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Connecting information literacy and social capital to better utilise knowledge resources in the workplace

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Abstract

Human resources and intellectual capital are best utilised through an ongoing interaction between individual and social processes. Still there is a research gap of empirical multilevel studies, focusing both on individual and organisational aspects of knowledge processes. To fill this gap, this article reports on a quantitative study, where the relationship between information literacy and social capital, representing the individual and social contexts affecting organisational knowledge processes, is explored. Structural equation modelling-based analysis of 378 employees working in different companies in Finland demonstrated that information literacy supports all three dimensions of social capital at workplace. Strong information handling skills enable better access to knowledge beyond the resources of an individual, that is, social capital. The results of the study contribute to a better understanding of how to manage human resources and the information and knowledge processes that employees are expected to be involved in.

Keywords

Information leadership; information literacy; social capital; workplace information literacy

1. Introduction

Human resources are among the most important assets in any organisation. An appropriate use of not only the actual asset, but the potential of this asset, is considered as a pivotal advantage for business success [1,2]. However, human resources do not easily translate into business success. To be able to utilise the most of human resources, it is crucial to ensure that employees can communicate and collaborate effectively to share knowledge and expertise for the common good of the workplace [3,4]. Because of the constant interplay between individual and social knowledge construction [5], it is essential to understand both the social and the individual underpinnings of ongoing knowledge processes.

Previous research shows that social capital improves information and knowledge sharing, trust, and organisational stability to achieve common aims [1,6–8]. It is a frequently used measure of the level of benefits and outcomes of (un)successful social cohesion and social knowledge processes and exchange. It is, therefore, an important enabler of effective utilisation of human and intellectual assets and accounts for some of the social factors affecting efficient knowledge sharing. Whereas social capital measures the social context of knowledge processes, information literacy is a related measure of the efficacy of individual knowledge processes. It enables an individual to master and communicate information and knowledge as assets for problem solving and lifelong learning [9–12] and prevents from information overload or from

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using misinformation for decision-making [13]. Although it is well-known that human resources and intellectual capital are best utilised through an ongoing interaction between individual and social processes [14–16], a recent literature review shows that there is still a major research gap of empirical studies with multilevel analysis of knowledge sharing outcomes, focusing on both individual and organisational aspects of knowledge processes [17]. To fill this gap, this article reports on a quantitative study, with the aim to explore the relationship between information literacy and social capital, representing the individual and social underpinnings of organisational knowledge processes. The results of the study contribute to a better understanding of how to manage human resources and the information and knowledge processes that employees are expected to be involved in.

2. Defining social capital and information literacy

Social capital is the network of relationships possessed by an individual or a social network and the set of resources embedded within that network, strongly influencing the extent to which interpersonal knowledge sharing occurs [18]. Social capital refers to the ability to work together through structures and networks to reach mutual goals. Trust, social interaction and collective identity are important conditions. Social capital constitutes the benefits obtained from both bonding and bridging ties [19], and wisely using these conditions and connections give a potential to reach information and knowledge resources that are beyond resources of an individual [20]. In information science, social capital has been used as a conceptual framework for studying relational factors associated with the choice of people as information sources [21] and how social capital can assist information and communication technology (ICT) capacity building and poverty reduction [22]. Social capital has also been used to understand information practices and motives for sharing knowledge and experience [5], and the dimensions of social capital have been proven to give a good overview to the complexity that knowledge sharing entails [7,23–25].

Information literacy relates to the ability to think critically and refers to individual skills in information handling that support learning [26,27]. In workplace context, information literacy translates to '*knowing when and how to use information in order to help adhere organisational aims and add value to organisational activities*' [26] and has increasingly been recognised as a professional key competence [27–29]. Information literacy develops through socio-cultural practice within which knowledge and meaning are built through dialogue and debate [27,28,30–32]. However, the concept of information literacy mainly focuses on individuals' information and knowledge handling skills, how they are developed and constructed, and how they support the individual in completing work tasks and reaching individual and common goals. Information handling skills are not only connected to handling information in inscribed forms but also to how individuals manage and utilise other people as information sources [33–35].

