Information and knowledge management in higher education institutions: the Polish case

Marek Deja

Institute of Information Studies,
Faculty of Management and Social Communication,
Jagiellonian University in Krakow, Krakow, Poland

Abstract

Purpose – The purpose of this paper is to discuss the problem of information and knowledge management (IKM) in higher education institutions. The research aims to determine the way in which the knowledge resources of a higher education institution are managed. The author intends to define how the information system is shaped and how information and knowledge are used in the reporting processes and for decision-making efficiency.

Design/methodology/approach – In total, 38 university administration employees from six higher education institutions in Poland participated in the study. Information barriers and benefits resulting from the implementation of the central reporting system "POL-on" were identified by using the sense-making technique. The purpose of the interviews was to determine the procedural and behavioural conditions of the reporting and decision-making processes in higher education institutions in Poland.

Findings – This paper suggests four characteristics of IKM in higher education institutions. A link between the information culture of the institution, its size and structure as well as the adopted model of IKM is demonstrated.

Originality/value – The main contribution of this paper is to introduce a framework for studying the IKM in higher education institutions from the perspective of information culture. Higher education institutions have developed different styles of striving for efficiency regarding decision making and reporting in administration. The IM and KM are now proved to be an integrated process in administrative activities of higher education institutions.

Keywords Higher education, Information management, Knowledge management, Information culture, Information behaviour

Paper type Research paper

Introduction

The paper discusses the problem of information and knowledge management (IKM) in higher education institutions. Besides the Polish case presented in this study, one can notice an organisational flexibility, which naturally adapts to the needs and requirements of the environment (external and internal impulses) (Krupski, 2006). The process of change is difficult for institutions, mostly for administrative staff involved in information transfer processes. Therefore, an appropriate approach – that is human predispositions to open behaviour (Widen and Hansen, 2017) and flat structures influencing the speed of decision making (Curry and Moore, 2003) – can facilitate the effective adaptation of the institution to the new environment (Brilman, 2002).

The concept of national digital-orientated change and the creation of a monitoring system of tangible and intangible assets of higher education institutions in Poland oblige academic units to reorganise their daily information work. With the new, digital-orientated approach, information becomes an important factor in interaction with the environment and the main strategic resource influencing the financial conditions of scientific and educational activities ("The concept of construction, content and organisation of the monitoring system, ranking of material and non-material resources of higher education in Poland", 2010). It is a unique situation in which a very dynamic environment experiences even more rapid national changes resulting from the implementation of integrated, central information systems.

www.

Administrative staff members must reorganise their internal information management (IM) processes – by seeking, acquiring, processing, gathering information and then sharing it. In these changes, it may also be crucial to use specialised knowledge of administrative employees.

IKM can be considered as two basic dimensions of the institution's information culture (Davenport, 1997; Marchand, Kettinger and Rollins, 2002; Oliver, 2008; Widén and Hansen, 2012). In information culture studies, one can find multiple confirmations of the relationship between IM and knowledge management (KM) processes in which the critical role for organisational effectiveness is played by physical factors, such as systems and information resources (Ginman, 1987; Marchand *et al.*, 2002), as well as human behaviour and attitudes towards the use of knowledge (Davenport, 1994; Oliver, 2004).

Information culture makes an essential contribution to decision-making processes, and similar to organisational culture, it affects the organisation's effectiveness by influencing the use of knowledge in the organisation (Zheng *et al.*, 2005). In this context, the organisational culture is a broader construct that influences the decisions that will be taken and the projects that will be implemented to ensure the efficiency of the institution's functioning in accordance with the strategy or goals set by the management team (Powley and Cameron, 2006). Information culture influences the effectiveness of decision making by influencing the use of organisational knowledge and the way that information is used in decision-making processes (Zheng *et al.*, 2005). Hence, it can be considered as a part of an organisational culture that affects the key information layer of the organisation's activity (Lauri *et al.*, 2016).

Management of both, information and knowledge, must be studied from the perspective of human behaviour and attitudes displayed towards information in the organisation. IM and KM, if they are understood as a culturally grounded process, can increase the empowerment of employees and be used to fully increase their impact on organisational efficiency (Abualoush *et al.*, 2018; Evans and Price, 2018). Structural, managerial and technological solutions are essential factors of effectiveness, if they are considered holistically, including human–technology interaction (Curry and Moore, 2003; Davenport and Prusak, 1997; Oliver, 2008). "Information culture is shaped by the information of a specific organisation (its resources, processing and communication technologies) and people who work with this information. Culture constitutes the position of information – the manner of its perception (gives it its meaning) and use. Its task is to shape and foster desired information behaviour" (Materska, 2007, p. 198). There is no optimal information culture. Culture is appropriate for the given environment and the IM processes adopted in it.

IM can be understood as a way of organising information processes (searching/finding (sensing), acquiring, processing, gathering and using information) according to two types of information orientations: internal and external. Internal orientation is the concentration of employees on the internal information environment and the use of their information resources. External orientation concerns the concentration of employees on obtaining information from external resources and on the use of information in communication with the environment – for example in the preparation of reports, information products or marketing activities (Choo, 2013; Ginman, 1987; Marchand *et al.*, 2002). KM is a way of initiating the development of organisational knowledge by stimulating the process of open information exchange between employees and conducting institutional research or by controlling employee competencies (Davenport, 1994; Delaney, 2009; Katopol, 2007). The goal of these two types of processes (IKM) is to achieve optimal practices of information use on the basis of the employees' developed knowledge.

The aim of this paper is to present a broad, holistic approach to the problem of IKM. An attempt has been made to present the management styles of information and knowledge that ensure the effective functioning of the organisation in the dynamic system of higher education.

The context of higher education institutions in Poland
The integrated information system on higher education POL-on was intended as a support mechanism for the Ministry of Science and Higher Education, the Central Statistical Office and the Central Commission for Degrees and Titles in Poland. The implementation of the system was preceded by a short test period, which allowed administration in universities and scientific units to prepare for the digitalisation of reporting processes. In the course of practice on information activities, it also turned out that it had become one of the leading factors influencing the organisation of the institutional information in higher education institutions.

The system has a multi-module construction; it consists of 21 modules separated into thematic areas (administrative, didactic or science activities). The systems integrated with POL-on are the Polish Scientific Bibliography and Polish Database of Citations – "POL-Index" – the Nationwide Repository of Written Diploma Works and System for granting Degrees and Titles. The design of the system facilitates delegation of the data management to all system users – that is all units of the science and higher education system in Poland.

Scientific units in Poland are obliged to permanently update data under the Regulation of 26 February 2016, which amended the Regulation of 29 June 2015 on the Science Information System. The problem posed after the implementation of this document is the insufficient typology of universities in Poland, which differ organisationally (structure, size, number of employees and number of beneficiaries) and in terms of profile (multi-departmental universities, technical universities, medical schools, art colleges and vocational schools). Each of these institutions will have its own kind of information culture and will react differently to changes in the environment. Such a situation may translate into the diversification of models of IKM, depending on the internal conditions of the institution.

