

# Where are the higher education institutions from knowledge protection: a systematic review

Higher  
education  
institutions

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## Abstract

**Purpose** – Knowledge protection (KP) is one of the main knowledge management (KM) processes that aim to protect the organization's knowledge from any inside and outside force leakage. In higher education institutions (HEIs), KP is rarely being discussed and covered in contrast to knowledge sharing (KS) in terms of its determinants. The purpose of this paper is to provide a deep analysis of previous research articles from 1980 to 2019 and examine the associated institutional factors on KP determinants within HEIs as a research objective.

**Design/methodology/approach** – The preferred reporting items for systematic reviews and meta-analysis was a well-established approach for analyzing the systematic literature review methodology. Several articles were published over the past decades collected from 5 different databases, but after the screening, 101 articles were reviewed and only 22 articles were relevant to the research objective.

**Findings** – The findings indicated that KP is under academic research topic in KM and has received minimal attention in HEIs compared to KS, which has been frequently studied in HEIs. The literature categorized KP determinants into four areas: technological, organizational structure, behavioral and ethics and organizational culture. It will open the door for academics to investigate further into the factors, theories and models of KP in general and HEIs from a particular perspective.

**Practical implications** – As evident from the paper finds, with few pieces of literature covered in this topic, HEIs have to protect the knowledge from any illegal usage or any expert's knowledge loss after leaving the institutions. This study can help university leaders to understand how the different KP determinants can maximize KP without affecting the KS and develop the KP phenomenon for a strategic fit to enhance their institutions' safe knowledge usage.

**Originality/value** – This is the first research of its type which has extensively examined the literature on KP related to HEIs. Also, this paper provides theoretical and practical insights through understanding the determinants that affect KP practices among academic staff.

**Keywords** Knowledge management, Knowledge protection, Academics, Higher learning institutions, Intellectual capital

**Paper type** Literature review



## 1. Introduction

Over the past few decades, knowledge has been essential to survive in the corporate world (Omerzel *et al.*, 2011; Thalmann and Sarigianni, 2016). Knowledge is widely considered a key asset for enterprises as a particular element of knowledge management (KM), which gives

them a high standard of competitive advantage (Ajmal and Helo, 2010; Kukko, 2013). Väyrynen *et al.* (2013) mentioned that loss of competitive advantage can happen because knowledge can be easily collected. Nevertheless, knowledge protection (KP) is complicated, as intelligence is naturally fluid and exists in people's minds (Elliott *et al.*, 2019). Knowledge is an important resource for most organizations but the issue is that knowledge managers pay little attention to KP in organizations (Asllani and Luthans, 2003).

KM has been typically discussed in relation to for-profit organizations, however, it is important to consider that knowledge plays a vital role in higher education institutions (HEIs) (Prahalad and Hamel, 1990). Thus, one of the main missions of HEIs is knowledge transfer. The universities are in the business of generating and disseminating knowledge (Al-Kurdi *et al.*, 2018). Using KM techniques and technologies in higher education is as vital as it is in the corporate sector. If done effectively, it can lead to better decision-making capabilities, reduced "product" development cycle time (for example, curriculum development and research), improved academic and administrative services and reduced costs (Kidwell *et al.*, 2000). As institutions launch KM initiatives, they can learn lessons from their counterparts in the corporate sector (Kidwell *et al.*, 2000). To gain control of market developments and users' needs, organizations use KM practices and rapidly bring the knowledge into action in the business development pipeline. Where HEIs use the KM to promote their educational mission in the build of community society and ensure adequate and accurate knowledge with current validity and honesty of truth.

HEIs are complex social organizations with predominating academic freedom and autonomy that dominate their culture, where teachers and researchers consider knowledge as their private property and source of differentiation. The knowledge base of HEI is fragmented into three basic domains of knowledge: institutional, scientific and pedagogical. In addition, the nature of diversity across different disciplines often implies difficulties in identifying which knowledge is critical to managing, representing some constraints in the development and implementation of academic KP. Academics' importance of knowledge within HEIs was given attention (Ayyagari and Tyks, 2012; Chan and Mubarak, 2012; Kam *et al.*, 2013) but protection strategies are still scarce in HEIs compared to other organizations (Rezgui and Marks, 2008).

Recent evidence suggests that the protection of knowledge is a complex problem that is frequently neglected in administration and left to knowledge "owners" (Ahmad *et al.*, 2014). HEIs have to establish plans for the use of institutional knowledge to improve their operations and efficiency (Bhusry and Ranjan, 2011). Consequently, a specific KP policy must be placed in motion so businesses can take maximum advantage of one of their most valuable tools (Thalmann and Sarigianni, 2016) and, in our situation, HEIs in particular. Thus, the preservation of KP is a vital technique for retaining academic expertise during or after their jobs. The observation demonstrated potential threats to an entity in terms of KP (Thalmann and Sarigianni, 2016). HEIs are often unique because their input and output are knowledge. The principal difficulty of current HEIs, therefore, resides in addressing the demands of academic staff, who at the same time include high-level developers, clients and generators and creators of new knowledge (Omerzel *et al.*, 2011).

As knowledge makers, knowledge, innovation and skills make a major contribution to higher education's intangible assets which consider a source of an advantage for all sectors. Significantly, HEIs can achieve a competitive edge in the market by identifying and measuring their knowledge asset bases (Omona and van der Wiede, 2014). The efficiency in higher education propels the wilderness of knowledge by using rich and novel authoritative information (Hoxby and Stange, 2019). In any case, the form of useful training and relevant experience generate productivity of knowledge capital in the employee's head

(Strassmann, 1999). Subsequently, knowledge capital is considered an intangible value of an organization (Kenton, 2019). High knowledge capital organizations can be more productive or profitable compared to lower knowledge capital organizations (Kenton, 2019). As indicated by Aleixo *et al.* (2018), the HEIs practices are connected to various dimensions such as: (financial, social, environmental and organizational) and are integrated into the primary activities of HEIs, specifically teaching, research, operations, social responsibilities and culture. Concerning the conceptualization variety of knowledge assets in the HEIs, this paper covered the knowledge assets of the institutional or organizational as one entity of dimension in general without any specification.

