Strategic alignment of IT and human resources management in manufacturing SMEs: Empirical test of a mediation model

Abstract

Purpose: Within the manufacturing sector, SMEs face specific challenges with regard to their strategic HRM capabilities. In this context, an emerging issue for both researchers and practitioners regards HR information systems (HRIS), i.e. the deployment of strategic IT capabilities to enable the firm's high-performance work system (HPWS) capabilities and thus improve the performance of its HR function. In addressing this issue, we use a capability-based mediation perspective to study the strategic alignment of HR and IT.

Design/methodology/approach: A survey study of 206 manufacturing SMEs was realized and the data thus obtained was analyzed through structural equation modelling.

Findings: Results confirm that the HRIS capabilities of SMEs influence the performance of the HR function through their strategic alignment with the HPWS capabilities of these enterprises.

Practical implications: Our results suggest that the manufacturing SMEs most active in developing their HRIS capabilities while developing their HPWS capabilities are most likely to develop a competitive advantage through the improved performance of their HR function. This is especially important in a time when firms of all sizes across the globe are waging a "war for talent", and are enabled to do so by their strategic use of IT.

Originality/value: The results of the study constitute a valid basis for prediction and prescription with regards to the strategic alignment of human and IT resources.

Keywords: strategic human resource management; human resource information systems; HRIS capabilities; HRIS competencies; IT resources; human resources; strategic alignment; SME.

Paper type: Research paper

1.   Introduction

In the last two decades, manufacturing SMEs (small and medium-sized enterprises) have been facing multiple management challenges in the face of globalization, including the strategic human resource management (SHRM) challenge (Mitchell, Obeidat and Bray, 2013; Ivars and Martinez, 2015; Wu, Hoque, Bacon and Bou Llusar, 2015). In the context of a "talent war" linked to an aging workforce and with the emergence of Web 2.0-based technology such as social media, the need to

recruit, retain and develop human resources (HR) requires these firms to perform better in terms of SHRM (Huselid, Jackson and Schuler, 1997; Barney and Wright, 1998), and in particular to deploy and use IT for this purpose (Olivas-Lujan, Ramirez and Zapata-Cantu, 2007). Furthermore, the IT-enabled management of HR, through the deployment and use of *human resource information systems* (HRIS) by firms, is meant improve the performance of their HR function (DeSanctis, 1986; Maier, Laumer, Eckhardt and Weitzel, 2013) and allow it to play a more strategic role in the organization (Haines and Lafleur, 2008; Barrett and Oborn, 2013). We must thus question the potential effect of HRIS technology adoption and assimilation on the HR function's capacity to improve its performance (Parry, 2011; Iqbal, Ahmad, Allen and Raziq, 2018), and thus better meet the strategic needs of manufacturing SMEs in this regard (Schalk, Timmerman and Van den Heuvel, 2013). [1]

Given that HRIS research to-date has mainly pertained to large organizations with an established HR function, it is necessary to adopt a different frame of reference that accounts for the specificities of SMEs with regards to the strategic management of IT resources and HR (Marler and Fisher, 2013). Moreover, the implementation of strategic or "mission-critical" IT such as HRIS pose a great risk to these organizations (Poba-Nzaou and Raymond, 2011), especially in terms of failing to meet SHRM objectives. A deeper understanding of the role played by HRIS capabilities in enabling the HR function in these firms is also required, given that HRIS research is relatively recent and consists mainly of conceptual or prescriptive research aimed at developing frameworks and guidelines for large enterprises and public organizations (Marler and Fisher, 2013). The relationship between HRIS and SHRM thus remains to be further studied empirically in the

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[1] Focusing on the HR function as our unit of analysis, we use the term "HRIS" throughout the paper rather than the more generic "e-HRM", given that HRIS technology is meant to enable this most important functional area of the organization and HRIS applications are used by HR managers for SHRM purposes (Bondarouk and Ruël, 2012).

specific context of SMEs, if one is to provide a better explanation of their complementary effect on the performance of the HR function in these enterprises. Such an analysis requires mobilizing both IS and HRM research findings in an interdisciplinary manner (Khatri, Baveja, Agrawal and Brown, 2010). Now, given that IT-related studies in both fields have generally been conducted in a disciplinary fashion, the performance effects of IT-HR complementarities have yet to be fully understood.