Research questions
The study aims to explore the information environment of selected universities in Poland, representing different profiles of education and research. In the considered case, information culture is a part of the IKM system that might explain how KM and IM can be considered as integrated processes in higher education institutions. In the study, information behaviour is an integral part of the information system in a holistic sense.

The primary research questions posed in the study are as follows:

RQ1. What kinds of models of IKM have been adopted in higher education institutions in Poland?

RQ2. What is the link between the KM and the IM in higher education institutions?

RQ3. What factors determine the implementation of the IKM model in the universities?

Literature review
So far, in the studies of information culture and IKM systems, the context of the administrative staff of educational institutions has remained understudied. A thorough review of research in the field of information culture was conducted by Lauri *et al.* (2016). The team noted that, in general, there is a lack of sufficient observation in the information culture of higher education institutions. Lauri *et al.* (2016) focused on showing the dependence between the self-assessment of academic employees and the types of information cultures presented by Choo *et al.* (2008). It is difficult to find empirical research that would study information culture only from the administrative perspective in higher education. This is why the aim of this paper is to diagnose the IKM status limited to the area of the academic administration activity in reporting processes and supporting decision making in higher education institutions. The originality of the research problem stems from the exclusive focus on the administration staff members involved in information processes and emphasis of their knowledge as the resource that supports efficiency, and not as a product or goal of academic activities.

In the research on information culture, two concepts of study should be distinguished: anthropological and sociological. Same differentiation was made by Cameron and Quinn (2011) regarding the organisational culture. The first one is based on the assumption that every action and its physical manifestations are the culture. For this reason, the anthropological observation will include some organisational factors, such as the IT system, the development of competencies, procedures, documentation, language or the size of the organisation. The characteristics of culture will also be dependent on the geopolitical situation. Such perspective was introduced, for example, by Adrienne Curry and Caroline Moore (2003), Mei-Yu Wang (2006) and partially Gillian Oliver (2004, 2008).

The sociological approach is entirely focused on the behaviour or communication as a more primary phenomenon for employees. Social connections affect all physical manifestations of organisation and how it will be managed, how decisions will be made (the use of information and knowledge) and how the person or the group achieves efficiency or productivity. Sociological approach was presented in numerous studies of the information culture, for example Wright (2013), Gunilla Widén-Wulff (2000), Choo *et al.* (2006, 2008) and Vick *et al.* (2015). This approach is often focused on the impact of culture on the organisational effectiveness, which in the case of higher education institutions can be considered as new knowledge developed by academics, educational materials, publications, grants results, innovations, etc. Such research in higher education was conducted by Vick *et al.* (2015), regarding the development of innovation, but also by Lauri *et al.* (2016), regarding the self-assessment of academic productivity. This is not a case in the present study. Knowledge (tacit and explicate) is a dynamic resource that supports efficiency of everyday work of all workers. It is a key element in the evolution of culture in the organisation (Nonaka and Takeuchi, 1995). The administrative staff use organisational knowledge and develop competencies to support academic activities in higher education and science.

A thorough study of the university's information environment was presented by Gillian Oliver (2008), who diagnosed the impact of organisational culture on IM and information culture in different countries. Oliver designed her study on the basis of the comparative method. She focused her comparison on geographical differences in organisations' information cultures in culturally close Australian and New Zealand, and culturally different Hong Kong and Germany (Oliver, 2008). She framed her observations in four types of bureaucracies based on anthropological dimensions like distance or strategic perspectives: full bureaucracy; implicitly structured; workflow bureaucracy; and personnel bureaucracy. She noticed that the geopolitical conditions of the region have the greatest impact on the formation of an organisation's information culture, especially in public sector institutions. Due to territorial limitations and the unique conditions of the higher education system in Poland, in the present study, the context of national conditions will remain unchanged. The comparative attributes are the size and academic profile of the institutions. These are presented in the methodology section as small, medium and large structures, described by five academic profiles included in the empirical study.

Jennifer Rowley stated that higher education institutions initiate procedures and online systems for knowledge creation, dissemination and learning. Rowley identified entities such as libraries, electronic collections of learning materials, networks for e-mail communication, and information systems for students as a manifestation of KM practices. However, this potential is not fully used, and the efficiency of KM requires "significant change in culture and values, organisational structures and reward systems" (Rowley, 2000). Rowley interpreted behaviour patterns in higher education institutions in the UK as a kind of barrier in the pursuit of effective KM. The aim of the current study is to examine behaviour that is a potential accelerator for the development of knowledge and good practices in dealing with environmental barriers. An effective culture is sought that supports knowledge development and use, and helps overcome environmental barriers.

The influence of information culture on the organisation's effectiveness has been conceptualised by Choo (2013) and presented in the 4R model. The 4R model was inspired by the work of Cameron and Quinn (2011) and their competitive values model of the organisational culture. Further, two dimensions of the 4R – information seeking and information values and norms – constitute four types of information cultures: result-oriented; rule-following; relationship-based; risk-taking culture. Each of this type can be characterised by five attributes of culture: the primary goal of IM; information values and norms; information behaviours in terms of information needs, information seeking and information use. Because Choo already placed the information seeking as well as information values and norms in the attributes of the 4R model, two dimensions of the 4R model are very difficult to interpret because they are partially redundant. Vick, Nagano and Popadiuk (2015) used this model in the empirical study of information culture in academic projects group, and they focused entirely on typology and attributes of culture in 4R model, leaving the issue of dimensions aside. This was possible due to the emphasis of knowledge as an innovative product, on which the sociologically understood culture has an important impact.

From an anthropological perspective, it is the dimensions and their bipolarity that are more important for the study because they influence not only the behaviour themselves but also provide the basis for formulating systematic solutions in IKM. Information seeking, according to Choo (2013), might have external and internal orientations (Table I). However, information orientation in the concept of Marchand *et al.* (2002) goes beyond seeking and is connected with information sensing, shearing and information use. These are processes much more important for administrative staff because they give sense to the core process they conduct – the information gathering (Leimer and Terkla, 2009).

Information gathering is a core process of administrative activities that are conducted according to the external and internal information needs (Terenzini, 2013). The activities of academics and students, as well as external regulations created by financing institutions, are the main cause of information gathering by the administration at universities. Based on this, all crucial information processes should be considered from a perspective of satisfying information needs in the way of the external and internal orientations of IM.

The second dimension suggested by Choo (2013) concentrated on comparison of sharing and pro-activeness vs control and integrity regarding information flows (Table II). KM does not have an anthropological representation in this model. Hence, it is a great tool to study information culture, where knowledge is a resultant of information process, that is effectiveness is combined with effect. To diagnose the effective information culture, there needs to be a place in such a model for the knowledge use and development while information processes are conducted.

