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Abstract: Our paper aims to analyze the role of ICT use in one's social and professional integration. In this perspective, we considered social integration from the social capital theory point of view. We studied how structural, cognitive and relational capital, using theorized key components, can be predicted by digital skills. We measured professional social capital (α= .80), based on two new dimensions: the first is recognition and interactions (α = .82), and the second is ties and network (α= .70). Regression analyses found significant relations between ICT use and professional social capital (β = .368, p < .001). Which leads us to conclude to a mediating effect of recognition of digital skills on social and professional integration and revisiting social capital as a potential and a result of recognition and interactions.

Keywords: social capital, organization, recognition, digital skills, ict use, quantitative

Introduction

The massive advancement of information and communication technologies (ICT) in all sectors of human organizations (professional, institutional, educational), has modified the relationships among its members (Kallinikos, 2007). From a socialization perspective, those tools have modified relations with one another, at the domestic level and professional level. Thus, new job market theories appeared, integrating the professional socialization dimension (Karlsson, 2017). ICT integration inside work organizations, economies and business models brings new human capital needs (Kowal & Paliwoda-Pękosz, 2017). New skills are required to integrate new professional networks and facilitate professional mobility and project building (Helsper & Van Deursen, 2015). Labour enables social inclusion thanks to a provided professional identity through social membership. Professional socialization is thus related to the integration into a workplace through the social and professional recognition qualification can bring. The purpose of this paper is to examine the role of ICT use in the recognition process of people's skills inside work organizations. Social capital literature provides great insight in explaining and defining this concept: a set of resources that the subject can transform into economic capital for Bourdieu (1986), Coleman (1990) and Lin (Lin, Cook & Burt, 2001), the collective value of all the individual's social networks for Putnam (2000), and a three dimension model (cognitive, structural and relational capital) proposed by Nahapiet and Goshal (1998). In comparison, little is written nor definitely arrived to a consensus concerning the social capital development process in the workplace: for example, Meng, Borg and Clausen (2019) found no evidence linking workplace intervention and social capital change. Instead, scholars insist on the importance of interpersonal processes in social capital construction (Adler & Kwon, 2002). This paper aims to focus on the role of interpersonal mutual recognition in this process, as it is seen as important factor of employee's well-being and relationships in the workplace (Clarke & Mahadi, 2015; 2017; Brun & Dugas, 2018). Mutual recognition is a key component of personhood (Laitinen, 2002) and almost entirely lies into micro encounters (Garrett, 2010). In a workplace context it can also be considered as the recognition of skills and competence (i.e. job performance, Clarke & Mahadi, 2015). In other words, what can the employee provide for the organization? Quality interpersonal professional interactions will be studied as a form of recognition (employee – employee and supervisor – employee) as well as employees' social ties and network, those two dimensions being considered as components of social capital (i.e. relational and cognitive capital and structural capital, Nahapiet & Goshal, 1998). We will examine the role of digital skills, as requirements in today's organizations,

recognition and social capital. More precisely, could mutual recognition in a social group be the key to understanding the relationship between social and professional integration and digital skills? Structural equation modelling (SEM) will be used to answer this question. We conducted a study in the Lebanese context, which is characterized by a relatively young population hit by a high rate of unemployment and mismatch between employment and skills (Dibeh, Fakih & Marrouch, 2019) and where digital skills constitute human and economic issues. Low quality of vocational ICT trainings discourages firms from hiring young fresh graduates (UNDP, 2016 cited by El Saheli-Elhage & Lakkis, 2019). As a research led amongst students of the American University of Beirut showed that digital and media literacy help them understand the field and make intelligent career choice (Melki, 2014), Lebanon active population's digital skills seem like an important issue that led us to choose this context for our study.

Social capital and organizations

According to Weber (1971), the social subject possesses three types of possible resources they can use to enhance their living conditions: economical resources, political resources and symbolic resources (social relations). Bourdieu (1985) considers that, to reach their goals, an individual not only uses material means and personal abilities, but also social relations available to them (from their family, community or professional background). Those resources are their social capital. With Coleman (1990), they consider this social capital to be the product of social interaction throughout time. It is within a social structure that individuals influence one another through interactions that must reach a certain intensity and stability over time. Coleman refers the concept of social capital to social obligations and expectations and relationships of trust within members of an organization, and to the access to information, and accepted standards and sanctions by members of the organization.

Social capital is a significant factor to be considered in work organizations: it contains aspects of a firm's social context such as interaction and social ties (Ortiz, Donate & Guadamillas, 2018), which refer to the structural social capital as defined by Nahapiet and Ghoshal (1998). The two other dimensions defined by the authors are the relational social capital (trusted relationships, shared norms and obligations) and the cognitive social capital: "identification of shared values and common assumptions developed by members (agents) of a network that are shown at individual and group levels" (Nahapiet & Ghoshal, 1998). All three dimensions act as drivers for knowledge acquisition (Andrews, 2010; Meléndez, Obra, & Lockett, 2012; Ben-Hador, 2017; Ortiz, Donate & Guadamillas, 2018). ICTs, by allowing interactions between individuals, and between individuals and communities

of individuals, can influence the social actor's accessible social network, and can also enable them to consider these relationships as resources that can be mobilized towards a personal goal (Chaker, 2011).