With the present study, we aim to contribute to the body of research on the joint effects of IT and non-IT resources in general (Song, Dröge, Hanvanich and Calantone, 2005; Jeffers, Muhanna and Nault, 2008; Chen, 2012), and of IT capabilities and HR capabilities in particular (Carte and Chidambaram, 2004; Aral and Weil, 2007). We do so by analysing these effects from a resource and capability-based view (Makadok, 2001), to answer the following research question: *In what manner and to what extent do HRIS capabilities of manufacturing SMEs contribute to the performance of their HR function?*

2. Conceptual Framework

The conceptual framework of this study is primarily founded upon the resource-based view and especially upon a capability-based view (CPV) with the concepts of organizational resources and competencies that pertain to both SHRM and HRIS. Managers can create an economic rent for their firm by being more effective than their rivals at selecting HR and IT resources or by being more effective in deploying such resources (Makadok, 2001). As it applies to both the HR function and the IT function in the organization, the CBV thus focuses on the managers' role in selecting, developing, combining and deploying HR and IT resources rather than on the firm's positioning in its business environment (Colbert, 2004; Wade and Hulland, 2004). Organizational capabilities refer to the firm's "capacity to deploy" its resources and "are based on developing, carrying, and

exchanging information through the firm's human capital" (Amit and Schoemaker, 1993, p. 35). These capabilities may be developed and hence observed both in functional areas (such as HR and IT) and at the corporate level (Grant, 1996).

2.1   HPWS capabilities

From a capability-based perspective that originates in the CBV, the firm's SHRM capability is defined as the its capacity to acquire, develop, and deploy human resources through a dynamic HR architecture in order to achieve a higher level of organizational performance in a complex and changing environment (Khatri, 2006). Research on HRM capabilities has focused on the HRM practices that are deemed to be most effective, that is, on high-performance work systems (HPWS), and has assessed their actual effect on organizational performance (Becker and Huselid, 1998; Kehoe and Wright, 2013). Now, HPWS capabilities are meant to allow the firm to offer a rich work environment and thus lead to greater strategic performance of the HR function in terms of greater employee satisfaction and commitment and lesser intent to quit (Fabi, Lacoursière and Raymond, 2015; Ivars and Martinez, 2015).

HPWS capabilities are non-IT resources deemed most critical in their capacity to be enabled by IT capabilities (Aral and Weil, 2007). In this regard, two strategic management mechanisms allow a firm to gain and sustain a competitive advantage: resource-picking and capability-building (Makadok, 2001). As the firm's HR are considered to be the key factor in both mechanisms, competent employees are thus needed to select and deploy the appropriate IT resources and to develop the required IT capabilities.

2.2   HRIS capabilities

The firm's HRIS capabilities are defined here simply as the "practices and competences" that support its use of IT for HRM purposes (Aral and Weil, 2007, p. 764). Now, HRIS capabilities

have been shown to "have significant effects on the strategic role of HRM in organizations" (Marler and Parry, 2016, p. 2250). As is the case for IT capabilities in general, HRIS capabilities focus mainly on the HRIS competencies of members of the organization (Ravichandran and Lertwongsatien, 2005; Ray, Muhanna and Barney, 2005; Kim, Shin, Kim and Lee, 2011), and members of the HR function in particular (Panayotopoulou, Vakola and Galanki, 2007), as well as on the firm's HRIS infrastructure which consists mainly of HRIS technology and software application (Hooi, 2006; Reddick, 2009). Various characteristics may be used to identify the infrastructural capability of the HR function such as the HRIS infrastructure's compatibility, flexibility, connectivity, level of integration and sophistication (Chung, Byrd, Lewis and Ford, 2005; Uwizeyemungu and Raymond, 2012).

Research on HRIS capabilities has focused in particular on their capacity to enable the HR function to play a more strategic role (Marler and Parry, 2016), and on the effect of HRIS competencies and practices upon the effectiveness of SHRM in the organization (Haines and Lafleur, 2008; Bondarouk and Ruël, 2012). Moreover, while they are based upon two different types of IT resources, the firm's HRIS competencies and HRIS infrastructure may affect one another. For instance, previous empirical research has found that by improving the technical and behavioural capabilities of its IT personnel, the firm could build a better IT infrastructure capability (Fink and Neumann, 2007). It has also been found that by developing the expertise of its IT function, through improvements in its IT management capability, the firm could increase the flexibility of its IT infrastructure (Kim et al., 2011).

3.   Research Model and Hypotheses

Given prior empirical studies on the complementarity of human resources and IT resources (Aral and Weil, 2007; Khatri et al., 2010) and on the adoption and consequences of HRIS in SMEs

(Bondarouk, Parry and Furtmueller, 2017), the capability-based research model to be empirically validated in this study is presented in Figure 1. This model is essentially founded upon Jiang, Lepak, Hu and Baer's (2012) mediation model-based meta-analysis of the effects of SHRM practices (in the form of HPWS) on proximal [human capital) and distal (voluntary turnover) strategic HR outcomes. Defining human capital as "the composition of employee skills, knowledge, and abilities" (Jiang, Lepak, Hu and Baer, 2012, p. 1266), these researchers found that the firm's SHRM practices were positively related to its human capital and that, in turn, the firm's human capital partially mediated the relationship between its SHRM practices and voluntary turnover.

