who perceive the importance of IT competencies as low. However, contrary to the results of the first clustering process, it is the smallest group and contains 19% of the sample (n=26). Cluster 2 is labelled "average group" and made up of respondents who perceived IT competencies as being of average importance for HR managers. In terms of size, it is the largest and contains 41% of the sample (n=56). Cluster 3 is labelled the "enthusiast group" and composed of respondents who considered IT competencies as being of high importance. It is the second largest cluster and contains about 40% of the sample (n=54).

Recalling our third research objective, one may ascertain whether the respondents' levels of competencies or their perceived importance are influenced by their characteristics. Empirical evidence in Appendices 1 and 2 indicate that it is with regard to the levels of competencies that such influence occurs. But respondents' characteristics have almost no influence on the perceived importance of IT competencies for HR managers. Whereas almost all respondents' characteristics in Appendices 1 and 2 have an influence on the level of IT competencies held by respondents, only two characteristics ("attended a class on IT ", "professional experience in HR") have an influence on the perceived importance of IT competencies for HR managers, and this influence is limited to three competencies: "experience in professional use of social media", "experience in the use for IT for organizational or HR effectiveness", and "vision for IT".

DISCUSSION

Our results highlight differences and similitudes within and between the emerging configurations of respondents' level of IT competencies and the importance of IT competencies for HR managers as perceived by them. Overall, our results highlight a contrast with the prominence of IT for HR management put forward by HR scholars.

As shown in Table 6, the cross-tabulation of the two sets of 3-cluster solutions reveals interesting patterns. First, the two groups of cluster 3 (the **strong** group and the **enthusiast** group) and the two groups of cluster 2 (the **fair** group and the **average** group) exhibit a stronger constancy over the level of IT competencies and the perceived importance of IT competencies for HR managers. In fact, from respondents who self-rated their level of IT competencies as strong, 51% perceive the importance of IT competencies for HR managers as high. The considered percentage drops to 48% for the "fair group". It is important to note that, for those who self-rated their level of IT competencies as low, the same percentage (about 30%) is scattered almost equally across **skeptic**, **average** and **enthusiast** with regard to the perceived importance of IT competencies for HR managers.

TABLE 6
CROSS-TABULATION OF THE TWO SETS OF CLUSTERS

	Perceived Importance of IT competencies for HR managers			χ^2
	Skeptic	*Average*	*Enthusiast*	
Level of IT competencies held by respondents	%	%	%	9.46
Weak	31.40	37.30	31.40	
Fair	13	48	39	
Strong	10	39	51	

Surprisingly, of those who have a strong level of IT competencies, about 10% and 40% are skeptic and average about the importance of IT competencies for HR managers respectively. Though at first glance, this finding might be interpreted as indicating that respondents overrated their own level of IT competencies. The same might be said about 13% of the respondents who self-rated the level of their IT competencies as of fair importance but, are skeptic about the importance of IT competencies for HR managers. However this does not hold true. Indeed, research has succeeded in alleviating this concern by providing support for the validity of student self-reported ratings of learning. For example, in the study by (Benton et al., 2011) who investigated the relationship between individual student self-reported ratings of progress on relevant learning objectives and performance on exams; a survey was administrated to 188 students, who were also asked to rate themselves on 10 other non-relevant learning objectives. Their results indicate that self-rating on course-relevant objectives correlate significantly and positively with four out of five exams and the course total, while ratings on irrelevant objectives did not.

In view of validity of the students' exams self-reported ratings, we see an alternative explanation in our results. We suggest that those students with strong or fair level of IT competencies but are skeptic about the importance of IT competencies for HR managers or perceive IT as of average importance for HR managers may not be convinced of the business value of IT for HR management. Business values are defined "as the organizational performance impacts of information technology at both the intermediate functional of process level and the organization wide level, and comprising both efficiency impacts and competitive impacts" (Melville et.al., 2004, p. 287). In fact, the creation of business value through the use of IT for HR is a relatively new phenomenon that is seldom studied (Ruel & Kaap, 2012) and the use of

IT by HR professionals lags far behind technology use in operations, finance, or marketing (Ulrich et al., 2013).