ICTs, skills, organizations

Through their use, ICT develop users' skills, as much as they require them (Chaker, 2013). Digital skills are not limited to technical skills, as they should also incorporate in their definition communication and socio-emotional skills (Van Dijk & Van Deursen, 2014) for instance for the use of social media. This necessity, along with experience, leads the individual to appropriate uses in a new organizational and communicational context (Heath, Knoblauch & Luff, 2000), and to develop new automatisms which require answers to specific professional needs, and to a new demand on the labour market (in relation to new specializations that ICT implantation leads to). Today's work organization model requires digital skills, and a flexible approach from the user for them to accept technology (Yarbrough & Smith, 2007). Access to information, afforded by ICT, leads the individual, mobilizing resources within their reach, to possess knowledge capital, which could contribute to their personal enrichment, and be perceived by the world of business as a personal quality, that they could put to use in their professional environment: according to Heath, Knoblauch & Luff (2000), "tools and technologies, and other features of the local environment are brought to bear, and are reflexively constituted in action and interaction within the workplace. (…) talk and interaction are embedded in the material environment". Computer, exchange and information-seeking tools, can be used in both the personal and professional spheres, as the effects in terms of impact on skills and performance of domestic use can apply on a professional level (Zinnbauer, 2007): computer skills and fluency with software applications learnt through training or on a personal level, can help the individual to find a job which requires adequate skills, or enable their professional mobility, and flexibility facing organizational changes, faster decision making, innovation and achievement capacity, and performance enhancement. Information seeking can offer them a knowledge capital they can use for job seeking, as well as in a professional capacity (monitoring, knowledge sharing, information-seeking and dissemination, capitalization of knowledge…) and to retrieve critical information and events (Heath, Knoblauch & Luff, 2000). Private human interactions can also be mobilized for job seeking, and professional human interactions can facilitate exchange and sharing on a professional level (Heath, Knoblauch & Luff, 2000). The authors also suggest that tools and artefacts contribute to the emergence of complex forms of interaction. ICTs are a structural component of today's work organizations. In 2002,

Bresnahan, Brynjolfsson & Hitt already wrote that organizations need to adapt to IT-based changes, as this constitutes a standing requirement of the modern firm, which results from a lasting shift in labour demands. Workplace studies (Heath, Knoblauch & Luff, 2000) must shed light on how the use of technologies can support co-operative work. Whipple, Wiedmer & Boyer (2015) explain for example that a high level of organizational social media assimilation from employees is associated with a high level of structural and cognitive capital of an organization. In our study, we limit ourselves to the technical use of ICTs, as we want to focus on the link between the technical use of digital tools and social capital and recognition, without integrating soft skills (communicational and informational skills) (van Laar et al., 2017) into the ICTs variable. Our goal is to analyze to what extent technical skills can lead to social outcomes.

Theory and research indicators

In this section, we will present the theoretical background we used to compile the questionnaire for our study. All the items were originally written according to the literature review below. The items that were created for this research feature in italics, in keeping with the related theoretical background. Many items have several theoretical links, as they were written to relate to several issues raised by our literature review, while at the same time keeping the item numbers low for practical reasons. Only items kept in the final version of the questionnaire feature in this section.

Intra and extra-organizational structural social capital

The structural dimension of organizational social capital relates to collaboration, coordination, and interaction between members of an organization (Tantardini & Kroll, 2015). It comprises the connection between individuals of a social group (Adler and Kwon, 2002). It also refers to the degree of interconnection and structure in terms of density or closure of a network (Reagans and Zuckerman, 2001). Furthermore, it makes information and knowledge available for workers and units, "thus increasing its use for managerial decision making" (Tantardini & Kroll, 2015).

There is a link between structural social capital and external knowledge acquisition (Yli-Renko, Autio & Sapienza, 2001; Maula, Autio & Murray, 2003; Presutti, Boari & Frattochi, 2007; Laursen, Masciarelli & Prencipe, 2012; Zhou et al., 2014; cited by Ortiz, Donate & Guadamillas, 2018). This external knowledge can be used by the company (Ortiz, Donate & Guadamillas, 2018) to expand its knowledge base, enhance recognition of opportunities but also threats, gain access to new markets and develop technological capabilities and innovative environments (Danneels, 2008;

Lopez-Saez et al., 2010; Garcia-Sanchez, Garcia-Morales & Criz-Gonzales, 2010; cited by Ortiz, Donate & Guadamillas, 2018). Faccin, Genari & Macke (2017) note that the most reported extra-organizational resource is related to information. For the authors, "the network can also be an important repository of ideas for creating new products, processes, management tools or even market performance". Relationships with external agents are also, according to Manev et al. (2017), an important source of social capital, as they can represent new opportunities.

Related questionnaire items: You have a lot of professional contacts outside and inside your workplace and Your job allows you to reach a significant social network.

Cognitive social capital

Intra-organizational social capital

According to Tantardini and Kroll (2015), "cognitive social capital refers to the capacity of the organization to share the same vision, mission and goals among members". It relates to shared goals, norms and values among employees of the same organization, and refers to the "willingness and ability to define collective goals that are then enacted collectively" (Leana & Van Buren, 1999). Communication inside organizations can be addressed using Habermas' communicational rationality, which results from the game of social norms between members of a professional community. This rationality underlies behaviours of cooperation, mutual aid, and knowledge sharing, which are necessary to productivity in organizations. In modern, industrialized, and capitalist societies, communicative action participates in the employee's social integration inside the organization, as newcomers learn about tasks and social norms through socialization processes (Myers & Sadaghiani, 2010). Organizational social capital can be enhanced if communication is used to acquire and transfer knowledge (Adler & Kwon, 2002), which can be an opportunity for members to learn and cooperate with each other (Tsai, 2001). The item *Your colleagues and superiors ask for your intervention to solve important issues* verifies the mutual aid dimension as well as a form of recognition of one's professional skills and knowledge.

Decentralization and information transfer

As mentioned by Jiang and Liu (2015), decentralization in organizations, or, in other terms, participative decision making from the employees, can facilitate the development of knowledge and information: "Decentralized decision-making practice encourages employees to involve themselves in the organizational activities and allows many minds to work simultaneously on the same problem". Hence the item *You are allowed to make*

your own decisions. They also cite Malone (1997; 2004), who proposed that "when upper managers delegate decision-making responsibilities, managers' spans of control become wider, creating a more lateral flow of information", or what we call horizontal transfer of information. Furthermore, "more shared information and opinions among employees and bottom up information", or what we call vertical transfer of information, enhances the cognitive system, or in other words impacts the cognitive dimension of organizational social capital, facilitating communication. According to Bitektine (2011), it is easier (in terms of cognitive cost) to "borrow" judgments from someone else than to make one's own. Hence the items: *Your colleagues ask for your advice on important topics* and *Your superiors ask you for advice on important topics*. We can notice here the importance of mutual recognition.