Figure 1: Research Model
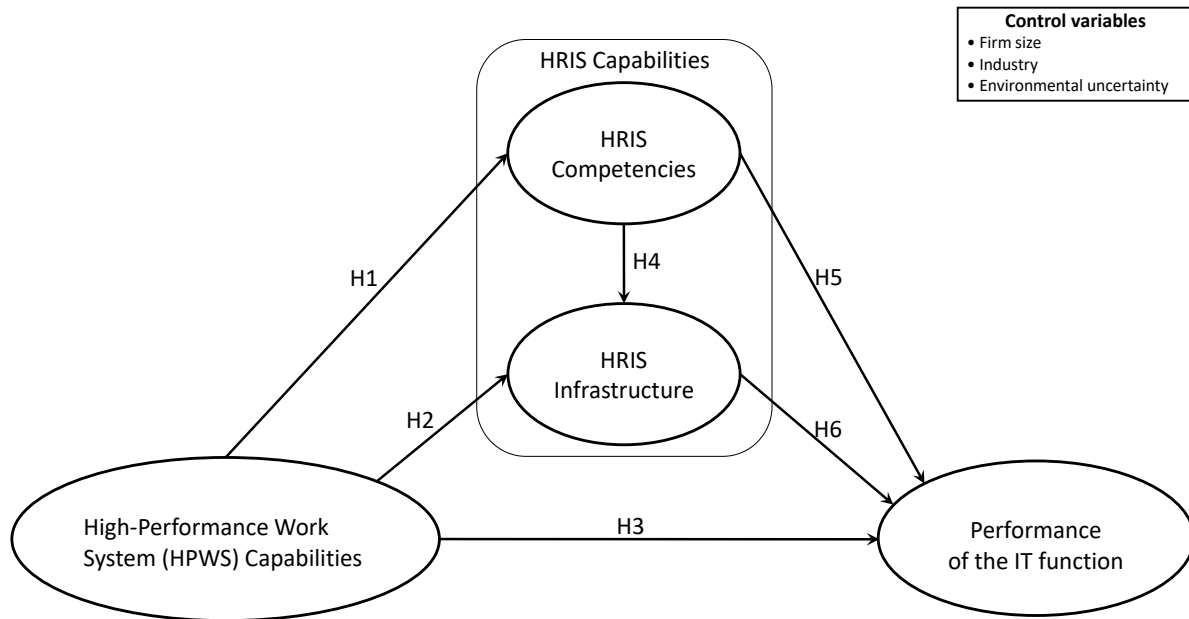
Considering HRIS capabilities to be a mechanism that mediates the influence of SHRM on organizational outcomes, we thus aim to test the following research hypotheses:

H1 - The firm's HPWS capabilities are positively related to its HRIS competencies.

H2 - The firm's HPWS capabilities are positively related to its HRIS infrastructure.

H3 - The firm's HPWS capabilities are positively related to the performance of its HR function.

H4 - The firm's HRIS competencies are positively related to its HRIS infrastructure.

H5 - The firm's HRIS competencies are positively related to the performance of its HR function.

H6 - The firm's HRIS infrastructure is positively related to the performance of its HR function.

H7 - The firm's HRIS capabilities partially mediate the positive relationship between its HPWS capabilities and the performance of its HR function.

Note that the last hypothesis (H7) corresponds to a "fit as mediation" perspective of the strategic alignment of HRIS capabilities (Bergeron, Raymond and Rivard, 2001), and of their complementary role as IT resources vis-à-vis the firm's human resources. Three control variables are included to provide added validity to the research model. Potentially influencing the SME's development of HRIS and HPWS capabilities as well as its HR functional performance, these variables include the firm's size (e.g. Pflughoest, Ramamurthy, Soofi, Yasai-Ardekani and Zahedi, 2003), industry (Chiason and Davidson, 2005), and the uncertainty of the firm's competitive, commercial and technological environment (e.g. Zhang, Sarker and Sarker, 2013).

4.   Research Method

4.1   Research design and sampling

Empirical data were obtained from a questionnaire-based survey. The survey population consisted of 1854 manufacturing SMEs whose number of employees ranged from 30 to 250, selected from a repertory of all manufacturing firms in the province of Quebec, Canada. After pre-testing, the

questionnaire was addressed to the person in charge of HRM in these firms. A total of 206 questionnaires were completed and usable for the analysis (11% response rate). The greater part of the survey's respondents (41%) held the title of human resources director (HRD) while others held titles such as HR support manager, chief financial officer, chief operational officer, president or CEO, controller and supervisor, reflecting the varied leadership and formalization of the HR function in the SME context. The mean size of the sampled firms is 81 employees, with a median of 65. The descriptive statistics and inter-correlations of the research variables are presented in Table 1.