The aim of this paper is to review existing studies on KP determinants within HEIs due to the scarcity of this topic, to identify opportunities for future research on this topic. In doing so, the authors will look for the most researched papers that discussed the determinants of KP in organizations in general and HEIs in particular. The paper is divided into seven sections as follows: Section 2 provides the overview of KP and intellectual capital of HEIs then is followed by Section 3, which aims to explore past literature related to KP determinants. Section 4 describes the methodology adopted in this study. After that, Section 5 discusses KP in the context of HEIs, by providing a summary of relevant studies in this domain area. Section 6 discusses the key factors finding that contribute to KP toward HEIs. Finally, the study conclusion, key implications and future research areas are presented in Section 7.

## 2. Knowledge protection: an overview

As KM has been closely linked to higher education's institutional research role, the implementation and protection of KM in higher education has so far only been partially examined. The institutions of higher education will benefit from learning that KM is more than just data management (Metcalf, 2006). KM is considered as one of the most important resources that will make a contribution to improve the environment of the educational system (Veer-Ramjeawon and Rowley, 2019). It plays a vital role for the whole education process to develop better quality and effective input and output of knowledge (Rowley, 2000). Pinto (2014) highlighted that KM creates crucial advantages to education institutions processes such as curriculum development, research, alumni services and administrative services. In KM, KP has recently been defined as a significant subject (Bloodgood and Salisbury, 2001; Ford and Staples, 2010). Organizations that do not adopt measures to avoid leaking their knowledge are just targets for malicious insiders. Knowledge is viewed as an essential corporate asset that needs to be safeguarded and as a vital tool for the growth of organizations (Wasko and Faraj, 2000). Knowledge is divided into two types: explicit is objective and tacit is the subjective source (Väyrynen *et al.*, 2013). Files and other data preserved in repositories are the explicit knowledge of an organization (Kogut and Zander, 1992). Sticky, complicated and hard to codify data refer to tacit knowledge (Cohen *et al.*, 2000). There is also a specific level of expertise in the organizations and it is essential to prevent losing the assets needed for HEIs.

KP remains a widely discussed subject among scholars and practitioners, depending upon the context and viewpoint, following many attempts at describing KP in literary journals. Protection of knowledge requires the focal point enterprise's actions to safeguard their knowledge from theft and imitation by the collaborators (Norman, 2002). Erickson and Rothberg (2009) argue that the need for KP depends on how competitive is the organization. Consequently, it is crucial to use other mechanisms of KP such as licenses, trademarks, trade secrets or non-disclosure agreements (Jean *et al.*, 2014). Manhart and Thalmann (2015) outlined that KP focuses on the leakage of knowledge to the unauthorized individual

(Ahmad *et al.*, 2014), knowledge visibility reduction from externals (Lee *et al.*, 2007) and the prevention of knowledge loss like those who leave or retire from the job (Jennex and Durcikova, 2013). For the HEIs context, knowledge sharing (KS) becomes increasingly important, but its inter-organizational nature and the blurring of organizational boundaries create new challenges for the protection of knowledge (Ilvonen *et al.*, 2018). However, KS and KP are interrelated processes of KM. Gast *et al.* (2019) shows that a balance between KS and KP in organizations is facilitated when inter-organizational KM helps employees share general and project-specific knowledge while they withhold core knowledge about their organizations. This means that the knowledge is provided enough to achieve the mutual goals while core knowledge is protected from unintended leakage to keep HEIs competitive advantages (Nguyen and Nafula, 2016).

Research conducted by several organizations, including the distribution of 242 surveys to companies, addressed KP and established that it improves KS and innovation performance (Hurmelinna-Laukkanen, 2011). Several studies presented the protection of knowledge. Access to security, freedom of partnership and inconvenience of security, as well as the management of innovation requirements, had successful effects on formal and informal safety mechanisms which were identified by Olander *et al.* (2014). Resource features and associated resources have affected the protection of knowledge (Norman, 2002). HEIs, just like private organizations, seek to achieve strategic advantage due to the stiff market and the need to tackle globalism. Consequently, HEIs must ensure that knowledge cannot be used improperly or illegally.

### *2.1 Intellectual capital of higher education institutions*

According to Dierickx and Cool (1989), intellectual capital (IC) is the reservoir of knowledge retained by the enterprise and consists of three components: human capital, institutional capital (organizational and technical capital) and relational capital/customer capital. As partners in the development, distribution and protection of knowledge, HEIs have taken on a more entrepreneurial position that is increasingly embodied in the light of the crucial issues of sustainability and social change (Fronzizi *et al.*, 2019). Besides, the growth of the knowledge economy and expanded networking in society. These authors emphasize the fact that this concept is in line with the fourth stage of intellectual capital, i.e. the creation of ecosystem-based knowledge (Pedro *et al.*, 2020), the creation of knowledge that must be implemented and shielded from any leakage or degradation from HEIs. Knowledge has been one of the key drivers of social and economic change, enhancing the role of IC in generating sustainable growth and development (Cabrita and Cabrita, 2010). HEI's IC may be one of the main elements in the promotion of sustainable development (Silva and Ferreira, 2019) and HEIs must, therefore, seriously rethink their knowledge stage of the IC and pay more heed to the protection of their knowledge.

IC ranks among the most crucial and important tools for knowledge organizations (Kamath, 2007), as is the case for HEIs, provided that their inputs and outputs are largely intangible and interrelated with knowledge. Accordingly, HEIs generate knowledge (e.g. research findings, publications, patents, among others), distribute knowledge by teaching (Ramirez and Gordillo, 2014) and recruit knowledge staff (Cong and Pandya, 2003). The term IC within HEIs refers to all intangible or non-physical assets of an organization, including systems, innovation resources, trademarks, implicit knowledge and skills of its employees, strengths and capabilities, acceptance by society, the network of partners and their connections, among others (Ramírez and Gordillo, 2014). In addition, HEI's most important resources include its lecturers, scholars, managerial and administrative personnel, governors and students and the full range of their respective interactions and operational

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practices (Leitner, 2004). Bongiovanni *et al.* (2020) discussed the connection between IC and its numerous insights into university records, expertise and knowledge, highlighted the critical importance of information management systems and initiatives to safeguard the IC of the institution and ensure that they will gain benefit from this crucial asset.

### 3. Determinants of knowledge protection

To build a thriving KM climate in an organization and adequately protected knowledge security system is critical (Wang *et al.*, 2016). Protection knowledge is essential for KM because organizations have to safeguard their intellectual property and, in specific, their operational knowledge (Bertino *et al.*, 2006). Manhart and Thalmann (2015) outlined that there is a range of obstacles to KP measures from a KM aspect. This involves the idea that KP is still perceived as just a hurdle to the exchange of knowledge (Khamseh and Jolly, 2008). Factors emerge from various framework levels inside and beyond the HEIs which involve policies, culture, individuals and systems that influence the mechanism of KP. Fullwood *et al.* (2013) examined knowledge and human capital as considerations control efficacy and play a major role in the acceptance of culture and support for information in HEIs.