Intra and extra-organizational relational social capital

Relational social capital refers to the nature and characteristics of relationships (Jiang & Liu, 2015), and to the level of trust and reciprocity between individuals within an organization (Nahapiet & Ghoshal, 1998). According to Shockley-Zalabak, Ellis & Winograd (2000), trust is the "positive expectations individuals have about the intent and behaviours of multiple organizational members based on organizational roles, relationships, experiences, and interdependencies". For Tantardini & Kroll (2015), trust can be used in explaining information exchange within an organization. As they recall, trust according to Putnam (1993), "enables participants to act together more effectively to pursue shared objectives". It can become an essential intangible asset to maintain inter-organizational relationships (Ortiz, Donate & Guadamillas, 2018). Trust allows key agents to access knowledge exchange (Nahapiet & Ghoshal, 1998), and influence the level of commitment between them for knowledge sharing (Sanzo *et al.,* 2012). Interacting peers can provide information and insight about the company performance that a supervisor might not have directly (Woehr, Sheehan, & Bennett, 2005), especially given that expertise knowledge is sometimes more prevalent at employees' than supervisor's (Artz, Goodall & Oswald, 2015) level. According to Jiang & Liu (2015), employees may indeed possess more specific expert knowledge than a manager: peers can help provide a more accurate performance evaluation, hence the need for vertical transfer of knowledge. Horizontal transfer of knowledge is also important: interpersonal social relationships within the firm are important organizational resource (Collins & Clark, 2003; Hansen, 1999; Nahapiet & Ghoshal, 1998; Uhl-Bien, Graen, & Scandura, 2000; cited by Jiang & Liu, 2015). Related questionnaire items: *Your colleagues ask for your advice on important topics*

and *Your superiors ask for your advice on important topics*, that look at both the cognitive and relational capital dimensions.

Intra and extra-organizational personal social capital

An employee's social relationships can add value to their organization providing access to their network ties, as greater sources of information (Collins & Clark, 2003). It can lead to a more flexible work organization (Leana & Van Buren, 1999) and enhance organizational intellectual capital (Nahapiet & Ghoshal, 1998). Furthermore, employees' social capital can be an asset for organizations: according to Ortiz, Donate and Guadamillas (2018), networks, as firms' external factor, can be considered as a source of social capital and an enabler for external knowledge acquisition. Garcia-Sanchez *et al.* (2017) explain how ICTs can help enhance improvements in a firm's ability to acquire external knowledge, as those technologies promote organization members' capabilities to interact with, locate and acquire knowledge in an open culture. Mobile technology provides flexibility and ability to work from outside normal office hours (Towers *et al.,* 2006). With this erasure of boundaries between professional and personal spheres, individuals can mobilize their personal social capital, in terms of knowledge and resources, for a professional purpose (Chaker, 2013). Questionnaire items: *You experience a lot of human contacts inside your workplace* and *Your job allows you to reach a significant social network.*

Skills and personal capital

According to Zinnbauer (2007), ICT skills are often learnt through our immediate social circle (family, friends, colleagues). Those adults "rely to a large extent on social support networks to be familiarized with new ICT devices and digital competences". He adds that networks of professionals or colleagues provide an important platform to access, share, discuss and collectively develop practical – or digital – skills. According to Bourdieu (1979), as recalled by Blasius & Friedrichs (2003), practical skills are a form of knowledge that can in theory be converted into social capital. In consequence, practical skills and personal performance can be considered as means to enhance one's social position in their social network (Blasius & Friedrichs, 2003). Helping others might then be a key to understanding and analyzing interpersonal interactions, inside and outside professional organizations. The notion of service rendering could then be understood as a technical support. According to Blau (1960), rendering services leads to social attractiveness. In their social circle, an individual can act as an "institutional agent" as suggested by Stanton-Salazar (2011). It is a form of social integration: "Whether consciously or unconsciously, such agents are oriented toward rendering services and providing institutional support"

(Stanton-Salazar, 2011). Related item: *Your job allows you to render services around you*, which would refer to social integration via social status.

ICT use

The ICT use items were also originally written by the author. We mainly focused on Internet use (three items: *Social media*; *Information websites*; *e-commerce*, or four possibly with *Leisure*) as well as the most commonly used in a professional context and most disseminated software: *office software* (without specifying the brand). *Frequency* was also questioned to timely quantify computer use. Those items related to private use, but also professional use. We didn't specify the context of use of those tools, as, in line with our theoretical background, considering the progressive loss of boundaries between the private and professional spheres, digital skills can be developed and used in both contexts. As Van den Hooff, De Ridder & Aukema (2004) point out, ICT play a critical role in the knowledge-sharing processes as we saw, inside organizations and from a social capital perspective, "it is essential to analyze the effects that ICT can have on such processes". Knowledge transfer being a key component of the cognitive and relational dimensions of social capital, as we have seen.

Research questions

Based on this theoretical framework, our main research questions are:

RQ1: What role do digital skills play in the recognition of professional and social competences?

RQ2: Is there a link between recognition and social capital?

Hence our measuring tool is conceived by linking the concepts of linkage and integration to recognition. In order to deal with this question, it's necessary to conduct an investigation in a context of an active population working in organizations.

Method

Sample

The study was conducted among an active Lebanese population (18-47 years old) using the snowball sampling (Goodman, 1961). We distributed printed versions of the questionnaire containing the items presented in the previous section and asked it to be distributed inside different organizations as well as online versions. We solicited personal and professional acquaintances to distribute the questionnaire among different social and professional contexts. We chose different sectors in order to reflect the diversity of qualifications: banking, informatics, insurance, health and

education sectors. The language used was French. Arabic or English was sometimes orally used to clarify certain questions, on demand. We didn't specifically cleaned out our data previously to the statistical analyses, as we plan to remove possible outliers during the inferential statistical tests stage involving our research variables. Our sample is N = 407 (F=53%) with a mean age of M = 28.09; SD = 4.4.