Table 1. Descriptive Statistics and Intercorrelations of the Research Variables

variable (n = 206)	mean	stdev	α^a	VIF^b	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
HPWS capabilities																
1. HR development capability	0.62	0.22	-	1.9	-											
2. HR motivation capability	0.50	0.19	-	1.8	.63	-										
3. HR empowerment capability	0.30	0.18	-	1.6	.55	.52	-									
HRIS Infrastructure																
4. HRIS technology coverage	5.0	4.1	-	1.2	.23	.23	.20	-								
5. HRIS applications coverage	7.8	2.4	-	1.1	.18	.18	.26	.27	-							
6. HRIS infrastructure connectivity	2.7	0.9	.66	1.2	.20	.17	.28	.37	.12	-						
7. HRIS infrastructure compatibility^c	3.1	1.0	.80	-	.09	.05	.06	.23	.20	.26	-					
HRIS Competencies																
8. HRIS technology competency	2.8	0.9	.81	1.6	.24	.25	.11	.35	.17	.21	.18	-				
9. HRIS applications competency	2.7	1.0	.87	1.6	.20	.18	.10	.38	.17	.22	.27	.57	-			
10. HRIS management competency	2.7	1.0	.86	1.3	.06	.00	.05	.22	.15	-.04	.24	.43	.42	-		
Performance of the HR function																
11. efficiency of the HR function	3.6	0.7	.74	1.7	.22	.13	.14	.02	.09	.06	.06	.17	.14	.15	-	
12. human capital value	3.3	0.7	.80	2.0	.14	.12	.15	.01	.00	.03	.07	.14	.17	.19	.64	-
13. effectiveness of the HR function	3.4	0.7	.73	1.4	.37	.24	.22	.13	.01	.07	.15	.15	.16	.17	.39	.52

^{a}Cronbach's alpha coefficient of reliability   [inappropriate for index – as opposed to scale – variables]
^{b}variance inflation factor = $1/(1-R_i^2)$ [where R_i^2 is the unadjusted R^2 obtained when $variable_i$ is regressed against all other variables forming a construct]

^{c}excluded from measurement model

As generally recommended in survey research (Hikmet, and Chen, 2003), the possibility of non-response bias was evaluated by comparing the responses associated with the "late" respondents, those who responded over a month after reception of the questionnaire, with the

responses provided by the other ("early") respondents. After statistical comparison through t-tests, no significant differences were found between the two groups, thus indicating the absence of non-response bias. Moreover, given that the questionnaire is answered by a single respondent at one point in time, there is also a possibility of common method bias (Podsakoff, MacKenzie, Lee and Podsakoff, 2003). One way to evaluate the presence of such a bias is to use a "marker" variable that should not be highly correlated to any of the research variables (Lindell and Whitney, 2001). We thus used the perceived uncertainty of the environment as the marker variable in relation with the three main research constructs, that is, HRIS Capabilities, HPWS Capabilities and Performance of the HR function. High correlation between environmental uncertainty and the twelve indicators of the research constructs would be indicative of a common method bias. As the average correlation between environmental uncertainty and each construct's indicators was equal to 0.08 (with a maximum of 0.15), this last result indicates the absence of common method bias.

4.2   Measurement

The operationalization of the research constructs is based on the extant literature. A firm endows itself with capable human resources through HR practices meant to recruit outstanding candidates, and to develop, motivate and empower them. Therefore, HR practices may be used as surrogate measures of HPWS capabilities. In line with SHRM theory and HPWS, and in conjunction with the ability-motivation-opportunity (AMO) framework, HR practices can be divided into three categories (Fabi et al., 2015). The presence and extent of screening, integration and development practices are thus used to measure the SMEs' HR development capability. Leadership, performance management, compensation and benefits practices are used to measure the HR motivation capability. And communication, participation and work-life balance practices are used to measure the HR empowerment capability.

The firm's HRIS capabilities focus on the characteristics of resources that allow it to benefit from the use of HRIS technology and software applications. Therefore, HRIS capabilities were operationalized through the HRIS infrastructure and HRIS competencies of the HR function. Two scale measures used to assess the capacity of an HRIS infrastructure pertain to its scope and range (Keen, 1991)]. The HRIS infrastructure's scope refers to the connectivity between different HRIS technologies while its range addresses the compatibility between these technologies (Duncan, 1995). The nine 5-point Likert scales used here to operationalize these two measures emanate from Byrd and Turner's (2000) study. Two other index measures of the HRIS infrastructure pertain to its coverage (Strong and Volkoff, 2010), operationalized as the number of HRIS technologies (e.g. social media, self-service portals) and software applications (e.g. e-recruiting, e-performance management) that it provides (e.g. Strohmeier and Kabst, 2014). The operationalization of the SMEs' HRIS competencies is adapted from Basselier, Benbasat and Reich's (2003) study, wherein the ability of executives to promote the deployment of IT and to do so effectively constitute the two main dimensions of their IT competencies. The first means to evaluate the knowledge of SME managers in terms of HRIS technology, HRIS applications, involvement in the management of HRIS and access to technological knowledge. The second evaluates their HRIS experience and focuses on the quality of their HRIS management and their HRIS project management in particular.