Vick *et al.* (2015) focused their work on using the 4R model to diagnose the influence of information culture on knowledge creation. They combined each type of culture with

4R	SECI	Knowledge transformation	Information values and norms	Information management orientation	Knowledge management orientation
Relationship based	Socialisation	Tacit–tacit (communicating)	Shearing	Internal	Openness
Risk taking	Externalisation	Tacit–Explicate (coding)	Pro-activeness	External	Openness
Rule following	Combination	Explicate–Explicate (recoding)	Control	Internal	Control
Result oriented	Internalisation	Explicate–Tacit (acquiring)	Integrity	External	Control

Table I.
The logical links between IKM, SECI and 4R

The scope of the problem	Procedural barriers	Behavioural barriers	Emphasis on IKM model
National	Unstable legal situation of the system	Frequent changes in the staffing of ministerial units – lack of respect for the achievements of predecessors	Managers camp; externalisation and external information use
National	Frequent system updates that change the metadata structure in the information gathering modules	In decision about the concept of system development – problems with strategic thinking	Central support; internalisation and integration with external information sources
National	Continuous augmentation of the system, including new modules and changes in metadata structures	Lack of future thinking and strategic decision making	Central support; internalisation and integration with external information sources
National	The construction and maintenance of the system are not matched with the needs and expectations of all parties involved in the system usage	Lack of openness to the expressed needs of institutional users	Central support; internalisation and integration with external information sources
National	The "black hole" system, a system that collects data but does not pass it on for further processing	Attitudes reluctant to open sharing and processing of information that could be conducted with the use of a national system	Managers camp; externalisation and external information use
Institutional	Despite the "bureaucracy reduction" policy in the higher education system, the dominant part of the data still has to be transferred to the national system manually	Not taking into account the imperfection of the human factor and knowledge workers' information overload	Bureaucracy; combination and internal information control
Institutional	There are no internal solutions or initiatives to transfer data from internal IT systems directly to the national reporting system	The IT system architecture design is not user friendly	One actor; socialisation and internal open sharing
Institutional	Adding metadata structures to the internal information system without prior notice	Resistance to the requirement of iterative data collection	One actor; socialisation and internal open sharing
Institutional	Reorganisation of internal administrative structures, which relates to the unstable functioning of an information system	Chaos in the area of responsibility for data processing	Bureaucracy; combination and internal information control
Institutional	Staff shortages causing difficulties in dealing with the non-compliance of external and internal metadata structures	Information processing overload caused by a lack of agreement in the field of data collection procedures	One actor; socialisation and internal open sharing

Table II.
Information barriers in IM in a higher education institution

specific knowledge development process in Nonaka and Takeuchi (1995) SECI model (socialisation, externalisation, combination and internalisation; Table I).

The subject of Vick *et al.*'s (2015) observations was the production of new knowledge, for example in the form of innovative products or new ways of technology implementations and patents. Even in such an obvious area of external market orientation, processes related to the support of internal knowledge exchange between employees must occur. Some of the surveyed teams also showed the dominance of cultures focused on internal information processes (Vick *et al.*, 2015).

Regardless of whether we are dealing with an organisation that is generating knowledge for the market (academic work) or providing services based on employees' knowledge (administrative work), both (internal/external) balancing approaches to IM are always noticeable. Vick *et al.* (2015) also noticed the co-occurrence between open values and the risk-taking culture – characterised by open sharing behaviour; openness and risk-taking culture – expressed in pro-active behaviour; control of competencies and rule-following culture – associated with control on information resources; and finely control over information flows and result-oriented culture – related to the integrity behaviour (Table I).

To focus on knowledge as a useful resource, one needs to broaden information-seeking orientation to information use in decision making. At the same time, values and norms must be focused on the utilisation of employees' knowledge (competencies). This approach is quite similar to that presented by Vick *et al.* (2015) but with the emphasis of transformations of tacit and explicate knowledge due to IM efficiency (Table II). Vick *et al.* (2015) also pointed out that the culture in the academic projects might depend on the culture in a given institution. Therefore, their correlation between the 4R and SECI models is worth using to check how in the anthropological way the information culture affects IKM.

It is worth to remember that knowledge itself is not measurable. Similar to Ra'ed Masa'deh study, it was assumed that what we can observe in the empirical study is KM as information processes – for example supporting efficiency and decision making. Ra'ed Masa'deh was looking for KM performance understood as the impact of KM on job performance (Masa'deh *et al.*, 2017). This study attempted to demonstrate the impact of the employee's potential knowledge resulting from job responsibilities and culture (patterns of behaviour) on IM procedures and good practices.

Lalitha Raman in her study pointed out that in the organisation like higher education institution there must be some basic rules and procedures that intend to sustain an effective order. These are typical representations of the control-oriented KM or combination and internalisation. However, in the dynamic digital environment, there might appear communities of practice (COPs) created by the workforce among themselves. COPs are informal, often spontaneous task teams, without a formal structure, in which employees temporary initiate free flows of knowledge (Raman, 2017). These are examples of openness-orientated KM or socialisation and externalisation.

Unlike the case of management staff, it is difficult to expect the competency in IKM techniques from lower level employees. In this study, the top-level management is a group that creates internal information needs and tries to manage the behaviour of employees, so they are not the subject of the study. The goal is to observe and model a peer-based framework for IKM that can be used in higher education institution to institutionalise community forums (like COPs) and that creates knowledge, provides solutions and supports decision making to achieve a desirable, effective state of performance.

Design/methodology/approach
Qualitative research design
This empirical study investigated the ways of using information and knowledge for higher education institutions by university administration employees of six selected Polish universities. The use of information was adopted as the term defining human interaction with tools, information resources, knowledge resources and management structures in which certain intentional information behaviours are manifested (Choo *et al.*, 2008).

In this paper, sense-making is treated as a data acquisition technique in which the researcher focuses on the awareness of information processes. Each participant has a free hand to describe his/her work and insights into an individual's work as if he/she were describing a routine of his/her daily work. The researcher only guides them through this and tries to conceptualise the information processes. The observation and self-determination of

information workers provide us with interpretations for gap bridging – filling cognitive gaps regarding questions such as "Why do we do certain activities during information processing?" or "How do the people in my surroundings and myself behave when a specific problem occurs?"

Sense-making is a research method similar to the second-person methods, and it is often used in phenomenology and psychology. The participant strengthens his/her description of the work environment by expressing himself/herself as an expert in a given process. He/she formulates descriptions of problems (cognitive gaps), and then he/she expresses opinions about his/her own work and the work of his/her colleagues related to these problems (Gorichanaz, 2018; Olivares *et al.*, 2015).