3. The connection between social capital and information literacy

A positive connection between knowledge management, social capital and firm performance has been found, where social capital mediates the relationship between knowledge management and performance [36,37]. Social capital has been showed to support and develop successful organisations through improving organisational knowledge sharing and development of trust. There is a mutual relationship between social capital and efficient knowledge sharing while social capital connects an individual to knowledge resources, sources that have insights and know-how that are needed for decision-making or problem solving [1,2,20]. However, existing social capital does not automatically bring advantages and access to information and knowledge sources. There is also a need for a reflective discovery and use of information, an awareness of different socially and individually sourced forms of information [38] and an understanding of how information is produced and valued [39]. This makes individual information literacy an important prerequisite for social capital. A higher level of information literacy helps employees to obtain needed information from different sources, networks and channels [1] and, consequently, support a more efficient use of the organisation's social capital.

Still, there is relatively little research that combines the perspectives of information literacy and social capital. There are a few societal level studies that highlight the importance of information literacy in making use of information for everyday life. For example, Caidi and Allard [40] have studied immigrants' information practices and emphasise that social inclusion generates social capital, giving better chances of integrating into a new society. Also, Lloyd et al. [41] stress that information sharing practices increase where settlers who have become established in a new environment become a referral source for others, reflecting how social capital is developed. However, social support does not always provide members with social capital. One contributing factor can be underdeveloped information literacy [42]. High et al. [43] show a connection between parents with low interest in books and reading, and children with underdeveloped social capital. Members in a culture of information poverty lack successful strategies in dealing with information and, therefore, have lack of social capital. A holistic view is, therefore, important, and studies connecting the individual

information literacy to organisational social capital would contribute with important insights about the relationship between social and individual knowledge processes that are essential to get the most out of human resources.

4. Hypotheses development

Combining social capital and information literacy in an empirical study is not easy. Both concepts incorporate several dimensions, and they have a mutual relationship, which impacts both ways. Information literacy refers to such individual abilities as the reflective discovery of information, understanding of how information is produced and valued and ethical use of information in creating new knowledge [39]. Even if information literacy in workplace context is not detached from individuals' socio-cultural context [30–32], it stays with an individual and stems from individual participation in the social.

Social capital is most often divided into three dimensions when studied in connection to knowledge work in organisations [5,18,20]. The dimensions explicate structural, relational and cognitive factors, and will also be the aspects linked to information literacy in this study (see sections 4.1–4.3). We posit that developing information literacy contributes to social capital as it develops human capital by enlarging an individual's skills or knowledge base [44, p. 2637] through access to information. Information increases in value when it is applied and out into use in a social context, where trust, mutual understanding, as well as shared values and behaviours – that is, social capital – is needed. Becoming information literate in this context could manifest in actions, attitudes, beliefs and ideology about practice [45]. Therefore, it is plausible to suggest that there is a relationship between information literacy and social capital. Social capital is a mediator of individual know-how [7] and it affects organisational outcomes positively [36,37]. An individual with a good understanding of information literacy can more effectively use the potential resources mediated through the organisational network, which is the organisation's social capital.

4.1. Information literacy and the structural dimension

Information literacy promotes the development of the structural dimension of social capital through active utilisation of personal network ties as a channel to information, and by supporting an understanding of the workplace as a social construct [32,35]. The structural dimension is manifested as social interaction ties, and network ties provide access to resources. Social interactions are channels for information and resource flows [46].

H1: Information literacy is positively associated with the structural dimension of social capital.

4.2. Information literacy and relational dimension

In the workplace context, information exchange occurs more often informally than formally and is dependent on and driven by social relationships or learning practices [27]. Therefore, workplace information literacy comprises also discourse and discursive practices, informal social and embodied sources in addition to competent engagement with formal information sources [47]. Similarly, the information practices that affect the level and quality of social exchange should be recognised. The relational dimension of social capital is manifested as trust, norm of reciprocity and identification [46]. Information literacy refers to not only the awareness of possible information sources but also the skills to choose relevant sources and evaluate their trustworthiness [39]. Successful information exchange increases the level of trust in one's social network. Therefore, information literacy is assumed to positively affect social capital as it would support managing relations to information sources (and people).

H2: Information literacy is positively associated with the relational dimension of social capital.