HR functional performance was operationalized along three dimensions, based on the measure proposed by Dulebohn and Johnson (2013). First assessed is the efficiency of the HR function, covering the costs and productivity of SHRM activities performed by this function with regards to certain SHRM activities such as hiring. The second dimension is assessed in terms of human capital value, that is, the value of human resources for the firm with items pertaining to the perceived costs of labor and return per employee. Finally, the third dimension is the effectiveness

of the HR function in its strategic role, that is, the extent to which this function contributes to the achievement of firm's strategic goals.

As to the control variables, firm size was measured by the number of employees. Industry was assessed by the technological intensity of the industrial sector in which the firm operates (low- to medium-tech vs. medium- to high-tech), following the OECD's classification (Hatzichronoglou, 1997). Environmental uncertainty was measured by adapting an instrument initially validated by Miller and Dröge (1986), in which the respondent is asked to evaluate, on eight 5-point Likert scales, the degree of change and unpredictability in the firm's competitive, commercial and technological environments ($\alpha = 0.68$).

5. Results

The adoption rate for the HRIS applications and technologies used by the sampled manufacturing SMEs is presented in Table 2.

Table 2. HRIS applications and technologies used by manufacturing SMEs (n = 206)

HRIS applications	adoption rate
Remuneration (salary and bonuses)	99%
Time management (scheduling, timesheets)	96%
Benefits	93%
Development and training	86%
Health and safety	84%
Performance management	83%
HR data analysis	79%
Recruitment (selection and hiring)	77%
HRIS technologies	adoption rate
Web sites	65%
Self-service portal for managers	44%
Self-service portal for employees	41%
Self-service portal for HR personnel	34%
Social media	32%
Mobile telephony	9%

Structural equation modeling was used to validate the research model, employing the PLS component-based technique for this purpose. PLS was chosen because of its robustness and lower requirements with regard to the distribution of residues when compared to covariance-based techniques such as LISREL and EQS, in addition to being more appropriate when the goal is to explain variance (Gefe, Ringdon and Straub, 2011; Henseler, Hubona, and Ash Ray, 2016). PLS is also more apt to handle measurement models that include endogenous formative constructs (Roberts and Thatcher, 2009). The recommended sample size requirement for PLS is easily met here (Henseler et al., 2016).
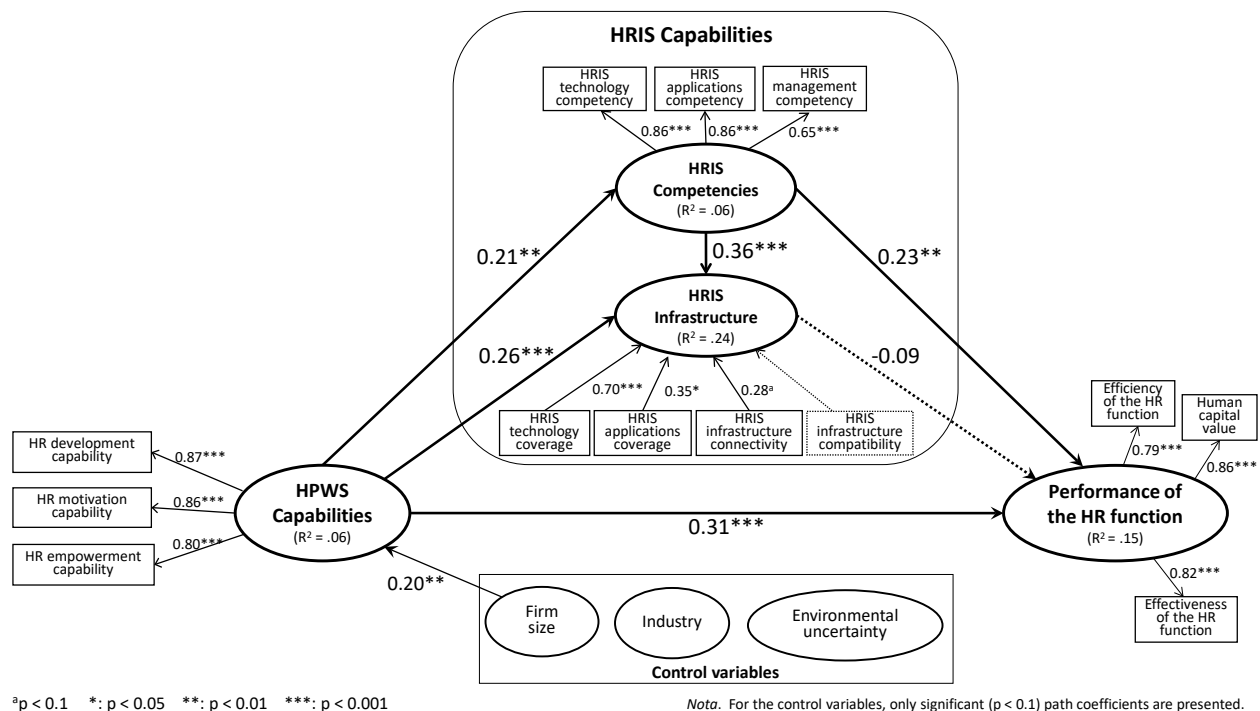
5.1   Assessment of the measurement model