Smith and McKeen (2003) have defined KM as one that debates ideas openly and applies knowledge and where the desire to exchange information and learn from others is the standard. Many recent studies have focused on sharing knowledge and not the protection of knowledge from scientific, societal, behavioral, ethical and organizational culture. The technical component concentrated on technologies and tools to enhance the expertise of organizations. Moreover, many of the discussions within these fields held economic, interpersonal, legal and cultural viewpoints of employees. Consequently, organizational and related behavioral factors should be viewed as necessary to KP goals in contrast with technical elements in the normal organizational cycle.

#### 3.1 Technological determinants

Information technology (IT) is essential to eliminate connectivity obstacles within organizations (Ngoc, 2005). Several sources indicate that supportive technology infrastructure is necessary to ensure that knowledge leakage is prevented (Desouza, 2006; Gold *et al.*, 2001; Norman, 2001; O'Donoghue and Croasdell, 2009). Identifying, configuring and deploying tools and technologies to verify, monitor and evaluate access to sensitive knowledge can prevent knowledge leakage. KP will concentrate on how IT should be developed in and within organizations' surveillance, to provide regulation and avoidance of the leakage of knowledge (Majchrzak and Jarvenpaa, 2010; Sveen *et al.*, 2007). Väyrynen *et al.* (2013) suggested an experimental approach to overcome KP challenges of social media (SM) within the organization. Bertino *et al.* (2006) emphasized that the protection of their intellectual properties should also be integrated into the KM lifespan.

Firms such as professional services, information and communication technologies ICT and knowledge are a large component of the overall valuation of the business. It is a crucial management challenge that must be tackled using secured systems and technology (von Krogh, 2012). The general opinion is that the technology is somewhat neglected by the KP literature, as it comes from strategic management studies. Also, this indicates that investigation into supporting IT for the protection of knowledge has still not been explored with an emphasis mainly on the interpretation of its core values (Manhart and Thalmann, 2015). Tashkandi and Al-Jabri (2015) found that there are main factors like privacy and complexity that are affecting cloud computing in HEIs. The non-adopters who were more worried regarding the safety and sophistication of the system shared these concerns

significantly. They will invest in emerging technology with a high standard of protection to secure knowledge in HEIs.

### 3.2 Organizational structure determinants

The hierarchical framework of efficient KM acquisition in an organization may be inhibited (Abubakar *et al.*, 2019). The organizational structure relates to the organization's method of organizing individuals and employees to do the organization's work. For instance, a strengthened or consolidated structure may lead to dense and uncompromising boundaries in the regulation for KP (Lee *et al.*, 2017). In terms of its effect on information flow between departments and proper documentation of policies, rules and processes placed in HEIs, the organization framework can be addressed and also how knowledge can be produced and communicated (Syed-Ikhsan and Rowland, 2004). There are information and files that are limited to specific employee grades, prohibiting knowledge from spreading across the organization. Files and information according to the organization structure are categorized into four categories, which are open, confidential, secret and top secret. Therefore, efficient communication is vital for the viability of current know-how for the organization; nevertheless, structured organizational entities that limit reporting exclusively through division networks limit the accessibility of each division to the knowledge gained by certain business divisions (Krylova *et al.*, 2016). This often establishes obstacles between divisions using vertical frameworks as each division operates mostly as if this was an individual organization, rendering it very hard to transfer knowledge (Krylova *et al.*, 2016).

### 3.3 Behavioral and ethics determinants

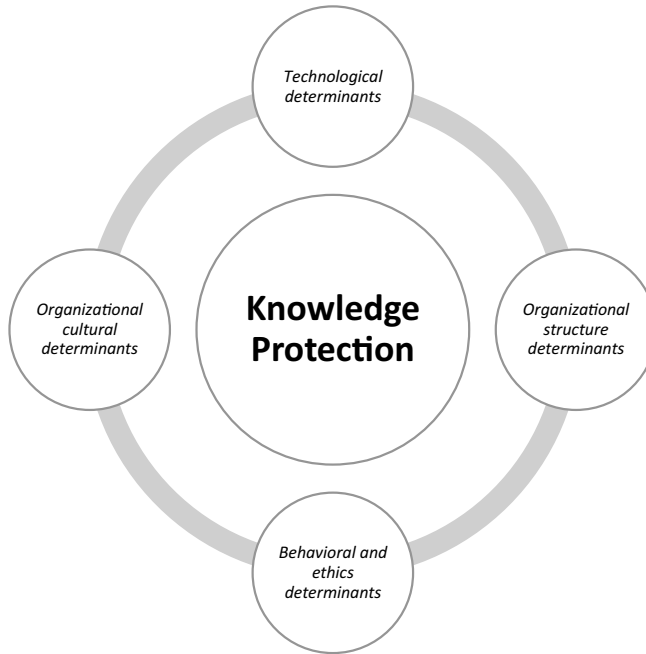
Some facilitators and success criteria in this activity are addressed in the literature to promote and implement KP behavior in organizations. Several studies (Olander *et al.*, 2016) have concentrated on the connection between organizational trust as an ethic and KP and the exiting of knowledge. If an individual is aware of any strategic decisions, the conventional methods cannot be applied to the adaptive and automated KM setting. Therefore, one of the tasks for maintaining environmental security is to ensure that human behavior and corporate ethics are as smooth as possible (Bertino *et al.*, 2006). Antošová (2011) stated that behavior can be changed either internally or externally but according to the environmental impact. It relies on the personality and principles of employees to protect and to share knowledge (Al-Alawi *et al.*, 2007). The right people must be able to and immediately use knowledge, which contributes to the creation of essential steps (Antošová, 2011). The actions and morals of the organization's employees may affect the protection of knowledge by compromising their trust and the faith to deter external individuals from the opportunistic activity may be one of the forms of preserving knowledge (Norman, 2002). Several studies (Elliott *et al.*, 2019; Thalmann and Sarigianni, 2016; Väyrynen *et al.*, 2013) have studied and analyzed hurdles to the protection of knowledge. The knowledge-sharing and protection actions of the staff can, as regard to practical significance, affect or support the overall plan of the organization (Husted *et al.*, 2013). Findings have identified many obstacles to KP which encompass lack of expertise, temperament and actions of workers, corporate integrity, means of contact, the culture of sharing of knowledge, instruction on IT security techniques, leadership and respect for it and engagement from top managers, work safety, global culture and the shortage of the desire to allow the use of advanced technologies in KP.