Several other results are worth mentioning due to their statistical significance in the multivariate analysis. First, among the students who have a HR management experience (43% of the sample, p <0.001), about 40% are **enthusiast** about the importance of IT for HR managers whereas 36% and 24% are **average** and **skeptic** respectively. Second, those with an experience in the use of IT for HR management (25% of the sample, p <0.05) are scattered among the three clusters with regard to the importance of IT for HR managers: 40% are **enthusiast**, 40% are **average** about the importance of IT for HR managers whereas 20% are **skeptic**. In the same manner, the breakdown of HR management experience by configuration of the level of IT competencies presented in Table 7 shows that the different range of HR management experience are not randomly distributed into the three clusters (global chi-square of 18.43, p < 0.01).

TABLE 7
BREAKDOWN OF HR MANAGEMENT EXPERIENCE BY CLUSTER

	Experience in HR management			χ^2
X(years) (% observed) **Clusters of self-rated level of IT competencies** (% expected)	*Weak*	*Fair*	*Strong*	
None (60)	75	56	45	
X ≤ 1 (20)	14	22	25	18.43**
1< X < 3 (9)	7	14	5	
X ≥ 3 (11)	4	8	25	
X(years) (% observed) **Clusters of perceived importance of IT competencies for HR managers** (% expected)	*Skeptic*	*Average*	*Enthusiast*	χ^2
None (59)	52	65	56	
X ≤ 1 (21)	24	15	26	2.93
1< X < 3 (8)	12	7	7	
X ≥ 3 (12)	12	13	11	
** p<0.01				

Lastly, it is important to note that the area in which all students self-reported the lowest level of competency is "knowledge of implementation". At the same time, this domain of knowledge is perceived as being one of the most important in each of the three clusters.

CONCLUSION AND IMPLICATIONS

Broadly speaking, the concept of competency is important as it helps capture the content of the work to be done, and it is a central input for the management of training and development, carrier development, compensation, performance management, etc. More directly, our results highlight the importance of IT competencies for HR managers. A majority of respondents in the sample, regardless of perceived level of individual IT competencies and personal factors indicate that IT competencies are very important (40%) or somewhat important (41%) for HR managers. Our results suggest that at academic curriculum level, HR management students are indeed aware of the importance of IT competencies for HR managers albeit their weak competencies in IT, as the majority (58%) lack IT competencies.

This finding strongly supports the assumption that IT courses are needed in HR management curriculums. This assumption is reinforced when related to the increasing tendency of the adoption of IT for HR management as well as an increase in the scope and diversity of the associated technologies (CedarCrestone, 2013), and the fact that few business schools are offering courses in Human Resource Information Systems (Hoell et al., 2012). As a supporting fact, these authors found that roughly 10% (47 colleges out of 469) of AACSB accredited schools in the USA offered a course in HRIS. This result is surprising given that the Guidebook and Templates for Undergraduate and Graduate Programs published by the SHRM Foundation and endorsed by AACSB explicitly identify Human Resource Information Systems as one of the recommended content areas of HR curriculum (SHRM, 2013).

Lastly, the heterogeneity of the level of IT competencies among the respondents sheds light on the necessity to adopt a differentiated instruction approach when teaching Information Systems to HR undergraduate students. Differentiated instruction is a "research-based model of classroom practice intended to support teachers in developing curriculum and instruction likely to maximize the capacity of a diverse group of learners" (Tomlinson, 2015, p. 203). In taking into account the differences between students' IT competencies, this approach may be deployed by differentiating the content, the process/activities, the product or the environment of the instruction (William-Black et al., 2010). As taxonomies, our 2 sets of 3-clusters contribute to theory, research and practice by providing "parsimonious descriptions which are useful in discussion, research and pedagogy" (Miller & Roth, 1994, p. 286), as well as a basis for predictive studies (Ibid). Though this study is exploratory in nature, it contributes as a first step towards a deeper understanding of the relationship between IT knowledge, IT experience, and HR domain knowledge, job performance and HR function performance.

This research has taken only a preliminary step in a stream of research that is of great relevance but still understudied. The first limitation of the current study is its limited sample, composed only of students albeit, working students. The second limitation is that the study relies on a small sample size, thus limiting its generalizability. Future research should be conducted to evaluate not only HR managers' level of IT competencies and perceived importance of IT competencies but also the relationship between IT competencies and job performance or the performance of HR function. Lastly, this study should be repeated with students or professionals in other business domains such as accounting and marketing to determine if the results apply across disciplines or if the business domains influence the perceived importance of IT competencies.