4.3. Information literacy and the cognitive dimension

The cognitive dimension is manifested as shared vision and shared language [18,46]. Knowledge creation is something you most often do together with others in a workplace. With an awareness of people as information sources, the need to actively share your visions, plans and so on, the need to talk about things so that you have a mutual understanding (shared language) means that information literacy supports the development of the cognitive dimension of social capital.

H3: Information literacy is positively associated with the cognitive dimension of social capital.

Table 1. Demographic profile of respondents.

Items	%	Items	%
Age		Industry	
18–29	6.1	Advertising & Marketing	3.2
30–39	18.3	Construction, Machinery, and Homes	5.4
40–49	25.5	Education	8.6
50–59	31.8	Entertainment & Leisure	4.3
60 and above	18.3	Finance & Financial Services	8.9
Education		Government	5.9
No education	0	Healthcare & Pharmaceuticals	8.1
Primary education (elementary)	1.1	Manufacturing	5.7
Secondary education (high school)	12.5	Nonprofit	5.7
Tertiary education (college or university)	86.4	Telecommunications, Technology, Internet & Electronics	12.7
Gender		Real Estate	5.1
Male	59.5	Retail & Consumer Durables	2.7
Female	38.1	Transportation & Delivery	1.9
Prefer not to say	2.4	Utilities, Energy, and Extraction	1.6
		Airlines & Aerospace	0.3
		Other	19.9

5. Methodology

5.1. Data

The sample of this study consisted of employees working in different organisations and industries in Finland. We secured access to organisations through alumni network of the authors' universities. Moreover, we obtained contact information of more than 5000 organisations from Orbis, a comprehensive company database, which contains detailed information on different organisational aspects ranging from demographic characteristics to ownership structures, key individuals and financial performance.

Data were collected with an electronic questionnaire distributed through email containing an invitation letter and a link to the questionnaire. Overall, we received 378 useable responses. The sample demographics are presented in Table 1, which shows a diverse cross-section of population with the representation of various professions and industries.

In cross-sectional surveys, common method variance can influence the results of electronic questionnaire. Harman's single factor test was used to assess common method variance in our data. The first factor extracted using principal axis factoring, without rotation, accounted for only 27% of the overall variance. Since the factor accounts for very small variance, it is very improbable that common method variance will influence survey results [48,49].

5.2. Measurement instrument

The questionnaire for this study consisted of two sections. The first section contained questions on respondents' demographic characteristics, summary of which is presented in Table 1. The second section contained questions on items used to measure each construct in the model. All constructs in this study were measured using multiple items on a five-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5). Existing validated scales were used to measure information literacy and social capital. Information literacy scale was adopted from the study by Ahmad et al. [50], which provides a comprehensive scale for measuring information literacy in workplace contexts. Workplace information literacy consists of five dimensions: information acquisition, evaluation, awareness of information environment, information use and learning from information experience.

Three facets of social capital – structural, relational and cognitive capitals – were measured using a scale adapted from the study by Chiu et al. [46]. The structural aspect consisted of two dimensions, referral and access. The relational aspect consisted of two dimensions, namely trust and norms of reciprocity. Finally, the cognitive aspect consisted of shared language and shared vision. All four constructs, information literacy, structural capital, relational capital and cognitive capital, were operationalised as second-order hierarchical constructs as they consisted of multiple dimensions. Hierarchal modelling reduces 'the level of collinearity among indicators' [51, p. 6] and enhances theoretical parsimony [52]. Moreover, it reduces complexity and improves interpretation of complex models with many constructs as is the case in this study [53].

Following the recommendation of Lohmöller [54] and Becker et al. [55], the repeated indicator approach was used to measure the four higher order constructs. As such, higher order construct is measured by indicators of all of its first-order constructs. For example, information literacy is measured by indicators of its five dimensions. Repeated indicator approach is useful in hierarchical model as it produces precise parameter estimates [55,56]. Long tenure in a company and extensive professional experience enhances an individual's skills and potential to utilise cognitive and communicative resources in developing, sustaining and strengthening social capital. Therefore, company tenure and industry experience are introduced as control variables in this study.