The first step in the causal analysis is to simultaneously evaluate the measurement model and the structural model with PLS. Psychometric properties of the measurements are evaluated in the context of the structural model in assessing the unidimensionality and reliability of the research constructs. As the standard reliability and validity criteria applicable to reflective constructs do not apply to formative constructs, one must first verify that there is no multicollinearity among a formative construct's indicators. In order to do so, one uses the variance inflation factor (VIF) statistic, the rule being that the VIF must not be greater than 3.3 (Diamantopoulos and Siguaw, 2006). As shown in Table 1, VIF value for the indicators of the formative construct in the research model, HRIS Infrastructure, were less or equal to 1.2 and thus indicates the absence of multicollinearity.

The Cronbach's α value for the nine indicators of the reflective constructs varied from 0.66 to 0.87, confirming their internal consistency. As seen in Figure 2, these indicators' loadings (λ) are all above the 0.70 threshold, save for one at 0.65, thus confirming the unidimensionality of the three reflective constructs in the research model. Moreover, the weights (γ) of the formative

indicators are all positive and strong enough to be retained in the measurement model, save for the "compatibility" indicator of the HRIS Infrastructure construct which had a nonsignificant weight (p > 0.1) and thus was excluded from the measurement model (Bollen, 2011). One can also see in Table 3 that the composite reliability coefficients of the reflective constructs are between 0.84 and 1.0, thus confirming these constructs' reliability. Also confirmed is their convergent validity as the average variance extracted (AVE) is between 0.64 and 1.0, which is above the 0.50 threshold.

Figure 2. Test of the Research Model

^{a}p < 0.1   *: p < 0.05   **: p < 0.01   ***: p < 0.001   *Nota.* For the control variables, only significant (p < 0.1) path coefficients are presented.

The last property to be analyzed in the measurement model is discriminant validity. This property indicates the extent to which a construct differs from other constructs in the research model. In the case of reflective constructs, the shared variance between such a construct and other constructs must be less than the average variance extracted (AVE) from its indicators, as confirmed in Table 3. In the case of formative constructs, the fact that such a construct shares less than 50%

variance with any other construct (inter-construct correlation inferior to 0.71) is evidence of such validity (MacKenzie, Podsakoff and Jarvis, 2005).

5.2 Assessment of the research model

The research model was tested by evaluating the path coefficients (β) that links the constructs in the research model (using the SmartPLS 3.2.7 software), as shown in Figure 2. The essential quality of model fit is assessed here by the strength and significance of the path coefficients and the proportion of explained variance, as befits PLS's focus on prediction and concern with generalization (Ringle, Sarstedt and Straub, 2012). Model fit may be assessed as well by the standardized root mean squared residual (SRMR) goodness-of-fit index whose value here is 0.067, below the 0.08 threshold (Henseler et al., 2016).

Table 3. Reliability, Validity and Intercorrelations of the Research Constructs (n = 206)

Construct	c.r.[a]	AVE[b]	1.	2.	3.	4	5.	6.	7.
1. HPWS Capabilities	.88	.71	.84[c]						
2. HRIS Competencies	.84	.64	.22	.80					
3. HRIS Infrastructure	-	-	.41	.41	-				
4. Performance of the HR function	.86	.68	.23	.23	.08	.82			
5. Industry (tech. intensity of the sector)	1.0	1.0	.10	.00	.02	-.04	1.0		
6. Firm size	1.0	1.0	.21	.07	.11	-.03	.07	1.0	
7. Environmental uncertainty	1.0	1.0	.10	.13	.04	-.07	-.11	.08	1.0