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APPENDIX 1
INFLUENCE OF RESPONDENT CHARACTERISTICS ON THE LEVEL OF IT COMPETENCES

IT competencies / Respondents characteristics	FA1	FA2	FA3	FA4	FA5	FA6	FA7	FA8	FA9	FA10	FA11	FA12	FA13	FA14	FA15
Attended a class on IT (1: yes, 0: no)	11.75**	14.24***	11.76**	4.08*	10.03*	8.41*	10.56**	0.34	4.65*	8.17**	3.21	6.66*	8.30**	14.52***	8.00**
Professional experience in HR (1: yes, 0: no)	13.21***	20.92***	12.20**	4.21*	6.35*	7.19**	10.24**	1.94	12.46***	10.61**	13.23***	10.11**	16.39***	17.10***	7.96**
Professional experience in the use of IT for HR (1: yes, 0: no)	5.08*	11.36**	4.52*	2.44	1.54	3.43	5.08*	0.099	1.48	1.50	0.53	4.77*	10.16**	9.57**	3.86
Professional experience in the use of other business applications (1: yes, 0: no)	13.32***	14.98***	8.09**	7.65**	6.65*	7.67*	5.77*	1.94	6.52*	4.06*	5.92*	5.06*	0.15	1.51	3.53
Professional experience in the use of a database software such as MS Access (1: yes, 0: no)	10.01**	16.09***	10.68**	8.25**	17.80***	11.96**	10.30**	0.63	7.49**	13.83***	5.04*	5.82*	9.08**	5.03*	1.85

FA1: knowledge about technology; FA2: knowledge about business IT applications; FA3: Knowledge about basic software FA4: knowledge about adoption and selection of IT for HR management; FA5: knowledge about implementation of IT for HR management; FA6: knowledge of management of HRIS FA7: knowledge about evaluation of IT benefits for HR management; FA8: knowledge about leveraging social media for HR management; FA9: Knowledge about accessing IT knowledge
FA10: experience in adoption and implementation of IT for HR management; FA11: experience in professional use of basic IT; FA12: experience in connecting and motivating actors through IT
FA13: knowledge about use of IT for organizational and HR effectiveness; FA14: mastering of HR management activities; FA15: vision of IT for HR
*p<0.05, ** p<0.01, ***p<0.001

APPENDIX 2
INFLUENCE OF RESPONDENT CHARACTERISTICS ON PERCEIVED IMPORTANCE OF IT COMPETENCIES FOR HR MANAGERS

IT competencies / Respondents characteristics	FB1	FB2	FB3	FB4	FB5	FB6	FB7	FB8	FB9	FB10	FB11	FB12	FB13	FB14	FB15	FB16
Attended a class on IT (1: yes, 0: no)	0.14	0.035	1.21	0.92	0.00	0.01	0.14	0.53	0.69	0.47	0.47	4.42*	3.43	5.84*	2.30	9.62**
Professional experience in HR (1: yes, 0: no)	1.90	0.29	0.92	0.20	0.00	0.16	0.11	0.36	0.45	0.20	0.14	3.37	0.94	3.40	3.70	14.05***
Professional experience in the use of IT for HR (1: yes, 0: no)	0.19	0.03	0.00	0.99	0.74	0.65	1.14	0.60	0.19	1.64	0.58	1.11	0.56	0.02	0.23	2.08
Professional experience in the use of other business applications (1: yes, 0: no)	1.44	0.12	0.78	1.80	0.78	0.56	2.37	0.23	0.13	0.00	0.15	3.18	0.84	1.30	0.00	1.99
Professional experience in the use of a database software such as MS Access (1: yes, 0: no)	0.00	0.02	1.11	3.50	1.11	1.84	0.00	0.42	0.73	0.41	0.016	1.53	0.64	2.70	0.11	1.25

FB1: knowledge about technology; FB2: knowledge about business IT applications; FB3: Knowledge about basic software
FB4: knowledge about adoption and selection of IT for HR management; FB5: knowledge about implementation of IT for HR management; FB6: knowledge about management of IT for HR management
FB7: knowledge about evaluation of IT benefits for HR management; FB8: experience in professional use of social media; FB9: knowledge about accessing IT knowledge
FB10: experience in evaluation of IT benefits for HR management; FB11: experience in adoption and implementation of IT for HR management; FB12: experience in professional use of social media
FB13: experience in connecting and motivating actors through IT; FB14: experience in use of IT for organizational and HR effectiveness; FB15: mastering of HR management activities; FB16: vision of IT for HR
*p<0.05, ** p<0.01, ***p<0.001