The interviews determine what is happening in the institution in terms of information resources and behaviour, and where there are gaps in understanding IKM, which confuse the actors in these processes and make them feel lost. The focus of the researcher and the respondent should be concentrated on "processes and change" – this does not exclude the use of more permanent information resources or organisational structures with dynamic relations between the actors (Dervin, 1999, pp. 731-732).

Participants

The respondents of the study are people involved in the processes of IKM at the university involved in logistics and decision-making support. Interviews were conducted with employees performing office functions at the university – that is support staff (Katopol, 2007). The participants were mainly persons who acted as coordinators of the POL-on system. They were responsible for the organising of reporting to central systems and the organising of data collection processes. They mainly organised information flows from central and departmental administration units to central internal IT systems. They had direct contact with the so-called "knowledge workers" – that is employees who had access to diverse information resources, and their work was based mainly on the creation and use of significant information resources during office work. Knowledge workers were also participants in the study. Their work is a significant factor in the quality of data and information used in decision-making processes (Cheuk, 1998).

The institutions were selected from "The register of higher education institutions" in POL-on system (https://polon.nauka.gov.pl/polon/), which contains information about all these types of institutions in Poland. The selection criteria in the database were set as follows: status: active; character: university and college; type: public. The condition for admission to the study was the formal consent of the university authorities. Also, the organisational structures must have at least two subdivision departments and central administration to observe information flows in the organisation. Although the management boards of 22 (out of 132) public universities in Poland agreed on research to be conducted in their institutions, most of them did not select workers to participate in the study. Therefore, it was not possible to reach employees of all these institutions. Finally, the study was carried out just in six units, where it was not possible to collect the relevant research material.

According to the sense-making methodology, the respondents were not assigned to categories related to experience, gender, age, education or personality. The respondents were actors in a dynamic university information system (Dervin, 2003). The study assumes that the selection criteria are dictated solely by the respondent's function in the information system. Every respondent has a potential impact on the management of information and knowledge in the institution through his office work. In order to qualify for the study, the respondents had to meet one of the following criteria: analytical or data processing position, involvement in the reporting processes (the respondent cannot be employed in a high managerial position), the work position related to the use of university IT systems (human resources, accountancy, student matters, institutional research office).

Data collection
The data collection procedure included informing employees about the purpose of participating in the study. All interviews with 38 employees were conducted individually. The time of the interview included approximately 60–80 min of conversation. Similar to Cheuk's (1998) study, the interview was organised into three parts. The warm-up part – familiarisation with the general problems of IKM – identified the gaps. Next, in-depth interviews provided a deeper insight into the gaps, time period of problems, placement of the problem in the context of higher education institutions, the dynamics of changes and influencing external forces. The in-depth interview included questions mainly about the process of institutional changes in the field of information resources and the use of employees' knowledge during the transformations. The summary part, in which the respondent had the opportunity to provide additional and direct emotional expressions, related to the variable factors of IKM in his/her work. The entire study was conducted in accordance with the micro-moment timeline interview methodology but with emphasis on a qualitative approach (Dervin, 1992).

Data analysis
The university authorities were assured of full anonymity of the research results. It is only possible to disclose the institution's education and research profile. The six institutions were divided into three categories (small, medium and large). The small structure was a university of professional (one Higher Vocational School) or artistic nature (one Higher School of Film and Theatre), where the administration employed up to 150 people (ten respondents). The higher education institutions with medium structure were technical (one Technical University) and medical universities (one Medical University – adjectival university), in which the administrative staff consisted of 1,000 people (12 respondents). Large institutions were multi-branch universities (two classical universities – over ten faculties) employing over 1,000 people in the administration (16 respondents).

The collected interviews were reviewed, audited and annotated by the researcher during the interviews and immediately after their completion. The data were categorised according to the observed behaviour patterns and recognised standard procedures. The analysis in this study includes identifying standard behavioural and procedural barriers in IKM; describing behaviour and good practices while dealing with these barriers according to IKM cultural dimensions (Figure 1).

Findings were categorised by anthropological approach to IKM attributes presented by (Oliver, 2008, p. 366): "power distance (attitudes to inequality between individuals), uncertainty avoidance (uncertainty about the future and the extent to which a culture will attempt to minimise that uncertainty), collectivism/individualism (the degree to which a society views individualism as a positive or negative trait),[…] and long-term/short-term strategy perspective". Within these attributes, there were embedded two reinterpreted dimensions of information culture from the 4R model by Choo (2013) model presented in Figure 1 and Table I. Observations of good practices and behaviour patterns were compared with four types of information cultures in the 4R model (Choo, 2013), four processes of knowledge transformation in the SECI model (Nonaka and Takeuchi, 1995; Vick *et al.*, 2015) and four types of bureaucracies presented by Oliver (2008, p. 366). Links between these models were used to describe four types of IKM in higher education institutions.

Findings
During the study, characteristic problems were discovered that surfaced when IKM was implemented in the unstable environment of higher education institutions in Poland. They were defined in interviews as information barriers that prevent the execution of the
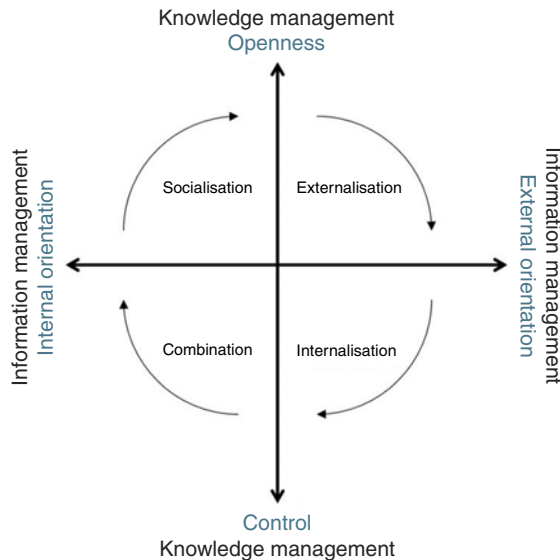
information seeking, gathering, processing and the use of the high-quality information. These barriers arose at the national and institutional levels and had a procedural or behavioural nature (Table II).

Each barrier was assigned a specific IKM model, where the highest efficiency in coping with specific kind of problem was observed. The best solution to cope with national problems was through internalisation and externalisation of knowledge, that is its transfer within the external environment for the purpose of adapting to national conditions or to make an impact on the science and higher education system by cooperating with other institutions (national barriers; Table II). However, struggling with internal barriers required a greater internal orientation supported by socialisation and externalisation of knowledge (international barriers; Table II). However, it must be pointed out that both, national and institutional barriers, are strongly dependent on each other. Therefore, one can hardly speak only about one of the adopted orientations, but rather about increasing the concentration and emphasis on one of them in problematic situations. Institutions have to balance the internal and external orientations, and openness and control in IKM. The following models present how in specific organisational conditions, these approaches are balanced.