Procedure

We will first conduct factorial analyses to examine the structure of the responses to the items and to verify the validity our tool which aim is to establish a statistical relationship between the three main concepts we introduced and constituting our research questions: recognition, skills and interactions. The validity of this tool will allow us to conduct further analyses putting to test the nature of the relationship between those concepts and other variables such as gender, age and social and professional categories. We will address RQ1 and RQ2 by executing a structural equation modelling, which will allow to study the relationships between digital skills, recognition and social capital.

Measures

The questionnaire contains the items we presented in the section 3. For the purpose of this paper, the items are translated into English by the author, the original version being in the appendix. For all the items, the subjects had to answer on a 4-point Likert scale ranging from 1 = I do not agree to 4 = I definitely agree. The same rating method was used for the ICT use items: from 1 = rarely/never to 4 = intensively. The original version of the questionnaire contains fourteen items.

Results

The structure of the exploratory factorial analysis

We conducted exploratory factorial analyses (EFA) with Varimax Rotation, with fourteen items about social and professional capital. (table 1) After removing items with factor loading below .32, only nine were retained, for a final two-factor model structure (table 1): Kayser-Meyer-Olkin's measure of sampling adequacy = .84, Bartlett's test of sphericity = 854.4, $p < .001$. The assumptions for the EFA are thus met. The Eigenvalue = 1.532 and the model explains 56.22% of the total variance. The first factor is "recognition and interaction" (*RI*) (with five items with factor loadings from .700 to .781, α =0.82). The second factor is "ties and networks" (*TN*) (with four items with factor loadings from .656 to .757, α = .70). The two-factor model of "professional social capital"'s (*PSC*) α = .80. Table 1 shows the rotated

component matrix of our instrument, with the details of each item. It indicates which definition of social capital each item is referring to features in italics. We also indicated with an "x" mark inside the columns, to indicate the dimension of social capital (structural, cognitive of relational social capital) it relates to.

Based on our literature review and the structure of the EFA, we can summarise two main dimensions which cover the accepted dimensions of social capital from Nahapiet and Ghoshal (1998), in the specific context of intra and extra-organizational social capital and personal social capital, to explain how those three contexts can interact with each other. Those considerations are in keeping with Widén-Wulff and Ginman's observation (2004): "research on social capital and research on both information behaviour and knowledge management (…) overlap greatly". Our explanation matrix gives rise to a new scale that measures professional social capital, which will be put to a linear regression test with ICT use predictors.

Table 2 displays the EFA for the kept items of *ICT use* (α = .70).

Confirmatory factorial analyses

We used various measures of fit to find out to what extent our model explains the data: the chi-squared degrees of freedom ratio (χ^2/df), the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI) and the root mean square error of approximation (RMSEA). Hu and Bentler (1999) consider that a value greater than .95 is preferable for the CFI and the TLI, whereas for Bentler (1992) and Schumacker and Lomax (1996), a value greater than .90 is sufficient. Hu and Bentler (1999) also suggest that the RMSEA should be equal or lower than .06. The Confirmatory Factorial Analyses (CFA) indicated that our data excellently fit a two-factor model for *Professional Social Capital*: χ^2/df = 1.04, p < .407; TLI = .99; CFI = .99; RMSEA = .014. As for *ICT use*, the CFA indicated that our data also excellently fit a single-factor model: χ^2/df = 1.37, p < .194; TLI = .96; CFI = .98; RMSEA = .042. These CFA results allow us to compute a mean score for each of our research variables and use it for the rest of our statistical analyses.

Theorization of our model: social capital as recognition and interactions

Performance recognition, as a sense of mutual identification (Ricoeur, 2005), can act as a driver of knowledge identification and acquisition in the network (Nahapiet & Ghoshal, 1998). This relates to both the relational (high levels of trust, shared norms and perceived obligations) and cognitive dimension (shared resources and shared representations) of social capital respectively. According to Hollenbeck and Jamieson (2015), by "asking employees questions about how they go to for advice and expertise or who helps them", it is possible to measure the performance of an organization in

a meaningful way. This knowledge transfer-based logic led to us reconsider the social capital approach when applied to a professional context, which gives way to the recognition concept (Honneth, 1996) inside organizations. Social recognition is thus firstly the recognition of one's action and social activity within society or a given organization, and, by extension, economic activity and utility. It is also the need for integration within the social link due to man's gregarious nature. Social and professional inclusion is thus a response to the social actor's need for social recognition. Mutual recognition between social subjects can represent an important resource for social capital, in the form of institutionalized relationships (Bourdieu, 1980). The more they adhere to mutual recognition, the better the chances of increase in social capital (Maak, 2007), hence the belonging to the relational and cognitive dimension of social capital. Indeed, the first five items draw interconnecting links between professional recognition (such as recognition of skills and competence), knowledge transfer and employee professional integration inside the organization.

Theorization of our model: social capital as ties and network

The structure of a social network can be used to study team communication networks and find lapses and bottlenecks in the communication process, such as individuals isolated from the internal information and knowledge network (Hollenbeck & Jamieson, 2015). According to Zinnbauer (2007), productivity can be increased thanks to collaborative work, innovation and information flows, through the internal organization network between colleagues, which represents an important communication and interaction infrastructure. According to Ben Hador (2017), social relations happen from micro (individual) to macro (societal) levels and are important variables for understanding what the possibilities for optimization of the organizational work capacity are (Inkpen and Tsang 2005; Han, 2006). Items 6 to 9 relate to the structural and relation dimensions of social capital: the importance of one's private and professional social network, and how it is mobilized qualitatively in a social and professional integration purpose. Leenders and Gabay (2013) highlight the importance of the local professional environment in one's extra-organizational social capital.