### 3.4 Organizational cultural determinants

In the beginning, culture can be defined within the institutions in terms of systemic or corporate culture, regional culture and, obviously, KP itself is a culture. Every organization has a unique cultural history (Al-Alawi *et al.*, 2007). According to Szczepańska-Woszczyzna (2014) culture is an internal organization mechanism which is helping individuals to adjust the organization's KP environment. Organizational structure can encourage or potentially stop collaboration, KS, expertise and insights (Szczepańska-Woszczyzna, 2014). The corporate culture has always played a significant role in many IT management systems and KM (Balthazard and Cooke, 2004). An organization's culture is an important factor that affects corporate ability (Ajmal and Helo, 2010). Leaders are a key player in protecting the knowledge and expertise of indigenous groups within the corporate community (Blakeney, 2011). The distribution of knowledge and resources without being taken advantage of or embezzled is essential for a healthy organizational culture (Lakshmanan and Lakshmanan, 2014). This distribution highlights all facets of KM activities may be more accurate and reinforces the information and expertise required for developing such a system while recognizing the protection of knowledge to obtain the desired result. Protecting knowledge is essential for efficient corporate operation and management (Mills and Smith, 2011) and for awareness impacting organizational culture or seeking to meet market demands (Liebowitz *et al.*, 2000). Organizational culture has a significant impact on the desire to exchange knowledge among individuals (Wasko and Faraj, 2000). However, an organization's culture has been regarded as a crucial barrier to practical university-industry training (Bruneel *et al.*, 2010). For this purpose, unless otherwise defined, the word "culture" is used in the whole paper to describe the corporate culture. In contrast with specific surveys in the Middle East and Africa countries, as well South America, the work examined in the commercial and government area has primarily been done in western nations, Malaysia and China (Al-Alawi *et al.*, 2007). Thus, it is challenging to determine the connection between actual corporate culture and behavioral influences, despite the focus of study within this framework. At the same time, the current work points to the same connection. A considerable number of studies in the government and relevant publications between knowledge and the national culture were also identified in the public and private sectors. Figure 1 shows the KP determinants.

### 4. Methodology for systematic literature review

Before carrying any research study it is important to have a rigorous literature review stage (Al-Emran *et al.*, 2018). It forms the basis for knowledge accumulation, which, in turn, helps for the theories' improvements and expansions, closes existing gaps in research and uncovers areas where previous research has missed (Marangunić and Granić, 2015). It must be done by identifying related published work and ensure thoroughness (Ali and Miller, 2017; Williams *et al.*, 2015). Therefore, it is appropriate because it provides breadth in searching and arranging evidence (Ali and Miller, 2017). In developing the methodology for this systematic review, the authors decided to adopt the recommended framework by Siddaway *et al.* (2019). This framework has the potential to apply to any discipline or subject area due to its high level of abstraction (Siddaway *et al.*, 2019). The authors conducted the review in five phases: scoping, planning, identification (searching), screening and eligibility. The details of these phases are demonstrated in the following sub-sections.



**Figure 1.**  
KP determinants

*4.1 Scoping*

The present study aims to identify the most determinants affecting KP in higher learning institutions, especially technological factors. Hence, it is necessary to consider that limited research exists.

*4.2 Planning*

The authors set several criteria for the subject domain to achieve a depths understanding of the knowledge context. In this respect, the articles that will be critically analyzed in this review study should meet the inclusion and exclusion criteria listed in [Table 1](#).

The authors applied the exclusion criteria to only papers focusing on or discussing general KP terminologies and concepts. In addition, book chapters were excluded to ensure peer revision status and academic research relevance.

Inclusion criteria	Exclusion criteria
Key knowledge-protection concepts It should involve KPs and technology It should involve KPs and HEIs	Non-English papers Publications prior to 1980 Non-opinion and conference review papers Unrelated journals
It should be written in the English language It should be published between 1980 and 2019 Peer-reviewed journals and conferences It should focus on knowledge-protection determinants among academics	

**Table 1.**  
Inclusion and exclusion criteria



#### 4.3 Identification (searching)

In this phase, five databases were included in this study: Scopus, Academic Search Premier (EBSCO), ProQuest, The Institute of Electrical and Electronics Engineers (IEEE) and Education Resource Information Center (ERIC). Also, these databases are considered as international publishers (Elsevier Science Publication Company, Emerald Group Publishing, Springer Science, Sage Publications, Inc. and Wiley Periodicals, Inc.) and peer-reviewed journals particularly in education and other disciplines. One of the most important steps is to select the keywords in any systematic review because it determines which articles are to be retrieved (Costa and Monteiro, 2016). Several types of keywords were used: “Knowledge protection” OR “protecting knowledge” OR “protect knowledge,” “knowledge protection” AND “technology,” “Knowledge protection” AND “higher education institutions,” “Knowledge protection” AND “academics.” These keywords were chosen to provide a clear understanding of knowledge-protection concepts and definitions. Also, it was used to understand the current research status in the academic fields and technological contexts. The search results retrieved (2,854) articles using the above-mentioned keywords.