RQ1. What kinds of models of IKM have been adopted in higher education institutions in Poland?
Four models of IKM were identified, which characterise three examined categories of higher education institutions in Poland.

One actor
For small universities employing up to 150 people in the administration, the model of one actor was identified. One actor is a small organisational structure in which the developed methods of information processes are rather intuitive. The central unit (rector office) and the small structure of the subordinate institutes only react to external

information requests but have a strong focus on internal beneficiaries (students and researchers). The information resource is adjusted to the legal status and to what "used to be done":

> I used to go to my friend next door for a coffee, who earlier [before POL-on] had a similar position. On such occasions, I was rarely able to get some tips on, for example, how to fill in a report. In standard working hours, there was no time to get any help and she didn't remember how she did it. But, the changes now are so fast that it wouldn't work anyway. […] I try to find a way to enter data quickly into the system by myself and get through it until next time. I create my own system of bookmarks [in binders] to quickly transfer all the [printed] data I manage manually by "clicking" to POL-on when the need arises. […] If I don't have some data – e.g. about grants, conferences or publications—I simply go to the right person and they know where the data are stored.

In practical terms of information use, a single actor creates know-how for reporting and improving information services oriented towards satisfying the needs of internal beneficiaries. Each employee individually builds his/her own experience, but the coordinator of reporting to the POL-on system – the rector in an Art School or delegated employee in a Vocational School – takes the full burden of organising the data resource. People employed in his/her office have no direct influence on IM, but they are a part of KM. Knowledge is cascaded; it is delegated per level of experience without clear control procedures. At the highest level stands, there is a main actor, who is aware of the reporting processes and who knows well the structure of the administration staff. The next levels are limited to understanding the needs of the main actor, the awareness of employees' own information competences and data gathering methods according to their preferences. The most important are *ad hoc* measures that meet temporary needs. Planning and implementation of permanent information processing procedures go beyond the time capabilities of one actor. In this model, one actor tries to control the horizontal flow of information. National changes have normalised the scope of the reported data but have not affected the procedures and behaviour of administrative employees. This characteristic is strongly related to the relationship-based culture in Choo's 4R model with a strong focus on self-development and socialisation in internal knowledge exchange. Personnel bureaucracy is noticeable with a family atmosphere, wide power difference and a very low need to avoid uncertainty.

Managers camp
The model of the management camp is characteristic for medium-sized higher education institutions employing 200–1,000 administrative staff. The IM processes involve a greater number of employees specialising in specific information areas – financial, personnel, teaching and administration – who develop their own procedures. The external reporting coordinator is the person appointed for this task by the management. Information flow structures are vertical and correspond to flat organisational structures. Engagement in decision-making processes is more open because more people are employed in lower level management (the largest related to the number of lower level support employees). The decision makers motivate the employees to share knowledge with their colleges because, as medium-sized institutions, they have to compete with large universities that have a larger academic staff, more resources and a healthier financial situation. This model implements procedures for collecting data in IT systems that allow improvements in terms of external reporting and internal evaluation. Despite being open to experience sharing, decision-making processes ultimately depend on the specific power group that is the university's governing body. Lower level managerial staff constitutes an advisory group that has no direct impact on central decisions and the construction of a university-wide development

strategy. The coordinator integrates external reporting with the collection and processing of information within the institution:

> I discussed the problems that I found in the [national] regulation with several deans and office managers, here among our administration staff. I started by notifying them about the changes because they had no idea what it [parametrisation] would look like. The standard reply was to not take too much time from their employees. They also gave me some suggestions on who to contact in the faculties and how to do it formally so as not to disturb their work. [...] Finally, contact with them helped me pass the procedure for the rector's approval. The Senate had comments on the reporting procedure in POL-on. I must download as much [data] as possible from the IT systems, because the admin offices have already introduced a lot of data there, and I will not interrupt their work with students or academics.

The internal information resource is sporadically used to support the senate in making decisions, but it is not widely available to all unit managers. This model, in the context of information behaviour and procedures, is open to changes in the national system to a moderate degree. However, more important are the needs of current and new beneficiaries, where the following systems are developed: IM about the range of academic courses offered (Web-CMS), web-based recruitment system and internal didactic control system. This model is strongly related to the risk-taking culture in the 4R model with the greatest degree of flexibility in terms of external changes of knowledge (externalisation). Implicitly structured bureaucracy is recognisable with the orientation on external cooperation, power distance is still low (but higher than one actor) and there is less need to avoid uncertainty.

Bureaucracy
Large universities employing over 1,000 people in administration (sometimes even up to 3,000 people) can be described by two models: bureaucracy or central support.

Bureaucracy is characteristic for universities with many years of tradition, which are at the same time in a state of controlled stagnation. The changes that take place at the ministerial level are felt the strongest here. Responsibility for the reported information lies with the rector. However, this responsibility is delegated horizontally across subsequent structural levels. Such an organisation has a structure containing up to a dozen faculties, and some autonomy exists regarding financial management. This results in the breakdown of IM processes into two areas: central administration and faculty administration. The external reporting coordinator is the rector's representative responsible for the organisation of the entire IM system, in particular, in the field of data collection and the use of information by the central administration. In the past, each unit had its own procedures for gathering information, such as criteria for the appraisal of academic employees and student retention or satisfaction. In various university units, other values were also associated with data collection, related explicitly to didactics and research:

> Our administration staff and also POL-on coordinators in the faculties got lost with successive requirements. The situation stabilized after several changes and when our SAP system [ERP system] and USOS [student information system] were modified [adapted to POL-on]. But a new law and regulations are being prepared that may confuse things again.

Currently, the reporting coordinators have also been divided into two areas, didactic and academic activities, whereas the central coordinator reports on the finances. Bureaucracy can be characterised by the insignificant influence of people practically managing information on making decisions. The implementation of detailed and stringent data collection procedures makes it difficult to break through with bottom-up initiatives. Procedures from the past meant that the faculties became hermetic structures wherein

employees were reluctant to cooperate or share their experiences with other units in the university:

> The biggest problem with POL-on is the constant change of requirements when we describe conferences or scientific projects etc. The content of the system does not keep up with the Ministry's regulations. [...] None of the changes is consulted with us, and each of these changes means that we have to beg employees in the faculties over and over again about trivial details of their work.

The current system only increased divisions by increasing competition with regard to funding; cooperation is not considered profitable. Satisfying the needs of internal beneficiaries is limited to the creation of an internal content management system on websites, a recruitment system and a system controlling the teaching activities. The systems operate on the principles dictated by internal management documents from the rector. KM in bureaucracy is characterised by competence control and evaluation of administration employees regarding the efficiency of the activities performed. Sharing knowledge occurs only among the lower level administration of a given unit in free contact. This model is strongly related to the rule-following culture in the 4R model with emphasising control and standardisation of information processes during the combination of explicate knowledge (procedures). Full bureaucracy and pyramidal model is noticeable with the highest power distance and a stronger need to avoid uncertainty.