6. Findings

Partial least square structural equation modelling (PLS-SEM) was used to validate the measures and test hypotheses. PLS-SEM is a multivariate technique, which has less restrictive assumptions about data such as normality and sample size. SmartPLS 3.0 was used to compute the path model [57]. The path weighting scheme was used for parameter estimation. As suggested by Hair et al. [52], assessment of the measurement model was conducted before the evaluation of the structural model.

6.1. Measurement model

Analysis of the measurement model includes evaluation of reliability (consistency reliability, indicator reliability) and validity (discriminant validity and convergent validity) of constructs used in the model. As shown in Table 2, composite reliability values of all constructs are above the recommended value of 0.70, which insures consistency reliability. Moreover, outer loadings of all the indicators are above 0.60 with the exception of third indicator of information acquisition construct, which has loading of 0.51. This indicator was retained to preserve the content validity. Indicators with 'loadings between 0.40 and 0.70 should be considered for removal only if deletion leads to an increase in composite reliability and [Average Variance Extracted] AVE above the threshold value' [58, p. 107]. In the case of information acquisition, inclusion of third indicator still results in AVE and composite reliability far higher than the minimum threshold. Convergent validity was examined using AVE values. As shown in Table 2, AVE values of all of the measured constructs meet the minimum threshold value of 0.50 which is required to establish convergent validity.

Discriminant validity was assessed using Fornell and Larcker criterion and cross-loadings. According to Fornell and Larcker criterion, the square root of AVE of each construct should be higher than its correlation with other constructs [59]. As shown in Table 3, Fornell and Larcker criterion is clearly fulfilled. Furthermore, evaluation of cross-loadings revealed that loadings of indicators on their respective constructs are higher than their cross-loadings on other constructs. This further confirms the discriminant validity of measured constructs. Overall, results summarised in Tables 2 and 3 confirm that there is sufficient evidence of reliability and validity of the measurement scales used in this study.

In this study, information literacy and three constructs of social capital are operationalised as second-order reflective hierarchal constructs. The 'degree of explained variance of a hierarchical construct is reflected in its components' [60, p. 110]. As shown in Tables 4 and 5 in Appendix 1, all the path coefficients from information literacy, structural capital, relational capital and cognitive capital to their respective first-order constructs or components are significant at $p < 0.01$. Moreover, composite reliability and AVE values of all four higher order constructs are above 0.70 and 0.50, respectively, confirming their reliability and validity.

6.2. Structural model

After establishing reliability and validity of all the constructs, we tested for hypotheses 1–3. PLS algorithm with the path weighting scheme and 5000 maximum iterations were employed to test the hypotheses. The results in Figure 1 show that information literacy has a positive and significant effect on structural capital ($\beta = 0.51$, $p < 0.01$), relational capital ($\beta = 0.0.45$, $p < 0.01$) and cognitive capital ($\beta = 0.50$, $p < 0.01$). Consequently, we can confirm that hypotheses 1, 2 and 3 are empirically substantiated. The effect of information literacy is strongest on structural capital followed by cognitive and relational capital, respectively. Nevertheless, the difference in effects is negligible.

Table 2. Measurement statistics of first-order constructs.

	Mean	Standard deviation	Indicator loading	Composite reliability	AVE
Referral				0.85	0.74
Item 1	4.18	0.64	0.86		
Item 2	3.93	0.84	0.86		
Access				0.79	0.66
Item 1	3.98	0.89	0.84		
Item 2	3.56	1.17	0.79		
Trust				0.85	0.67
Item 1	3.33	0.96	0.66		
Item 2	3.67	0.83	0.88		
Item 3	3.85	0.85	0.89		
Norm reciprocity				0.87	0.63
Item 1	4.25	0.69	0.73		
Item 2	4.31	0.62	0.84		
Item 3	3.83	0.92	0.81		
Item 4	4.18	0.83	0.78		
Shared language				0.86	0.68
Item 1	4.03	0.77	0.73		
Item 2	3.97	0.78	0.89		
Item 3	3.76	0.75	0.84		
Shared vision				0.93	0.80
Item 1	3.96	0.73	0.90		
Item 2	3.79	0.83	0.89		
Item 3	3.92	0.80	0.90		
Information acquisition				0.81	0.60
Item 1	3.93	0.80	0.86		
Item 2	3.92	0.77	0.87		
Item 3	3.49	0.89	0.53		
Information evaluation				0.83	0.56
Item 1	3.67	0.76	0.72		
Item 2	3.85	0.74	0.77		
Item 3	3.82	0.75	0.77		
Item 4	3.82	0.72	0.74		
Awareness of information environment				0.90	0.69
Item 1	3.91	0.87	0.87		
Item 2	3.89	0.88	0.88		
Item 3	4.07	0.78	0.76		
Item 4	3.86	0.93	0.83		
Information use				0.80	0.50
Item 1	3.32	0.93	0.61		
Item 2	4.03	0.76	0.77		
Item 3	3.72	0.79	0.74		
Item 4	3.81	0.84	0.72		
Learning from information experience				0.80	0.50
Item 1	3.93	0.73	0.66		
Item 2	3.82	0.76	0.71		
Item 3	3.81	0.81	0.73		
Item 4	3.87	0.89	0.72		