Table 1 - Exploratory factorial analysis for Professional Social Capital

				Professional Social Capital		
				Dimensions		
Items	**Theory and references**	**α**	**Factor loadings**	**S**	**R**	**C**
Recognition & interactions		.82				
1. You are allowed to make your own decisions	Decentralization (Yang Jiang & Liu, 2015; Malone 1997, 2004)		.700			x
2. Your colleagues ask for your advice on important topics	horizontal information (Malone 1997, 2004) & knowledge transfer (Johnson & al., 1981; Qin, Johnson, & Johnson, 1995; Sanzo *et al.*, 2012), trust (Putnam, 1993)		.753		x	x
3. Your superiors ask for your advice on important topics	vertical information (Malone 1997, 2004) & knowledge transfer (Sanzo *et al.*, 2012), trust (Putnam, 1993)		.780		x	x
4. Your colleagues and superiors ask for your intervention to solve important issues	skill congruence and trust (Putnam, 1993)		.781		x	x
5. Your colleagues and superiors value your remarks and opinions	value congruence (Tsai and Ghoshal, 1998), trust (Putnam, 1993)		.719		x	x
Ties & network		.70				
6. You have a lot of professional contacts outside and inside your workplace	internal knowledge, external knowledge, strong ties (Tsai & Ghoshal, 1998)		.709	x		
7. You experience a lot of human contacts inside your workplace	Trust (Putnam, 1993), personal social capital (Zinnbauer, 2007), strong ties (Tsai & Ghoshal, 1998)		.757	x	x	
8. Your job allows you to reach a significant social network	personal social capital (Zinnbauer, 2007), external knowledge		.741	x		
9. Your job allows you to render services around you	personal social capital (Zinnbauer, 2007), social status (Blau, 1960; Stanton-Salazar, 2011)		.656		x	
Professional social capital		.80				

C = cognitive; S = structural; R = relational

Table 2 - Exploratory factorial analysis for ICT use

Items	**α**	**Factor loadings**
News website		.781
Social media		.714
Office software		.629
Frequency		.608
Leisure		.558
E-commerce		.514
ICT use	.70	

Descriptive statistics

We found relatively moderated means for all three indicators: M_{PSC} = 2.41; SD = .51; M_{RI} = 2.65; SD = .68 and M_{TN} = 2.12; SD = .56. Kolmogorov-Smirnov (D = .066 ; p < .001) and Shapiro-Wilk's (W = .990; p = .026) tests suggests that the *PSC* score's distribution violates normality, which is not unusual for large samples (Pallant, 2007). However, the visual inspection of the Q-Q plot as reproduced in figure 1 displays a satisfactory shape for parametric tests (Elliott & Woodward, 2007).

Figure 1 - Normal Q-Q Plot of PSC

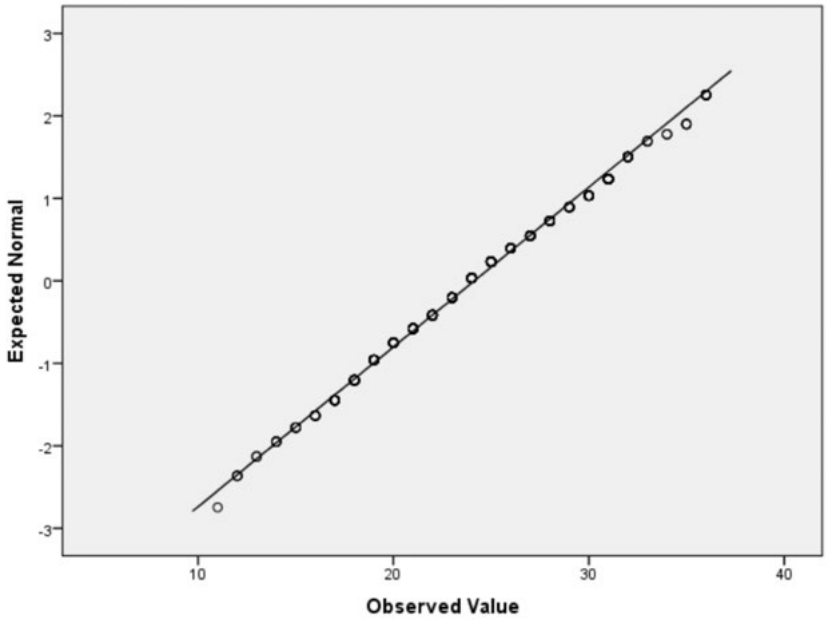


Table 3 - Descriptive statistics and correlations

	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1.	Age	28.09	4.4												
2.	Sex	1.54	.50	-.080											
3.	SPC	3.45	10.03	.033	-.074										
4.	ICT use	2.90	3.12	-.044	-.085	.164**									
5.	Social media	3.08	.82	-.107	-.007	.066	.697**								
6.	News websites	3.45	.67	-.009	-.035	.063	.706**	.447**							
7.	e-commerce	1.63	.88	.063	-.068	.229**	.595**	.310**	.262**						
8.	Offices oftware	3.30	.81	.063	-.071	.160**	.632**	.263**	.371**	.250**					
9.	Leisure	2.89	.86	-.153*	-.147**	.129*	.596**	.389**	.300**	.257**	.185**				
10.	Frequency	3.08	.86	-.023	.008	-.029	.618**	.279**	.439**	.149**	.372**	.128*			
11.	PSC	2.41	.51	.183**	-.126*	.274***	.368**	.224***	.283***	.271***	.367**	.007	.261**		
12.	RI	2.65	.68	.193**	-.084	.241**	.334**	.180**	.288***	.231***	.378***	-.052	.265***	.893***	
13.	TN	2.12	.56	.094	-.150**	.198**	.253**	.204**	.141*	.231**	.185**	.099	.108	.792**	.350**

Sex: 1 = male, 2 = female (1 = 47%, 2 = 53%); SPC (social and professional category): 1 = worker, 2 = farmer, 3 = employee, 4 = executive or higher intellectual professions, 5 = merchant or entrepreneur or craftsman

**p < 0.05. **p < 0.01. ***p < 0.001*

Table 3 shows the descriptive statistics and correlations between all variables. The results point to a relevant and significant correlation between *PSC* and *ICT use:* $r = .368$, $p < 0.01$. *PSC* is also separately significantly correlated with all the *ICT* items, except leisure. If we look closely at social capital, both subscales are also significantly correlated with *ICT* use (*RI:* $r = .334$, $p < .01$ and *TN:* $r = .253$, $p < .01$), with a more significant contribution to the social capital global correlation index from *RI*.