#### 4.4 Screening

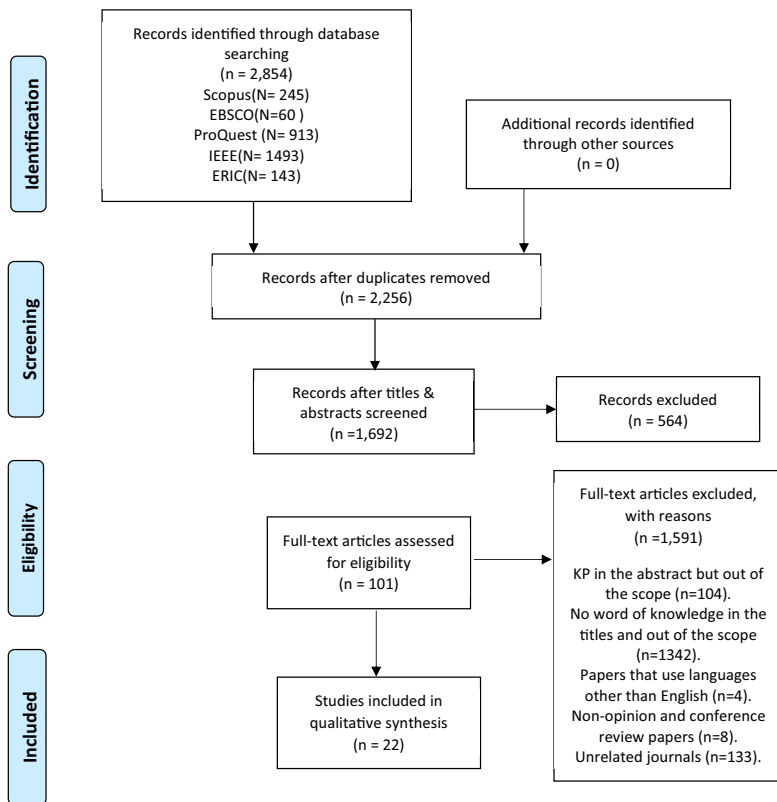
Next, the authors proceeded with the screening step. This step identified (598) duplicated articles and were filtered out. Hence, the overall number of remaining articles becomes (2,256). As this study is examining the previous studies on KP determinants within the context of higher learning institutions, the authors screened the titles and abstracts for all records and the inclusion and exclusion criteria for each study are confirmed. Finally, (101) research articles were found to fit the inclusion criteria then were included in the analysis process. While these articles were analyzed, it was observed that there were a large number focused on KM and KS compared to KP. This review study was carried out according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) as shown in Figure 2 (Moher *et al.*, 2009).

#### 4.5 Eligibility

To check the eligibility of papers we need to carry quality assessment along with the inclusion and exclusion criteria which are considered as a crucial factor (Al-Emran *et al.*, 2018). In the last phase, both authors screened the abstracts with further sections of the articles if relevant to make sure that the pre-defined scope is covered. This step generated a final selection of (22) articles, which we believe fulfilled the criteria mentioned in this study and then both authors individually worked for analysis. We decided to use articles in which “knowledge protection” and academics appeared in the title or abstract. The reason for doing this method is to avoid selecting unrelated papers and to obtain the correct number of studies. However, (104) papers outlined KP in the abstract but were out of the scope and (1,342) papers that did not use the word knowledge in their titles and out of scope. Also, four papers used languages other than English, eight non-opinion and conference review papers and (133) papers were published in unrelated journals.

### 5. Examining knowledge protection in higher education institutions

HEI are essential players in the development of an educated society and leading social changes. Knowledge is a crucial component and HEIs play a significant role in creating and promoting its social use and guaranteeing it protects against losses. More knowledge is accessible at the subsidiary stage, which raises the need for KP (de Faria and Sofka, 2010). Mathew (2010) claims that KM offers a range of approaches to issues related to the teaching-learning process of sustainable higher education. Albastaki and Shajera (2012) stated that



**Figure 2.**  
PRISMA flowchart  
for the selected  
studies

the absence of KM initiatives may contribute to the failure of higher learning institutions. For the successful resources KP in HEIs (El-Badawy *et al.*, 2015), preserving knowledge capital against depletion, obsolescence, unauthorized disclosure, unauthorized alteration and erroneous acquisition is essential. The protection of knowledge is usually considered and ignored in the light of present research (Hurmelinna-Laukkanen, 2011) and exceedingly inaccessible literature covering either the role or presence of KP in higher education (Bolisani *et al.*, 2013).

The policy environment defines the role of the state government in managing the sometimes conflicting forces of professional ideals on the one side and the economy on the other (Richardson *et al.*, 1998). Policymakers, in particular, need to build a policy environment in which organizations are enabled to have a good deal of autonomy as this allows them to be strategic, dynamic and willing to shift rapidly enough in international competition (Kitagawa, 2003). In this policy setting, which is marked by interconnections and knowledge flows, think tanks may fill a significant niche (Hovland, 2020). The policy environment is not really conducive to the use of evidence and expertise due to a structural and leadership distance, considering the necessary involvement of policymakers. In this sense, leadership and structural infrastructure need to be developed to allow researchers to have an effect (Carden, 2009). Therefore, the policy environment is in place to govern the usage of HEIs knowledge among the internal and external individuals within the stipulated

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rules of sharing, controlling and protecting the knowledge. Protecting the knowledge adheres to meet the institution policy environment regulations in accordance with its safe sharing to the institution educational society.

The main concept of KP is to protect the tacit knowledge loss, when it comes to having an expert and knowledgeable person intentionally or sometimes unintentionally leaving the institution without taking any precautionary steps in securing this individual knowledge for future usage and KS purpose. Other KP is to ensure the explicit knowledge is protected from non-authorized personnel who may have illegally access it. However, KP should not be seen from a narrow-angle, which could be considered a process of KM that will prevent sharing the knowledge in case this has the more restricted protection measurements. In general, this process aimed to ensure a safe protection procedure for both tacit and explicit knowledge in HEIs.

### *5.1 Knowledge protection among academics*

Academics discussed their thoughts and opinions on the forum universities represent (Martin and Marion, 2005). It has long been a custom to protect all related records in the information library or archive of almost all HEIs using in-house tools. Adhikari (2010) emphasized that attempts to manage educational institutions in today's environment without KM programs could lead to degradation. The formal and informal protection methods have a somewhat different structure and the difficulty for many organizations is finding a proper balance of steps for the organization. For starters, staff awareness training, teaching personnel about conduct laws and the value of the protection of knowledge (Ivonen *et al.*, 2018). It has contributed to the difficulty of maintaining the equilibrium of "trying to learn and trying to protect" (Kale *et al.*, 2000), leading to the conflicting demands of learning and maintaining the protection. The different directions of industry and universities (Siegel *et al.*, 2004) and the different motives, attitudes and organizational cultures of these organizations, are significant obstacles to a combined sense-making of university-industry relations (UIRs). However, the primary incentive for organizational players is to establish and build private knowledge that is expected to stay concealed or revealed by patenting in a restricted manner (Geuna and Nesta, 2003).

### *5.2 Summary of knowledge protection contributions in higher education institutions*

The authors identified several studies, but a limited number of identified studies are existing specifically on KP in HEIs, the selected papers were thoroughly reviewed to identify research factors affecting knowledge-protection determinates related to a larger organization. Table 2 presents the KP determinants examined in these identified studies.