AVE: average variance extracted.

7. Discussion

7.1. Relationship between information literacy and social capital

The aim of this article was to explore the relationship between information literacy and social capital as measures of individual and social constituents and outcomes of organisational knowledge processes. Social capital is the network of relationships possessed by an individual, and the set of resources that are possible to access through that network. Wisely used, these conditions and connections come with a potential to help to reach information and knowledge resources that are beyond the resources of an individual [18–20]. Although a positive connection between knowledge management,

Table 3. Intercorrelations of the latent variables for the first-order constructs.

	1	2	3	4	5	6	7	8	9	10	11
Access	**0.81**										
Awareness of information environment	0.25	**0.83**									
Information acquisition	0.29	0.38	**0.77**								
Information evaluation	0.18	0.24	0.34	**0.75**							
Information use	0.23	0.38	0.38	0.39	**0.71**						
Learning from information experience	0.21	0.29	0.30	0.39	0.65	**0.70**					
Norm reciprocity	0.50	0.45	0.29	0.18	0.41	0.36	**0.79**				
Referral	0.33	0.37	0.32	0.26	0.44	0.33	0.46	**0.86**			
Shared language	0.40	0.34	0.28	0.24	0.37	0.36	0.65	0.43	**0.82**		
Shared vision	0.49	0.40	0.27	0.16	0.40	0.36	0.75	0.37	0.68	**0.90**	
Trust	0.28	0.30	0.18	0	0.19	0.23	0.56	0.24	0.47	0.6	**0.82**

Bold numbers represent the square roots of the average variances extracted (AVEs).