Analysis of variance tests

While analyzing the data for our two subscales, we excluded data lines with missing values, as well as multivariate outliers using Mahalanobis' distance (max = 16.087), Cook's distance (max = 0.04) and Centred Leverage Value (max = 0.52) which translated into excluding 23.34% of the participants (reducing sample size from N = 407 to N = 312) from all the subsequent analyses.

We conducted analyses of variances (ANOVA) tests between *ICT* use and *Age*, *Sex* and *Socio-professional Category* (*SPC*) (as independent variables) and the *PSC*, broken down into *RI* and *TN* dimensions (as dependent variables). The results are given in table 4: they display significant results between the *RI* and *ICT* use [$F(12, 300) = 4$, $p < .001$, $\eta 2 = .138$], and all *ICT* items (except *Leisure*) and with *Age* [$F(20, 290) = 2.48$, $p < .05$, $\eta 2 = .146$] and *SPC* [$F(5, 303) = 7$, $p < .001$, $\eta 2 = .122$]. *TN* depends also significantly on *ICT* use: $F(9, 302) = 2.75$, $p < .001$, $\eta 2 = .076$. It depends on all *ICT* items but *Leisure* and Frequency. There is also a significant link between *TN* and *Sex*: $F(1, 310) = 7$, $p < .05$, $\eta 2 = .022$, and between *TN* and *SPC*: $F(5, 301) = 4.5$, $p < .001$, $\eta 2 = 0.084$. As for the *PSC* variable, like *RI*, it presents dependency with *ICT* use [$F(22, 289) = 3.85$, $p < .001$, $\eta 2 = 0.227$], and all its items except *Leisure*. It also depends on *Age*: $F(20, 292) = 2.24$, $p < .05$, $\eta 2 = .135$; and *Sex*: $F(1 , 311) = 4.95$, $p < .01$, $\eta 2 = 0.016$; and *SPC*: $F(5 , 300) = 9.2$, $p < .001$, $\eta 2 = .157$. Nevertheless, effect size is greater from *ICT* use on *RI* (14.2% of the variance explained) than on *TN* (7.6% of the variance explained). It reflects the effect size of *PSC*: 22.7% of the total variance explained. The relatively smaller effect sizes in *TN* shows that *ICT* use has a more significant effect on *RI*. We expect then a smaller coefficient from *ICT* use on *TN* than on *RI*, from the linear regression test. The ANOVA table also shows significant dependency between *ICT* use and *SPC*: $F(5, 307) = 3.79$, $p < .01$, $\eta 2 = .07$. It is a small (7% of the total variance explained) but significant effect. No significant effect was conversely found between *ICT* use and *Age*, and *Sex*. We can conclude, at this stage, on a significant effect from technology on demographic and social capital variables.

Table 4 - ANOVA table

	ICT use		**RI**		**TN**		**PSC**	
	F	η^2	**F**	η^2	**F**	η^2	**F**	η^2
ICT use			4.00***	.138	2.50***	.06	3.85***	.27
Social media			4.08**	.038	4.50**	.043	5.73**	.053
News websites			11.06***	.097	2.80*	.027	10.61***	.094
e-commerce			6.11**	.056	5.80**	.053	8.38***	.076
Office software			17.58***	.146	4.4**	.042	15.6***	.140
Leisure			1.00		1.80		1.00	
Frequency			8.17***	.074	1.60		7.76***	.071
SPC	3.79**	.07	7.00***	.122	4.50***	.084	9.2***	.157
Age	.87		2.48**	.146	1.00		2.24**	.135
Sex	2.26		2.20		7.00**	.022	4.95*	.016
α	.70		.82		.70		.80	

Age: 1 = male, 2 = female; SPC: 1 = worker, 2 = farmer, 3 = employee, 4 = executive or higher intellectual professions, 5 = merchant or entrepreneur or craftsman

**p < 0.05. **p < 0.01. ***p < 0.001*

Linear regression tests: is ICT use a predictor of professional social capital?

We conducted two regression analyses, both with entry mode, each time breaking down the *PSC* variable, as the predicted variable, into the two subscales composing it: the *RI* subscale and the *TN* subscale (table 5). The first analysis is a multiple linear regression, the independent variables being the six *ICT* variables, plus *age*, *sex*, and *SPC*. The second is a simple linear regression using the *ICT use* variable, computed as explained above, as the predictor of *PSC*.

Table 5 - Linear regression table: Predictors of professional social capital

Predictors	**β RI**	***p***	**β TN**	***p***	**β PSC**	***p***
Multiple linear regression						
Age	.142	.005	.077	.171	.142	.005
Sex	-.063	.213	-.131	.019	-.102	.042
SPC	.189	.000	.140	.014	.214	.000
Social media	.088	.135	.162	.014	.136	.021
News websites	.139	.022	.006	.930	.112	.064
e-commerce	.098	.075	.126	.039	.120	.030
Office software	.226	.000	.065	.295	.197	.001
Leisure	-.212	.000	-.032	.603	-.168	.003
Frequency	.115	.044	.012	.854	.106	.064
F	12.88	.000	21.85	.000	13.22	.000
R^2	.281		.128		.288	
N	307		306		304	
Simple linear regression						
ICT use	.334	.000	.253	.000	.368	.000
F	39.16	.000	21.2	.000	48.32	.000
R^2	.112		.064		.136	
N	312		312		304	

Age: 1 = male, 2 = female; SPC: 1 = worker, 2 = farmer, 3 = employee, 4 = executive or higher intellectual professions, 5 = merchant or entrepreneur or craftsman
RI = recognition and interaction; TN = ties and network; PSC = professional social capital