## **6. Discussions**

HEIs must capture knowledge internally and externally and use it for operational effectiveness. Protecting knowledge is another main agenda. Knowledge of HEIs should be shielded from leaks to other parties. HEIs have similar strategic and tactical business strategies as any other organization. Similarly, common strategic priorities, marketing tactics and corporate-like approaches to optimizing HEIs outcomes face similarly acute risks of other companies. The HEIs often provide a rare intersection of extremely classified student information (from many countries), private research projects and even sensitive government-funded research projects. Accidental leaking of classified information in numerous organizations, including HEIs, has resulted in major financial and reputational damages (Posey Garrison and Ncube, 2011). In addition, data stealing, false representation and social modification efforts will effectively damage the recipients of stolen information

**Table 2.**  
Summary of KP  
determinants

No	Author(s)/year	Country	Methodology	Sample	Researched determinants	Outcome
1	<a href="#">Thalmann et al. (2014)</a>	Austria	Narrative review	N/A	IT security management (security controls and configurations) Knowledge audit Regulations, technical support and trust	KP was significant in enhancing organizational performance. IT security management could be adapted to the needs of KP in KM as a technical solution The study demonstrated the correlation between KP and trust
2	<a href="#">Völz et al. (2011)</a>	Germany	Interviews and two case studies	50 interviews among 11 small and medium-sized enterprises (SMEs) 5–10 interviews for the case study 50 interviews	Personal relationships, personal attributes and social norms	The study confirms that dual low allegiance or dual high allegiance patterns exist and a relationship is shown between KS, allegiance and protection behavior The study indicates that when an organization puts more efforts to have strong protection, sharing knowledge with varying partners results in improved innovation performance of an organization
3	<a href="#">Husted et al. (2013)</a>	US, Finland and China	Interviews and participant observations	242 Finnish companies with at least 50 employees	Regime of a firm Collaboration	KM and innovation are the key drivers for the improvement of organizational performance. The study found that KM impacts technical innovation in the academic setting, but not all components of KM are directly associated with administrative innovation. However, knowledge utilization is significantly associated with technical innovation in the public universities setting in Vietnam
4	<a href="#">Hummelma-Laukkanen (2011)</a>	Finland	Survey-based questionnaire	531 respondents in 30 public universities	Organizational structure, administrative process, procedures, infrastructure, staff development program, work design system and policies	The study shows that both experience sharing and shared interpretation have a positive impact on knowledge exchange. Also, ambidexterity in knowledge exchange and KP has a positive effect on organizational performance
5	<a href="#">Ngoc-Tan and Gregar (2018)</a>	Vietnam	Survey-based questionnaire	135 organizations	Governance mechanisms (hostage arrangement), trust	
6	<a href="#">Yang et al. (2014)</a>	Taiwan	Survey-based questionnaire			

(continued)

No	Author(s)/year	Country	Methodology	Sample	Researched determinants	Outcome
7	Mohamad <i>et al.</i> (2017)	Malaysia	Survey-based questionnaire	202 organizations	Information technology capability	The study shows that both knowledge conversion and KP are positively and significantly related to organization innovativeness. Information technology capability was found to mediate the relationship between KP and knowledge conversion
8	Gold <i>et al.</i> (2001)	USA	Survey	300 senior executives	Knowledge infrastructure (culture and technology, structure) Knowledge process (acquisition, conversion, application and protection)	The results provide a basis for understanding the competitive tendency of an organization as it enters a program of KM. It suggests that knowledge infrastructure which consists of, structure, technology and culture along with knowledge process architecture of acquisition, conversion, application and protection are important for organizational capabilities for effective KM
9	Väyrynen <i>et al.</i> (2013)	Finland	Case study through interviews	11 IT managers	KP challenges (information security; reputation; management challenges) Characteristics of SM (information distribution speed; blurry audience; merging of private and professional identity; easily collectible information and generation transition) Decision-making and innovation through communication and mitigating security risks Sensitivity of information Degree of employees' trust Investments in protection mechanisms	The study developed a framework that presents eight questions that organizations should answer to help them address the three types of KP challenges like information security, reputation; management challenges in social media
10	Elliott <i>et al.</i> (2019)	UK	Interview	5 engineers and a manager		The interviews results suggest a potential conflict between two of the most important appropriability protection mechanisms: secrecy and lead-time advantage
11	Bolisani <i>et al.</i> (2013)	Italy	Survey	471 companies	Management knowledge Data management, data security; KP, knowledge-intensive business services	The study helped both Chief Executive Officers of knowledge-intensive business services regarding the mechanisms of KP and to policymakers about the possible public policies that may help organizations to protect their competitive knowledge capital without delaying their networks of interaction

(continued)

Table 2.

Table 2.

No	Author(s)/year	Country	Methodology	Sample	Researched determinants	Outcome
12	<a href="#">de Fara and Sofka (2010)</a>	Portugal and Germany	Survey	1,800 firms	International knowledge spillovers, especially through multinational companies (MNCs)	The study found differences at the level of the host country but not at the industry level. Multinational companies prefer broader sets of KP strategies in a host country with fewer opportunities for knowledge sourcing (Portugal). In Germany, though, they opt for narrower sets of KP strategies if they invest in innovation activities themselves. The authors argued for more research on the protection related to tacit knowledge, more research on technology support, deep investigations and more theories in KP research consideration, also research on how firms could build a strategy of KP
13	<a href="#">Manhart and Thalmann (2015)</a>	Austria	Structured literature review	48 papers were analyzed	Information technology artifact in KP	Integrating the perspectives of the base domains of knowledge, strategy, innovation and information security management to identify KP requirements in the era of digital transformation
14	<a href="#">Iivonen et al. (2018)</a>	Austria	Literature review	69 papers	Organizational boundaries Domains of knowledge, strategy, innovation and information security management	The result found that task uncertainty and task interdependency enhance KP regulation in teams and that information technology support moderates the relationship between both. Also, KP regulation improves inter-team coordination and team performance
15	<a href="#">Lee et al. (2017)</a>	China, South Korea	Survey	Empirical data from 138 teams in seven organizations	KP regulation by adopting communication privacy management theory at the team level	The results show that KP exerts a significant positive effect on knowledge ambiguity and relational capital mediating the relationship between knowledge ambiguity and alliance performance
16	<a href="#">Lee et al. (2007)</a>	Taiwan	Survey	95 Taiwan-based companies	KP, knowledge ambiguity and relational capital on alliance performance	The results show that KP exerts a significant positive effect on knowledge ambiguity and relational capital mediating the relationship between knowledge ambiguity and alliance performance
17	<a href="#">Jean et al. (2014)</a>	China	Survey	170 multinational automobile suppliers	Supplier involvement and KP on product innovation in customer-supplier relationships	KP, trust and technological uncertainty are all found to drive greater product innovation

(continued)