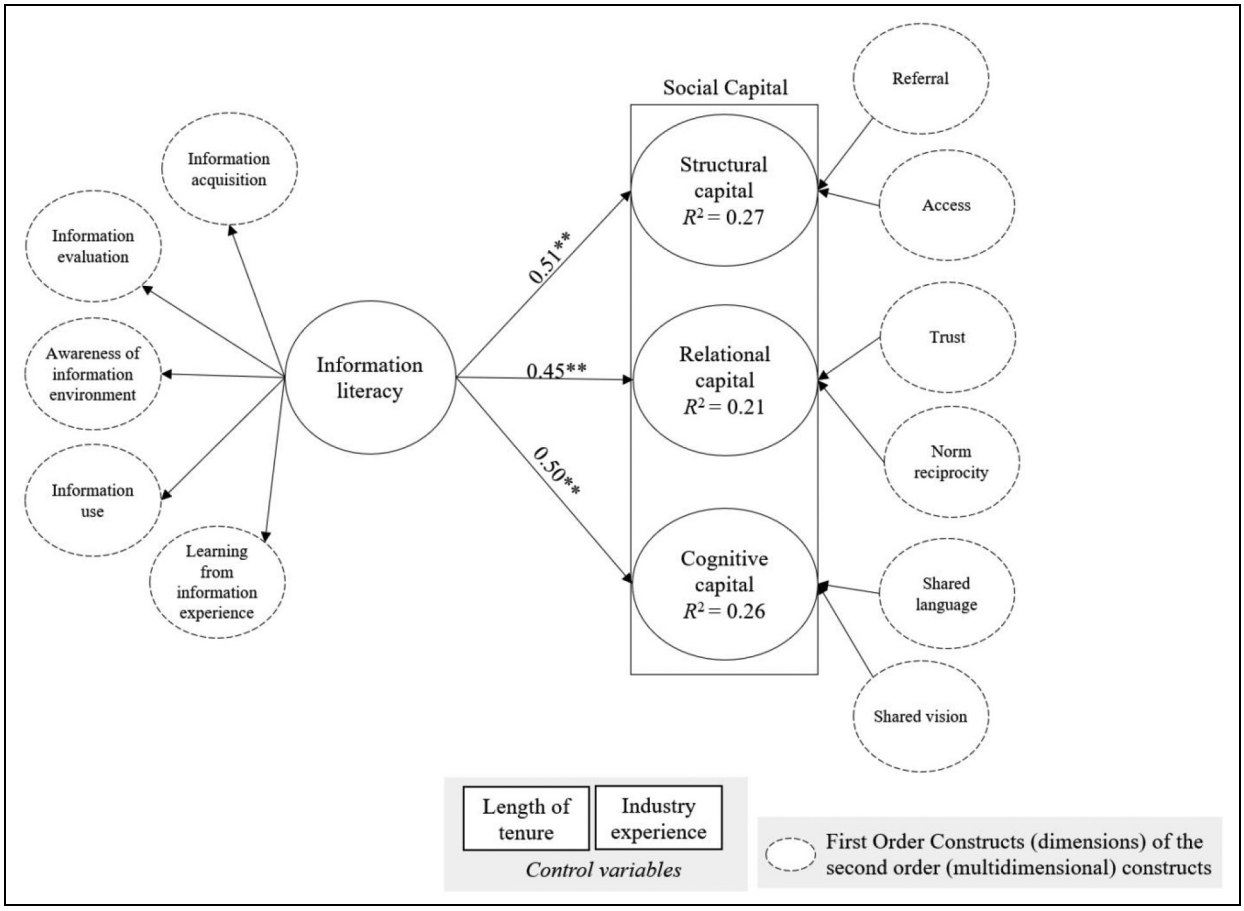

Figure 1. PLS analysis results.
$^{**}p < 0.01$ (two-sided test).

social capital and firm performance has previously been found [36,37], a more specific approach, focusing on the impact of employees' information literacy on organisational social capital, has not been studied earlier. This study has demonstrated clearly that information literacy is one of the factors that indicate capability to reach knowledge beyond the resources of an individual, that is, social capital. More concretely, the results indicate that a good understanding of

appropriate information handling skills support the development of social structures, directly helping an individual to access the right information at the right time, which is of crucial importance in today's business organisations. Information literacy further supports the development of trust and inclination to help each other, that is, factors that constitute the relational dimension of social capital. With a good ability to evaluate the reliability and trustworthiness of information sources (CILIP 2018), individuals are clearly better off in managing and utilising their social networks for decision-making and problem solving. Finally, information literacy has a positive effect on fostering a shared language and a common vision in the organisation, which is the cognitive dimension of social capital, and a prerequisite for reaching mutual goals. These insights also add to recent research that have shown information literacy to have an impact on innovative work behaviour [50,61], and technology use [62,63], building up hard evidence to the discussion that focusing on information literacy makes a difference.

This study has further shown that connecting information literacy with social capital makes a good framework for studying workplace information literacy. Although both concepts are complex and closely interconnected, they are established and much studied as separate frameworks. However, when explicitly brought and utilised together, they contribute to the much needed holistic understanding of the unfolding of ongoing negotiations between individual and social knowledge processes. Combining the information literacy and social capital perspectives also highlights how employees' information literacies are interlinked to each other, and how they are embedded in socio-cultural and socio-technical practice [27,28,31,32]. These insights are important for supporting employees to develop information strategies, involving interaction with both humans and technology for knowledge creation.

7.2. Information literacy management

The findings of this study contribute also to a better understanding of how to manage human resources and the information and knowledge processes employees are expected to be involved in. As knowledge management is concerned with the processes of creating, sharing, using and managing the knowledge and information of an organisation [64], the findings support the perception that information skills are crucial for developing social capital and reaching organisational aims.

Workplaces have a great need for people who are good at collaborating and sharing knowledge [32]. Considering that social capital has been proven to have a positive impact on business success [1,2], this study shows that an investment in information literacy is an investment in social capital too, and managing employee's information handling skills is a concrete step towards utilising organisational social capital and reaching positive outcomes.