Central support
The central support model is very similar to the procedural model of bureaucracy. It was diagnosed in institutions with a much longer history of development, dating back several 100 years. The long-term stability and the growth in the number of jobs in the institution's administration translated into an organisational inability to change. This is particularly noticeable in situations requiring changes in the IM system. In this model, complex and strictly controlled IM procedures, characteristic for bureaucracy, are no longer sufficient to ensure an effective information system ensuring high quality of information in the reporting and decision-making processes. Information subcultures have been created within faculties and even central administration units. These subcultures are characterised by different information values and different patterns of information behaviour, which prevented efficient cooperation in the reporting processes and the reorganisation of the internal information system:

> At the last moment we find out what is about to change in the law, but in the system changes can happen much later, and we don't know if they will coincide with the rules. [...] We want but cannot think strategically because the situation is too uncertain. We're in a fog. Why make yourself work overtime? [...] You cannot get anything useful out of this system anyway.

The consequence of reaching this state of powerlessness was a reaction by the university authorities who established a special unit employing qualified information processing specialists. They organised the university's information system and a network of departmental contacts. This unit had a significant impact on decisions, owing to the manager who actively participated in the university's decision-making processes. At the same time, the employees of this unit shaped an information culture with more open attitudes and tried to overcome barriers to the flow of information between individuals. Due to the central support unit, equality was achieved between external requirements met by one key organisational unit and the internal beneficiaries' requirements, which were better recognised and satisfied by individual faculty units.

This unit balances the flows of information in horizontal and vertical structures and supports the use of knowledge in the organisation by creating a database containing the skill profiles of employees and a knowledge base for the management. IM procedures are

now balanced between the flexible use of staff knowledge (the freedom of making decisions of lesser importance) and restrictive procedures for the flow of information in a horizontal manner. This model is strongly related to the result-oriented culture in the 4 R model with the strongest focus on external information demands and internalisation (acquiring) of knowledge that comes from an externally regulated environment. Workflow bureaucracy and "well-oiled machine" attitudes are noticeable. There is a lower power distance than in the bureaucracy, but there is also a strong need to avoid uncertainty.

RQ2. What is the link between the improvement of organisational knowledge and the information management in higher education institutions?

IM and KM are two categories of activities that depend on each other. It is the most visible in units with the one actor model. IM to a large extent is based on the knowledge about the distribution of competences in the organisation. Individualism in knowledge use affects the autocratic use of information and the organisation of mostly horizontal flows. Vertical flows ; are minor and are limited to loose conversations about the situation of the organisation. The Ministry's external IT system for one actor model began to substitute the internal solutions in the field of information gathering. The institution has printed documentation and administrative employees deposit data in the external system. In medium-sized higher education institutions, the critical knowledge flow takes place at the management level in administration and has a critical value for making decisions. There is a noticeable willingness to train employees and gain the knowledge required in order to cooperate in the external environment and to create positive public relations with potential stakeholders and new beneficiaries (mostly student candidates). In the bureaucracy, knowledge – in reality, the employee competencies – is controlled and used to provide high-quality information. Vertical flows of information (from the bottom to the top) and the internal institutional resources play a significant role in decision making.

RQ3. What factors determine the implementation of the IKM model at the university?

The primary factor in the implementation of the IKM model is the amount of data gathered and reported and the size of the information resource used in decision making. The small amount of personal and financial information in small vocational and artistic colleges is caused by the small academic and teaching staff and the low ratio of beneficiaries per administration employee. In art colleges, it may even be 3:1, whereas in a bureaucracy, it can be 15:1. In small institutions, the reporting processes also constitute a small time and financial burden. Therefore, the model of one actor is sufficient and effective:

> In our office (the rector's office), we keep all the student data in our files. We don't have to worry about the security of the informatics systems. The data is physically protected. Only authorized people can transfer data to the POL-on system in which we archive data. […] We don't have a lot of students, so we had a general idea about the total numbers, but not the details. Now we have more specific data in the system. We've started using this site [POL-on] to keep an eye on student retention.

In middle-sized institutions, the managers camp model results from the ratio of managerial staff to the small total number of administration employees. The flat organisational structure motivates cooperation at the management level. The size of the information resource is bigger because the number of beneficiaries and their didactic or science activities is also greater. Therefore, basic management arrangements related to data collection and IT systems organising information flows are implemented without affecting the use of data in future decision making. Reporting obligations are distributed to a larger number of managers specialising in relevant types of information:

> I give access to our POL-on modules to several people in the faculties to enter data into the system. I set deadlines, control the collection process and present [information] for the rector's approval.

Bureaucracy and central supports involve organisations too large to implement such dispersed models as small- and medium-sized institutions. Bureaucracy transformed into central support because decision makers began to experience difficulty in accessing information. There were also small loads of information processes intended for large numbers of knowledge workers who did not fill their working time. Their potential and experience were wasted, and the entire information system was inefficient. A unit had to be created that would use the intellectual potential of the information specialists already employed in the institution. This unit also had to create an open communication platform and spread awareness about the information needs in the environment. Bureaucracy persisted when IT systems were constructed in a more open manner before national changes. Decision makers using new orders dictated changes in information systems according to the knowledge-based guidelines of the coordinator.

Research limitations/implications
The main limitation of the study was the area of observation narrowed only to the administration staff of higher education institutions in the public sector. The focus on universities in the public sector should be an issue for further considerations. This is a different approach to the one presented in previous studies where information culture of higher education is mostly examined as the behaviour influencing academic activities. A different perspective was presented, resulting from two aspects. The first aspect is the way of interpreting knowledge, which the current research understood as a resource supporting efficiency and decision-making ability. This results in a second aspect of limiting the research to an anthropological approach, in which every part of the institution's activity can potentially be considered as a manifestation of an information culture – including the knowledge (competencies) of lower level staff.

There is a need to check whether the identified models actually translate into academic productivity. Implications of this study should be the examination of both the administrative staff and the academic staff. Quantitative correlation should be tested between the indicated models in administration staff and the types of cultures in the 4R model in academic staff.

Originality/value
In this paper, two dimensions of information culture have been used, in which KM and IM processes are harmonised with the evolution of behaviours. Such structured analysis, inspired by the 4R model (Choo, 2013) and the attributes used by Oliver (2008), gives results describing four IKM styles. Each type of IKM is based on the affirmation that information culture, that is established behavioural patterns, unites the IM and KM processes in the pursuit of efficiency. This has now been confirmed in the study from the anthropological perspective in which the tacit knowledge is an integral part of the culture, similar to its explicate manifestation in the information processes. Management processes aiming at the efficiency of reporting and decision-making activities must, therefore, integrate IM and KM at the level of information behaviour to formulate effective information culture.