No	Author(s)/year	Country	Methodology	Sample	Researched determinants	Outcome
18	Manhart <i>et al.</i> (2015)	Austria	Interviews	53 interviews with members from 10 SME networks	Organizations need to balance sharing and protecting knowledge	Result indicates collaborative IT does not necessarily hamper KP, but adapted use can support both KS and KP. They argue that organizations should develop protection capabilities to manage the switches
19	Van Oorschot <i>et al.</i> (2018)	China, Norway	Theoretical conceptual model	15 participants	Sharing and protecting strategies	The results indicate that protection is detrimental to long-term success because it undercuts the trust of the Chinese suppliers and irreparably reduces innovation rates. KP is reduced instead of increasing the ability to share (new) knowledge in the future
20	Olander <i>et al.</i> (2014)	Finland	Survey	209 firms	Motivation, prerequisites for the use of protection mechanisms and firm age, turnover and personnel	Firms' availability of protection, the safety of collaboration, inconvenience of protection and preservation of the prerequisites for innovation are factors that effectively influence formal and informal protection mechanisms
21	Krylova <i>et al.</i> (2016)	N/A	Conceptual paper	N/A	Improvisation factor, experimental culture, the practice of storytelling and shared mental models	Improvisation is proposed as the moderating factor in enhancing the positive impact of experimental culture, minimal structures, storytelling practice and shared mental models on knowledge transfer and KP
22	Kunftu and Neuvo (2019)	Finland	An explorative qualitative in-depth case study approach through interviews, as well as secondary data	690 employees in 6 university-industry relationships	Mutual trust, based on personal-level relationships	The study indicated that the development of mutual trust, based on personal-level relationships, adaptation and reaching a consensus are the key processes that enable partners to balance between learning and protection, as well as lower the informational barriers within the collaboration

Table 2.

(Kam *et al.*, 2013). Unfortunately, the amount and scale of data violations in HEIs tend to rise due to poor levels of information system security awareness, employee incompetence, missing or stolen devices, social media, malicious website attacks, unintended leakage of confidential information, viruses/malware and unsafe email attachments by third parties (Chan and Mubarak, 2012). The study concluded that KP has not been adequately covered in the sense of HEIs relative to other sectors, rather than that there is not enough literature to expand about how KP is overwhelmingly regulated in HEIs. The research includes how HEIs can protect their knowledge at different framework levels (inside and outside HEIs) by considering the four KP determinants (technological, organizational structure, behavioral and ethical and organizational culture) to achieve an appropriate KP.

### *6.1 Technological factors*

Few reports have discussed technology development considerations (Manhart and Thalmann, 2015; Manhart *et al.*, 2015; Thalmann *et al.*, 2014; Mohamad *et al.*, 2017; Völz *et al.*, 2011). Different technologies and practices enable KP. The whole co-operation may be at risk without such innovations (Völz *et al.*, 2011). Neville *et al.* (2003) view IT as a factor that affects the effectiveness of KP (Manhart and Thalmann, 2015). For instance, based on Zhou and Liu's (2010) research, one might analyze IT as a way to enhance KP and explore the impact of such an IT object on protection results. IT might function as a motivating factor that quantitatively threatens KP. The available literature considers the factors which influence knowledge-protection practices in other institutions but not comprehensively for HEIs. The IT tool's perspective is generally disregarded owing to the conceptual aspect of KP research and the examination noticed the need to protect knowledge infrastructure (Manhart and Thalmann, 2015). Although IT forms an integral part of the transmission of knowledge through communication inside and through organizations, technology infrastructure mechanisms will concentrate on how IT can be built in and across organizations to track, regulate and prevent knowledge leakage (Majchrzak and Jarvenpaa, 2010; Neville *et al.*, 2003; Sveen *et al.*, 2007).

Although the connection between factors and impacts of KP in HEIs is well-investigated in other sectors to some degree, this study highlights that more work is needed. Important implications will be on academics' decision to engage in KM and KP programs to define, customize and implement tooling and technology to verify, monitor and manage the exposure of vulnerable individuals. HEIs may build technologies to restrict or track access to critical knowledge. Regardless of the complexity of KP, it is a necessary method for HEIs. KP is difficult inherently, but HEIs need to invest in a complete infrastructure to promote critical knowledge and communication.

### *6.2 Organizational structure factors*

Most theorists believe that changing an organization's structure, like moving from hierarchy to a flatter level of network development and transmission, is useful (Matin and Sabagh, 2015). This will effectively secure and not limit access when needed. The structure plays an essential role in protecting knowledge. Organizational structure is essential in exploiting technical architecture through attempting to streamline particular roles or divisions within an organization (Gold *et al.*, 2001). The literature studied organizational structure including minimal structures that contain underlying mechanisms relating to the set of measures that members use for synthesizing the elevated rates of innovation, continuity, flexibility and control (Kamoche and e Cunha, 2001).

The main challenge for an organization is to find the balance between exchanging and protecting knowledge (Manhart and Thalmann, 2015), especially when that conflicts with its



structure and policies. If an organization's framework is flexible and flatter, it is simpler for experienced employees to supervise newer or less qualified employees to plan and to function in accordance with the KM system (Tyulkova, 2014). The layout of a company is more compact and straightforward. The framework is essential to promote knowledge creation and sharing across organizational boundaries (Nejatian *et al.*, 2013). Zheng *et al.* (2010) claimed that it might affect KM processes by influencing communication behaviors and rates among the organization's representatives, creating decision-making locations and influencing the efficiency and efficacy of the application of novel ideas (Zheng *et al.*, 2010). When the organization has a fully stratified organizational structure, there would be massive data differences between senior management, middle managers and employees at a lower position. When these top employees retire or quit the organization, their replacements must start anew in several areas.

### 6.3 Individual behavioral and ethics factors

For people participating in knowledge exchange and ensuring that shared knowledge is protected, behavior issues are theoretically a significant part of individuals' willingness to engage in corporate KP. Inclusion of trust, personal attitude, enthusiasm, personal qualities, emotional commitment, subjective values and personal desire, every particular behavioral and ethical consideration are essential to help determine how to exchange and protect the knowledge in the intercompany networks. The protection of knowledge is focused on the behavior of employees and the perspectives of each employee's knowledge on how they act can also be determined by the usefulness of national law mechanisms for KP (de Faria and Sofka, 2010; Husted *et al.*, 2013; Väyrynen *et al.*, 2013). One method of protecting knowledge is to create a trust that keeps people from being deceitful (Norman, 2002). Organizational challenges tend to be related to various motivations, behaviors in knowledge creation and protection (Kunttu and Neuvo, 2019). Knowledge is considered as a power according to academics, but in case losing it would threaten their promotion opportunities in the future (Cheng *et al.*, 2009; Jain *et al.*, 2007). Many types of research in different contexts (Wang and Noe, 2010) are rarely addressed in the HEI context which also defined such influences in the existing literature. Given the limited influences in this vital industry, more work may lead to the influence of these factors on the KP of HEIs.