[a]composite reliability= $(\Sigma\lambda_i)^2/((\Sigma\lambda_i)^2+\Sigma(1-\lambda_i^2))$
[b]average variance extracted = $\Sigma\lambda_i^2/n$ [inappropriate for formative constructs]
[c]diagonal: (average variance extracted)$^{1/2}$ = $(\Sigma\lambda_i^2/n)^{1/2}$ ["   "   "   "   ]
 sub-diagonals: correlation = (shared variance)$^{1/2}$

Hypothesis 1 (confirmed). As shown in Figure 2, a positive and significant path coefficient (ß = 0.21, p < 0.01) confirms the hypothesis that the firm's development of stronger HPWS capabilities will lead it to increase its HRIS competencies. It thus appears that when manufacturing SMEs improve their ability to develop, motivate and empower their human resources, these firms

do so partly by improving their HRIS competencies, that is, through increased knowledge and improved management of HRIS technology such as social media.

Hypothesis 2 (confirmed). A positive and significant path coefficient ($\beta = 0.26$, $p < 0.001$) also confirms the hypothesized positive relationship between the firm's HPWS capabilities and its HRIS infrastructure. Manufacturing SMEs may thus be seen here as needing to widen their use of HRIS technologies such as employee self-service portals and mobile computing, and to increase the connectivity of these technologies to strengthen their HR development, motivation and empowerment capabilities.

Hypothesis 3 (confirmed). The hypothesis that developing stronger HPWS capabilities leads to improved performance of the HR function is confirmed, as the corresponding path coefficient is shown to be positive and significant ($\beta = 0.31$, $p < 0.001$). This result further confirms that manufacturing SMEs develop their HPWS by being effective in selecting their human resources (resource-picking) and deploying these resources (capability building), in line with the dynamic capability-based view (Colbert, 2004; Becker and Huselid, 1998).

Hypothesis 4 (confirmed). Given a positive and significant path coefficient ($\beta = 0.36$, $p < 0.001$), the hypothesis that greater HRIS competencies lead to a better HRIS infrastructure is confirmed. This finding further confirms the influence of the HR function's IT competence on "championing" IT for strategic HRM purposes (Basselier et al., 2003), more precisely on developing an HRIS infrastructural capability as a co-requisite of developing a HPWS.

Hypothesis 5 (confirmed). The hypothesis that greater HRIS competencies lead to improved HR functional performance is confirmed, as the corresponding path coefficient is found to be positive and significant ($\beta = 0.23$, $p < 0.01$). This result highlights the critical importance for the

SME's HR function, and especially for the RH manager, of developing HRIS competencies that enable the firm's strategic HR management process.

Hypothesis 6 (unconfirmed). Given a negative and non-significant path coefficient (ß = -0.09), the hypothesis that a better HRIS infrastructure leads to improved HR functional performance is unconfirmed. In conjunction with hypotheses 2 and 4's confirmation, one could tentatively surmise that the HRIS infrastructure may in truth have become a SHRM capability. In other words, it may have become a constitutive element in the development of a HPWS by a manufacturing SME rather than a consequence of such a development.

The presence of a partial mediating effect of HRIS on the HPWS → HR functional performance relationship was first ascertained by analyzing, through a bootstrapping procedure (Nizl, Roldan and Cepeda, 2016), two specific indirect effect, that is, the one from HPWS Capabilities to Performance of the HR function via HRIS Competencies and the other via HRIS Infrastructure. As shown in Table 4, results indicate the first indirect effect, equal to 0.046, is significant as its bias-corrected 95% confidence interval excludes 0. The second indirect effect, equal to -0.025, is nonsignificant however. In conjunction with the simpler and more powerful test of joint significance of indirect effects (Leth-Steensen and Gallitto, 2015), these results partially confirm the last hypothesis in that the sampled firms' HRIS competencies - but not their HRIS infrastructure - partially mediate the effect of their HPWS capabilities on the performance of their HR function. Again, one may surmise from these last results that a strong HRIS infrastructure is a component rather than a consequence of a high-performance work system, and thus is a capability that may be developed by manufacturing SMEs concomitantly and coherently with their HR development, motivation and empowerment capabilities, and with their HRIS competencies.

Returning to Figure 2, the three control variables, firm size, industry and environmental uncertainty, were found to add very little explanation to the research constructs' variance, that is, to have no significant impact on the firms' HPWS capabilities, HRIS capabilities and HR functional performance, save for the unsurprising finding that larger firms show stronger HPWS capabilities. Finally, further analysis of the data was made by testing an alternative research model, that is, one in which a moderation - rather than mediation - perspective was taken. As estimated by structural equation modeling, the moderating effects of HRIS Competencies and HRIS Infrastructure on the HPWS → HR functional performance relationship were null.