The main contribution of this paper is to demonstrate the framework for studying the IKM in higher education institutions from the perspective of information culture and to demonstrate four models of IKM. Higher education institutions, through the organisational differences, have developed different styles of striving for efficiency regarding decision making and reporting in administration. Both IM and KM are now proved to be integrated processes in higher education institutions. Knowledge in administrative work is treated as a resource that supports IM. KM is based on four SECI processes that stimulate the development of tacit and explicate knowledge. The evolution of knowledge also favours the evolution of cognitive behaviour in which efficiency is sought.

Discussion

There is a similarity between the four models observed in the study and the cultural characteristics in the 4R model by Choo (2013). However, it is necessary to notice the differences in the understanding of knowledge use. Despite similar orientations of IKM, there might appear different interpretations of the uncertainty. In the manager camps, we can notice a lower focus on the strategy resulting from high flexibility of decisions in the area of medium-sized management, whereas in the case of risk-taking culture, Vick *et al.* (2015) noticed that the willingness to take a risk in innovation is also associated with high concentration on avoiding internal uncertainty. This situation does not correspond with behaviour in the administration staff, which uses dispersed and tacit knowledge to quickly react to changes in the environment.

It should also be noted that in the case of lower level administration staff, the SECI model must be interpreted differently than its original version (Nonaka and Takeuchi, 1995). Nonaka and Takeuchi described their model as an iterative spiral of processes. Vick *et al.* (2015) studied these processes individually in the context of types of information cultures in academic staff. In the lower level administration, there is also no continuity of the process. The management' work is to control the steps in SECI, whereas for employees, it is a natural process. It is a part of their behaviour that management staff can try to control in a given culture. Thus, it is very important to observe not only procedures but also more natural COPs cooperation in which employees independently initiate SECI processes.

The presented findings agree with several empirical and conceptual papers. Similar to Lalitha Raman (2017) study, it was possible to conclude that when changes happen rapidly in the higher education system, the iterative implementation of the new operating procedures is no longer effective. Like in the Oliver's (2008) Hong Kong case, in the bureaucracy model, there was a visible reluctance to share information beyond the workgroup, especially if procedures were imposed for every process. Unless we deal with internal systems that are flexible in metadata structures (maintaining control is possible), visible divisions lead to stagnation and a high degree of organisational fragmentation. The situation in Poland is quite similar to higher education changes in Hong Kong at the beginning of century where the traditional collegial governance model was changed to management-oriented model. Hong Kong was the first country in the East Asia region to apply quality measures to monitor university performance (Oliver, 2008). In such a situation, one should draw attention on balancing all four presented models (one actor, managers camp, bureaucracy and central support) to achieve IKM efficiency.

If we take under consideration the assumptions made by Kidwell *et al.* (2000), achieving IKM effectiveness in higher education is not possible if we do not balance tacit and explicit knowledge use. If more emphasis is placed on explicit knowledge, we do not keep up with the changes (Bureaucracy). On the contrary, the COPs can be too chaotic, as in the one actor model. Issues may arise if the formal procedures are omitted in the case of large data resources and numerous beneficiaries: "Accessing information within the organisation could be a question of knowing who to go to, and relying on having the right connections" (Oliver, 2008). Formal procedures should exist in the case of supporting the connections between COPs. The presented IKM models are frameworks that in an unstable organisational environment can assist managers in monitoring and coordinating the transformations of knowledge with accordance to the dominant information culture.

Conclusion

As Oliver showed, regional differences have a significant impact on IKM (Oliver, 2008). However, it should be added that while national conditions influence IKM, each institution represents a very individual knowledge characteristic and organisational structure. Such characteristics are dependent on general information needs in the institution. Hence, setting the primary orientation of IKM will depend on the internal information culture.

There is also a visible correspondence to conceptual information culture typology presented by Choo (2013). In this paper, the four characteristics described are based mainly on the strongest and most clear signals of behaviour and norms. However, they are not hermetic and, for example, solutions from the managers camp can infiltrate one actor or central support. The IKM differences depend mainly on structural solutions and the size of the beneficiary group (anthropological approach). Choo's model (the sociological approach) can measure the share of one of four cultures in the organisation, so it may be suitable for diagnosing the balance of behaviour patterns that represent knowledge workers' quest for efficiency.

Choo's 4R model, in theory, can be used in further IKM studies and practice to observe sociological balance of four anthropological IKM characteristic presented in this paper. However, culture cannot be managed. The 4R model in such a situation may be helpful only in the diagnosis of information behaviour patterns. For a more holistic approach, it is, therefore, necessary to check the cultures in the Choo typology that correlate with the four models of IKM presented in this paper. The statistical correlation between these models must be further checked.

References

Abualoush, S., Obeidat, A., Tarhini, A., Masa'deh, R. and Al-Badi, A. (2018), "The role of employees' empowerment as an intermediary variable between knowledge management and information systems on employees' performance", *VINE Journal of Information and Knowledge Management Systems*, Vol. 48 No. 2, pp. 217-237.

Brilman, J. (2002), *Nowoczesne Koncepcje i Metody Zarządzania*, Polskie Wydawnictwo Ekonomiczne, Warsaw.

Cameron, K.S. and Quinn, R.E. (2011), *Diagnosing and Changing Organizational Culture: Based on the Competing Values Framework*, Jossey-Bass, San Francisco.

Cheuk, B.W. (1998), "Modelling the information seeking and use process in the workplace: employing sense-making approach", *Information Research*, Vol. 4 No. 2, pp. 2-4.

Choo, C.W. (2013), "Information culture and organizational effectiveness", *International Journal of Information Management*, Vol. 33 No. 5, pp. 775-779.

Choo, C.W., Bergeron, P., Detlor, B. and Heaton, L. (2008), "Information culture and information use: an exploratory study of three organizations", *Journal of the American Society for Information Science and Technology*, Vol. 59 No. 5, pp. 792-804.

Curry, A. and Moore, C. (2003), "Assessing information culture - an exploratory model", *International Journal of Information Management*, Vol. 23 No. 2, pp. 91-110.

Davenport, T.H. (1994), "Saving IT's soul: human-centered information management", *Harvard Business Review*, Vol. 72 No. 2, pp. 119-131.

Davenport, T.H. (1997), "Ten principles of knowledge management and four case studies", *Knowledge and Process Management*, Vol. 4 No. 3, pp. 187-208.

Davenport, T.H. and Prusak, L. (1997), *Information Ecology: Mastering the Information and Knowledge Environment*, Oxford University Press, New York, NY.