Previous research has shown that an awareness of the workplace information culture is an important part of effective management of information sources [65–67] and coping with such information challenges as information overload [68]. The management and support of employees' information literacy should be aligned with organisation's information culture, understanding its particular information-related attitudes and values. Acknowledging the cultural aspect in connection to workplace information literacy can also help to design more concrete implementation and assessment frameworks [69]. A more holistic approach to information literacy is needed, where leadership aspects in connection to information handling is crucial [70], to show direction and facilitate especially the relational and cognitive dimensions of social capital.

7.3. Theoretical contributions

This study makes also an important theoretical contribution to information literacy research. It confirms that benefits of information literacy transcend boundary of education domain. Although this is a theoretically well-known premise, empirical evidence particularly in the context of workplace is still lacking. Second, by investigating the relationship between information literacy and different dimensions of social capital, this study sheds light on the critical role that information literacy plays in the development of one of the most important organisational operations' supporting factors, that is, social capital. Consequently, this study is so far one of the first studies along with the study by Podsakoff and Organ [49] that explains the direct impact of information literacy on knowledge-intensive organisations.

Theoretical elaboration of the information literacy field is also enhanced. Lack of strong empirical evidence regarding business value of information literacy is a key reason that, so far, information literacy has not been taken seriously among business professionals and management scholars [71]. At policy level, governments and such international institutions as the European Union have advocated for the benefits of information literate society. Nevertheless, the goal of information literate society can never be fully achieved unless concerted efforts are made to improve and update information literacy according to changing environmental needs beyond even education in the working life. Large-scale quantitative investigations such as this study make a major contribution to this end by providing evidence of the role of information literacy

in major organisational processes and by promoting cross-proliferation of ideas and interdisciplinary dialogue between information literacy and business management research.

8. Conclusion, limitations, and future research

This study has shown that there is a positive and significant connection between information literacy and social capital that, in turn, brings important insights about how to develop organisational social capital more effectively. Studying multi-dimensional concepts such as information literacy and social capital is, however, challenging and comes with some limitations. There is probably a mutual relationship between information literacy and social capital that brings some vagueness into how their effects work in practice. Further research is needed. For example, qualitative interviews could bring more clarity into the mutual relationship between structures, relations and information skills. Furthermore, for the time being, as there is no exact scale for measuring information literacy in workplace context, the respondents might only have a vague idea about what information literacy entails and would not know how well they are achieving in relation to any information literacy framework [29], but they can address how they value information skills, and the role of information management in relation to organisational outcomes.

This study has shown the relationship between information literacy and social capital on a general level. In future studies, it would be valuable to further extend the understanding and make additional comparisons such as whether there is a relation between information literacy, social capital and profitability of the companies or whether there are differences between specific sectors and branches. A qualitative approach would also be important to better explore different nuances in information literacy practices and how they affect social capital.

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Appendix 1

Table 4. Second-order information literacy construct and its association with first-order components.

Information acquisition	Information evaluation	Awareness of information environment	Information use	Learning from information experiences
$R^2 = 0.41$ $\beta = 0.64$ $p < 0.01$	$R^2 = 0.42$ $\beta = 0.65$ $p < 0.01$	$R^2 = 0.49$ $\beta = 0.70$ $p < 0.01$	$R^2 = 0.65$ $\beta = 0.81$ $p < 0.01$	$R^2 = 0.54$ $\beta = 0.74$ $p < 0.01$

Table 5. Second-order social capital constructs and its association with first-order components.

Structural capital		Relational capital		Cognitive capital	
Referral	Access	Trust	Norm reciprocity	Shared language	Shared vision
$R^2 = 0.74$ $\beta = 0.86$ $p < 0.01$	$R^2 = 0.58$ $\beta = 0.76$ $p < 0.01$	$R^2 = 0.72$ $\beta = 0.85$ $p < 0.01$	$R^2 = 0.84$ $\beta = 0.91$ $p < 0.01$	$R^2 = 0.81$ $\beta = 0.90$ $p < 0.01$	$R^2 = 0.87$ $\beta = 0.93$ $p < 0.01$