Table 4. Analysis of Indirect Effects

path (n = 206)	indirect effect	95% confidence interval[a]
HPWS capabilities → Performance of the HR function (*via* HRIS Competencies)	0.046	[0.007, 0.102]
HPWS capabilities → Performance of the HR function (*via* HRIS Infrastructure)	-0.025	[-0.080, 0.014]

[a]bias-corrected

6.   Contribution and Implications

The necessity to complement non-IT resources, such as HR, with IT resources in order to maintain and improve the firm's competitive position is an idea that is conceptually and practically deep-seated in the body of IS literature that is founded upon the CBV. The present study has thus contributed to furthering our knowledge of the complementary effects of two types of strategic IT and HR capabilities upon the HR functional performance of manufacturing SMEs, namely HRIS capabilities and HPWS capabilities. This study's results suggest that the mediation approach taken here constitutes a viable theoretical alternative to the universalistic approach and to other strategic

alignment perspectives such as the configurational approach to capture the complementary effect of IT resources and human resources in order to understand the firm's choices in matters of SHRM and to explain the performance of its HR function (Delery and Doty, 1996; Delery, 1998).

The results of this study have implications for both research and practice. To our knowledge, this is the first study to take a mediation perspective of the strategic alignment of IT and HR capabilities, and to do so by taking the HR function (instead of the organization) as the unit of analysis and its performance as the proximal outcome of alignment (instead of a distal outcome such as organizational performance). In addition, our research sheds new light on the contribution of strategic IT capabilities to SHRM, that is, on the mediating effect of these capabilities on the relationship between the firm's HPWS capabilities and the performance of its HR function. While some authors have historically questioned the existence of a direct link between IT capabilities and performance (e.g. Brynjolfsson and Hitt, 1996; Carr, 2003), this study demonstrates that while HPWS capabilities remain as a crucial determinant of the firm's HR functional performance, manufacturing SMEs should consider their strategic use of HRIS when developing and deploying new HPWS capabilities.

From a practical standpoint, this study raises awareness for SMEs in the manufacturing sector on the use of HR information systems to support their strategic HR management and improve the performance of their HR function. One can see from our findings that developing the firm's HPWS capabilities while concomitantly developing its HRIS capabilities results in greater improvements in performance than if the HPWS was developed alone. This suggests that the organizations that are most active in developing their strategic IT capabilities while developing their HPWS capabilities are most likely to develop a sustained competitive advantage through the improved performance of their HR function. This is especially important in a time when firms of all sizes

across the globe are waging a "war for talent", that is, are battling to attract and retain human resources and are enabled to do so by using information technology (Beulen, 2008). Moreover, this research has identified what types of strategic IT and HR capabilities should be developed by manufacturing SMEs to reach a high level of HR functional performance. For HRIS capabilities in particular, this includes first the HRIS competencies of the HR function's personnel and second the HR function's HRIS infrastructure in terms of technologies, applications and connectivity.

Finally, this study's revisiting of the complementarity and joint effects of manufacturing SMEs' HRIS and HPWS capabilities could provide the conceptual and methodological kernel for a diagnosis of the HR functional area in these organizations. The use and adaptation of our measurement instrument could allow managers, consultants or government agencies to jointly assess the strategic IT and HR capabilities required for the strategic development and competitiveness of SMEs in the manufacturing sector, in line with their strategic objectives.

7. Limitations and Conclusion

The results of this study must be interpreted with some caution due to its inherent limitations. Given the nature of the sample, its representativeness in relation to all SMEs limits the scope of these results. While comparing the strategic HR and IT management of firms in the same industry (manufacturing in our case) should be viewed as a legitimate approach, we acknowledge that the sample's homogeneity also limits the generalizability of our findings to organizations in other sectors and industries, and especially in the services sector. The research model should also be extended in future research to include factual measures of HR functional performance (such as voluntary turnover) and organizational performance, as well as potential strategic determinants of

HRIS other than HPWS capabilities (such as the SME's entrepreneurial, strategic and market orientations).

In answering its research question, our empirical investigation was able to provide a better understanding of the manner in which HRIS capabilities contribute to the performance of the HR function in the context of manufacturing SMEs. Based upon a mediation perspective of the strategic alignment of the firm's IT resources with its human resources, the results of this study have revealed the specific HRIS capabilities that are associated to superior HR functional performance in this context. These results support the proposition that HRIS capabilities drive performance to the extent that they complement the HPWS capabilities of SMEs. In sustaining their competitive position within a globalized, knowledge-based economy, many manufacturing SMEs will be asked to do more and better with regard to the strategic management of their human resources. It thus behooves them to develop their HPWS and HRIS capabilities in coherence with their strategic objectives.

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