Delaney, A.M. (2009), " 'Institutional researchers' expanding roles: Policy, planning, program evaluation, assessment, and new research methodologies", *New Directions for Institutional Research*, Vol. 2009 No. 143, pp. 29-41.

Dervin, B. (1992), "From the mind's eye of the user: the sense-making qualitative-quantitative methodology", in Glazier, J.D. and Powell, R.R. (Eds), *Qualitative Research in Information Management*, Libraries Unlimited, Englewood, pp. 61-84.

Dervin, B. (1999), "On studying information seeking methodologically: the implications of connecting metatheory to method", *Information Processing and Management*, Vol. 35 No. 6, pp. 727-750.

Dervin, B. (2003), "Human studies and user studies: a call for methodological inter-disciplinarity", *Information Research*, Vol. 9 No. 1, pp. 1-9.

Evans, N. and Price, J. (2018), "Death by a thousand cuts: behaviour and attitudes that inhibit enterprise information asset management", *Information Research: An International Electronic Journal*, Vol. 23 No. 1, available at: http://informationr.net/ir/23-1/paper779.html (accessed 12 November 2018).

Ginman, M. (1987), "Information culture and business performance", *IATUL Quarterly*, Vol. 2 No. 2, pp. 93-106.

Gorichanaz, T. (2018), "Perspective in information behaviour research", *Information Research: An International Electronic Journal*, Vol. 23 No. 4, available at: www.informationr.net/ir/23-4/isic2018/isic1803.html (accessed 28 December 2018).

Katopol, P.F. (2007), "Information culture of support staff in municipal government and implications for managerial decision-making", ProQuest dissertations and theses, University of Washington, Seattle, Washington, DC.

Kidwell, J.J., Vander Linde, K. and Johnson, S.L. (2000), "Applying corporate knowledge management practices in higher education", *EDUCAUSE Quarterly*, Vol. 23 No. 4, pp. 28-33.

Krupski, R. (2006), "Elastyczność organizacji – elementy teorii", *Zeszyty Naukowe WWSZIP*, Vol. 9 No. 2, pp. 4-11.

Lauri, L., Heidmets, M. and Virkus, S. (2016), "The information culture of higher education institutions: the Estonian case", *Information Research: An International Electronic Journal*, Vol. 21 No. 3, available at: http://informationr.net/ir/21-3/paper722.html (accessed 28 November 2018).

Leimer, C. and Terkla, D.G. (2009), "Laying the foundation: institutional research office organization, staffing, and career development", *New Directions for Institutional Research*, Vol. 2009 No. 143, pp. 43-58.

Marchand, D.A., Kettinger, W.J. and Rollins, J.D. (2002), *Information Orientation: The Link to Business Performance*, Oxford University Press, New York, NY.

Masa'deh, R., Shannak, R., Maqableh, M. and Tarhini, A. (2017), "The impact of knowledge management on job performance in higher education: the case of the university of Jordan", *Journal of Enterprise Information Management*, Vol. 30 No. 2, pp. 244-262.

Materska, K. (2007), *Informacja w Organizacjach Społeczeństwa Wiedzy*, SBP, Warszawa, available at: http://bbc.uw.edu.pl/dlibra/docmetadata?id=470&dirds=1&tab=2

Nonaka, I. and Takeuchi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, New York, NY.

Olivares, F.A., Vargas, E., Fuentes, C., Martínez-Pernía, D. and Canales-Johnson, A. (2015), "Neurophenomenology revisited: second-person methods for the study of human consciousness", *Frontiers in Psychology*, Vol. 6, Article No. 673, available at: www.frontiersin.org/articles/10.3389/fpsyg.2015.00673/full (accessed 28 November 2018).

Oliver, G. (2004), "Investigating information culture: a comparative case study research design and methods", *Archival Science*, Vol. 4 No. 3, pp. 287-314.

Oliver, G. (2008), "Information culture: exploration of differing values and attitudes to information in organisations", *Journal of Documentation*, Vol. 64 No. 3, pp. 363-385.

Powley, E.H. and Cameron, K.S. (2006), "Organizational healing: lived virtuousness amidst organizational crisis", *Journal of Management, Spirituality & Religion*, Vol. 3 Nos 1/2, pp. 13-33.

Raman, L. (2017), "Application of knowledge management in university research and higher education: an experiment with communities of practice (COP)", Enhancing Academic Research With Knowledge Management Principles, IGI Global, Hershey, PA, pp. 92-114.

Rowley, J. (2000), "Is higher education ready for knowledge management?", *International Journal of Educational Management*, Vol. 14 No. 7, pp. 325-333.

Terenzini, P.T. (2013), "'On the nature of institutional research' revisited: plus ça change… ?", *Research in Higher Education*, Vol. 54 No. 2, pp. 137-148.

Vick, T.E., Nagano, M.S. and Popadiuk, S. (2015), "Information culture and its influences in knowledge creation: evidence from university teams engaged in collaborative innovation projects", *International Journal of Information Management*, Vol. 35 No. 3, pp. 292-298.

Wang, M. (2006), "The impact of information culture on managing knowledge: a double case study of pharmaceutical manufacturers in Taiwan", *Library Review*, Vol. 55 Nos 3/4, pp. 209-221.

Widén, G. and Hansen, P. (2012), "Managing collaborative information sharing: bridging research on information culture and collaborative information behaviour", *Information Research: An International Electronic Journal*, Vol. 17 No. 4, available at: http://www.informationr.net/ir/17-4/paper538.html (accessed 28 November 2018).

Widen, G. and Hansen, P. (2017), "The embeddedness of collaborative information seeking in information culture", *Journal of Information Science*, Vol. 43 No. 4, pp. 554-566.

Widén-Wulff, G. (2000), "Business information culture: a qualitative study of the information culture in the Finnish insurance industry", *Information Research: An International Electronic Journal*, Vol. 5 No. 3, available at: http://informationr.net/ir/5-3/paper77.html (accessed 27 November 2018).

Wright, T. (2013), "Information culture in a government organization: examining records management training and self-perceived competencies in compliance with a records management program", *Records Management Journal*, Vol. 23 No. 1, pp. 14-36.

Zheng, W., McLean, G.N. and Yang, B. (2005), *The Impact of Organizational Culture, Structure, and Strategy on Knowledge Management Effectiveness and Organizational Effectiveness*, University of Minnesota, Ann Arbor, MI, available at: https://search.proquest.com/docview/305434413?accountid=11664

Further reading

Davenport, T.H. and Prusak, L. (2000), *Working Knowledge: How Organizations Manage What they Know*, Harvard Business Review Press, Boston, MA.

Mokhtar, U.A. and Yusof, Z.M. (2016), "Records management practice: the issues and models for classification", *International Journal of Information Management*, Vol. 36 No. 6, pp. 1265-1273.

Corresponding author
Marek Deja can be contacted at: marek.deja@uj.edu.pl