Multiple linear regression

The Variance Inflation Factor test result is acceptable (for all the dependent variables: 1.066 < VIF < 1.359), which verifies the assumption of non-multicollinearity. The results of the multiple linear regression show that age and *SPC* are predictors of *PSC* (respectively β = .142, p = .005; β = .214, p < .001), while *gender* shows a negative relationship (β = -.102, p = .042). As for the *ICT* predictors: *social media* (β = .136, p < .001), *e-commerce* (β = .120, p = .021), *office software* (β = .197, p = .001) and leisure (β = -.168, p = .003), indicate significant prediction of *PSC*, with a negative relationship for the last one, with a global R^2 = .288 and a significant F score (F = 48.32, p < .001). *News website* and *frequency* do not constitute a significant predictor of SPC (β = .112, p = .064 and β = .106, p = .064).

If we look closely at the structural dimensions of *SPC*, the *RI* variable is significantly predicted by *age* (β = .142, p = .005) and SPC (β = .189, p < .001) but not by *gender* (β = -.063, p = .213). Conversely to the *PSC* score, *RI* is significantly predicted by *news websites* (β = .139, p = .022) and *frequency* (β = .115, p = .044), but not by *social media* and *e-commerce*. However, they have in common a significant relationship to *office software* and *leisure*, with an overall R^2 = .281 and significant F score (F = 12, p < .001).

As for the *TN* variable, *gender* (β = -.131, p = .019) and *SPC* (β = .14, p = .014) are significant predictors, conversely to age. From the *ICT* items, only *social media* (β = .162, p = .014) and *e-commerce* (β = .126, p = .039) are significantly related to *TN* (conversely to RI). The only *ICT* variables that are not significant for the *PSC* score are *news websites* and *frequency*: they are significant predictors of *RI*, but not strong enough to survive within the global social capital (*PSC*) score.

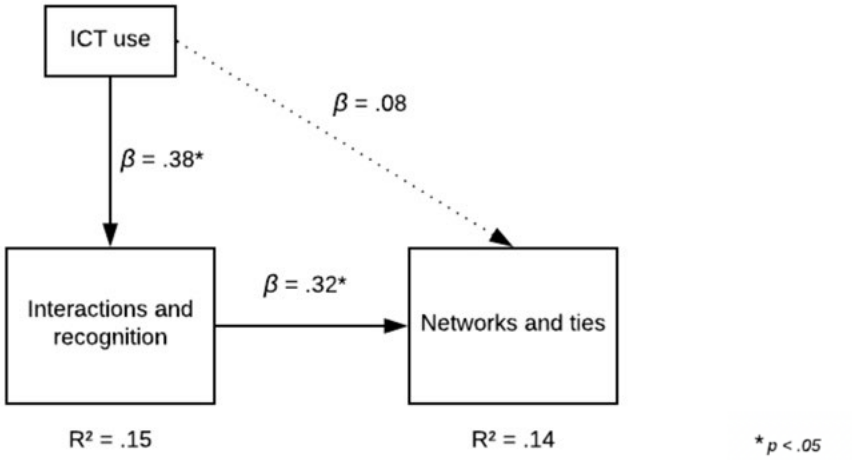
Simple linear regression

The Variance Inflation Factor test result is acceptable (VIF = 1), which verifies the assumption of non-multicollinearity. The simple linear regression shows an *ICT use* variable as a significant predictor of *PSC* (β = .368, p < .001), with R^2 = .136, and F = 48.32, p = < .001. The test results also show a stronger effect from *ICT* use on *RI* (β = .334, p < .001, R^2 = .112, F = 39.16, p < .001) than on *TN* (β = .253, p < .001, R^2 = .064, F = 21.2, p < .001), in line with the effects sizes shown by the results of the first ANOVA tests we conducted.

Structural equation modelling

Finally, we conducted a structural equation modelling (SEM) to examine the causality structure and intensity of the pathways between our research variables (fig 2).

Figure 2 - ICT use, recognition and network causal model



CFA indicate that our data fits very well the model: $\chi^2(1) = 1.19$, $p = .275$; TLI = .97; CFI = .99; RMSEA = .030, 90%. The model shows significant effect from I*CT use* ($\beta = .38$; $R^2 = .15$) on *interactions and recognition*, which in turn interacts significantly with *networks and ties* ($\beta = .32$; $R^2 = .14$). No significant relationship was found between the latter and *ICT use*. Thus, these findings lead us to assume that *ICT use* plays an indirect effect on *network and ties*, by the mediation of socialization inside workplace and recognition of skills. Interpersonal interactions develop trust and relationships inside organization: this mutual recognition between employees and between employees and superiors, lead to the recognition of skills and competence, which in turn extend this primary social capital into an extended network of ties and relations, the structural dimension of social capital. Network and ties cannot be developed by technological skills without the mediation of workplace interactions and professional recognition. Networks and ties are the results social and professional interactions and recognition.

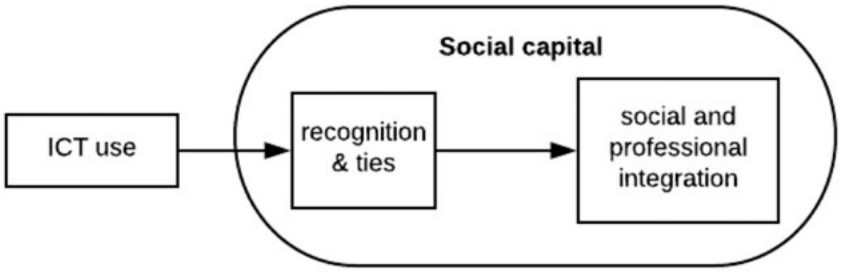
Both multiple and linear regressions show a significant effect of technology on social capital variables. We can conclude from our study that in the studied Lebanese context, *ICT use* acts as a predictor of professional social capital, which appears as the reification of skills recognition.

Discussion

Our findings are in line with many previous works that find a link between technology use and social integration inside groups or organizations. According to Van den Hooff, De Ridder and Aukema (2004), the use of ICT use positively contributes to knowledge sharing in groups, by affecting norms and reciprocity inside them. According to Sproull and Kiesler (1991), changes in the communication structures in and between organizations are a result of ICT use. Knowledge transfer is often viewed as a mediating effect between social capital and team performance (Maurer, Bartsch & Ebers, 2011). Our study however emphasizes the interpersonal recognition of individual performances. The transfer of knowledge between micro and macro, or between individual level and group level has been addressed by Ben Hador (2017). Our conclusions are not specifically drawn upon computer-mediated communication, as is the case for Ali-Hassan, Nevo & Wade (2015). When we address the ICT use issue, it is not only from the use of ICT as communication tools perspective, it is from a general acceptation: the digital skills perspective, as singled out by Zinnbauer (2007). It is not only about technology-mediated communication between members of an organization (and people outside the organization), it is also about how the use of ICT develops skills that lead to improved professional recognition, which in turn contributes to professional social capital as in its cognitive dimension.

In other words, the use of ICT leads to better recognition of one's skills and competences (RQ1), which end up being necessary to social integration, by the process of reciprocity and mutual recognition. Social capital reciprocity has also been singled out by Steinfield et al. (2009) in these terms: "reciprocity implies that people obtain benefits from the network and give back to the network". Figure 3 below models ICT use as predictors of recognition and ties, which are key components of social and professional capital. In line with our findings, we can propose that social capital is a resource be recognized by the members of the social group, for the individual to be using it for a professional or a social purpose (RQ2). ICT use is in our study viewed as skills and exploitable resources in an organizational context, which lead to the development of one's professional career and social integration. It plays the role of social capital as a "tangible" tool, or resource, that can be invested in, exploited and enhanced. Indeed, as put by Blasius & Friedrichs (2003), social capital is needed to transform cultural capital (in our case ICT as cultural capital, as in Tondeur et al. 2010) and practical skills into economic capital. Our study also shows that social capital can be modelized using a different structure than the classic triad: cognitive, relational and structural social capital, which are different yet interlaced entities. They can act altogether throughout a different modelization integrating other concepts as recognition and skills. We propose that social capital is as much a potential (in the form of recognition and ties) as an actualization of this potential (as social and professional integration), as shown in the figure 3:

Figure 3 - Recognition and ties are the link between ICT use and social and professional integration



The role of tools and technologies, from a practical action and interaction perspective inside work organizations, positions our paper in the field of workplace studies (Heath, Knoblauch & Luff, 2000). It helps highlight how ICT use, through social recognition of skills and the extension of social networks, can enhance one's integration potential inside their workplace, but

also on extended social ground. In other words, professional social capital relates to integration inside a work organization, that considers extra-organizational and personal ties and network, which the employee will put to use for a professional purpose, in line with literature on the progressive erasure of boundaries between private and professional lives. Remaining questions dwell in the reversed relationship between ICT use and social capital, in other words, how social capital impacts digital skills. As proposed in some studies (Tondeur et al. 2010), digital divide is more seen as an inequality in usage than just inequality in access or ownership of a personal computer. Concerning the studied population, we can argue that developing training programs in computer or ICT must be a leading policy, along other adult and lifelong learning programs, in developing countries hit by massive youth unemployment such as the Lebanese context.

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Appendix

Items from the original French version questionnaire[1] (only items retained for the study are listed):

Dans votre emploi, dans les tâches qui vous sont confiées (pour chaque proposition, donnez une note de 1 à 4, du moins d'accord, au plus d'accord): *In your job, in the task you're being given (for each proposal, award a score on a scale of 1 to 4, from do not agree to definitely agree)*

- Il vous est permis de prendre des décisions seul *(You are allowed to make your own decisions)*
- Vos collègues demandent votre avis sur des sujets importants *(Your colleagues ask you for advice on important topics)*
- Vos supérieurs demandent votre avis sur des sujets importants *(Your superiors ask you for advice on important topics)*
- Vos collègues ou supérieurs vous demandent d'intervenir pour régler des problèmes importants *(Your colleagues and superiors ask for your intervention to solve important issues)*
- Vos collègues et supérieurs accordent de l'importance à vos remarques et avis *(Your colleagues and superiors value your remarks and opinions)*
- Vous avez beaucoup de contacts professionnels avec l'extérieur ou au sein de votre lieu de travail *(You have a lot of professional contacts outside and inside your workplace)*
- Vous avez beaucoup de contacts humains au sein de votre lieu de travail *(You experience a lot of human contacts inside your workplace)*
- Votre travail (pour chaque proposition, donnez une note de 1 à 4, du moins d'accord, au plus d'accord): *Your work (for each proposal, award a score on a scale of 1 to 4, from do not agree to definitely agree)*
- Vous permet d'accéder à un réseau social important *(allows you to reach a significant social network)*
- Vous permet de rendre des services autour de vous *(allows you to render services around you)*
- Comment utilisez-vous l'ordinateur ? (choisir le niveau d'utilisation approprié, de 0=jamais à 4=beaucoup): *How do you use the computer? (chose the appropriated level of use, from 0=never to 4= a lot)*
- Réseaux sociaux *(social media)*

[1] author's translation in English is in italic

- Consultation de sites d'information *(website news)*
- Commerce électronique *(e-commerce)*
- Logiciels de bureautique pour votre travail quotidien et/ou professionnel *(office software for everyday and professional use)*
- Loisirs (musique, jeux, films…) *(leisure: music, gaming, movies…)*
- Fréquence d'utilisation de l'ordinateur : *(frequency of computer use)*[2]
- Intensivement *(intensively)*
- Souvent *(often)*
- Occasionnellement *(*occasionally*)*
- Très rarement ou jamais *(rarely or never)*

[2] for this question, the items were coded as follows: intensively = 4; often = 3; occasionally = 2; rarely or never = 1.