### 6.4 Organizational cultural factors

Culture is essential organizational capabilities along with KP as a knowledge process for effective KM (Gold *et al.*, 2001). One aspect that can have beneficial effects on the protection of knowledge is the experimental culture (Krylova *et al.*, 2016). Analysis of the connection between corporate structure and KM shows the role of organizational principles in fostering awareness among participants and the beneficial impact of "good" cultural values (e.g. transparency and trust) (Alavi *et al.*, 2005). Lee *et al.* (2017) also claimed that a centralized structure or strict corporate culture could lead to KP restrictions. Manhart *et al.* (2015) suggest that the KP can be considered as a network culture to have a more accurate understanding of protection phenomena. Culture can have a deceptive impact on all organizations, as they are often communicated at the corporate stage. Teferra and Altbachl (2004) also stated that it could be hard to have internationalization attempts because of diversity. With cultural diversity, the protection of knowledge for multinational employees may be challenging to accomplish in case a cultural activity is unified into one common culture within the organization. In contrast to specific surveys in the Middle East, Africa and South America, much of the study examined was performed in commercial and public sectors in West countries, Malaysia and China (Al-Alawi *et al.*, 2007). Limited literature

discussed the aspect of the organization's cultural influence on educational institutions' success, but none was dealt with as an area for self-identification in HEIs. The philosophy of HEIs will be adaptive to accommodate growing staff and students. The versatility of culture will improve the exchange and protection of knowledge.

## 7. Implications

### 7.1 *Theoretical contribution*

This study showed that KP in HEIs is not comprehensively examined compared to KS and there are several factors that might assist HEIs to motivate employees to protect knowledge within the institutions. The main contribution of this paper is to fill the literature limitations gap on covering KP in HEIs. This study outlined a set of determinants that influenced KP within HEIs and we believe it will expand previous research to consider the technology role in KP, particularly the adoption of recent technology to facilitate protection procedures. Also, other determinants discussed in the literature might influence academics to enhance KP within HEIs.

### 7.2 *Practical contribution*

It is clear from this review that KS is practiced more compared to KP in different ways particularly in HEIs due to knowledge supporting cultures. We believe KP is important to higher learning institutions same as other organizations. To gain competitive advantage universities, implement KP programs and knowledge management system due to high competition for government fund. Therefore, leaders of the university need to initiate KP programs, procedures and policies to motivate employees to practice it as a culture with the consideration of the above four determinants. From a realistic point of view, our research reveals that technology determinants play a role in the protection of knowledge compared to other determinants. Thus, HEIs should be open to the implementation and balance of technologies with other determinants. Tacit and explicit knowledge is critical and if HEIs want to keep their competitive advantage, they need to strengthen the way they protect their knowledge. The Extreme Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) pandemic positively known as COVID19 has pressured governments and decision-makers to implement technologies in most organizations, but HEIs have seen major digital transitions (Dwivedi *et al.*, 2020). As a result, the pandemic has led to a new age of cybersecurity, as privacy and security are core issues for many organizations after the pandemic. HEI decision-makers will also protect their knowledge by recognizing the effect of the determinants and reassessing the application of technologies to deliver better strategies.

### 7.3 *Limitations and future research*

Five databases were used for this paper to identify KP studies. Therefore, there is a possibility of missing related articles published in the study area. Another limitation is due to the balance between protecting and sharing knowledge as some papers discussed KS and protection concurrently and this led to the inclusion of several papers in the systematic review. The study aimed to cover the knowledge assets of the institutional or organizational as one entity of dimension in general without any specification, however other dimensions could be separately discussed in future studies. Our study will open the door for academics to investigate further into the factors, theories and models of KP in general and HEIs from a particular perspective.

## 8. Conclusion

KP has contributed to gaining a competitive advantage and helped to shape the company's performance. Both tacit and explicit are knowledge and inserted in people and processes for higher learning education (Fullwood *et al.*, 2013). This study provides a holistic picture of existing literature related to KP in HEIs through systematic literature review methodology to direct academics for future research. The authors discussed KP determinants in terms of four areas: technological, behavioral and ethics, organizational structure and organizational culture. After the 22 papers were screened, it was concluded that the topic of KP is under-researched in the KM area and still received little attention in the literature (Bloodgood and Salisbury, 2001; Liebeskind, 1996; Manhart and Thalmann, 2015). The screening also revealed that, in the perspective of HEIs, KP among universities' staff and academics has been stagnant over the past decade, unlike KS. Third, there is an obvious gap in the literature about knowledge-protection practices in HEIs compared to other sectors. Fourth, some of the investigated papers discussed specific theory, but overall, the papers are inclined toward conceptual concepts and there is a need for a discussion from the perspective of a specific theory. Fifth, IT-protected knowledge is an influencing factor such as clouding computing, but there are challenges that need to be considered. Also, Väyrynen *et al.* (2013) outlined three types of challenges which are reputation, management and information security through using social media by the organization. Sixth, KP is different from knowledge security and knowledge leakage. KP must be distinguished from the general definition of knowledge security, which includes both external and internal confidentiality, integrity and availability of knowledge (Ilvonen, 2013) and can be viewed as the convergence of KM and information security (Desouza, 2006). On the other side, leakage has been described as "The malicious or unintentional loss of knowledge to unauthorized employees inside or beyond the organizational boundaries" (Annansingh, 2005).

It is necessary to understand the nature of the knowledge that needs to be protected to determine which type of security system to be implemented. Randeree (2006) suggested a framework can be adapted by researchers to develop policies and mechanisms to protect knowledge. The development of KPs could become a strategic fit for the organization. This development can be done by addressing knowledge types and their nature which will create a long-term impact inside the organization. Another concept of "secure knowledge management" begins to display a sign of future potential to address the protection of knowledge resources and management. These will include areas such as secure collaboration, secure semantic web, securing the intellectual assets, secure multimedia data and applications, as well as secure peer-to-peer computing (Randeree, 2006). Finally, it may be easy to share knowledge, but it is necessary to know what is being shared and with whom for protection purposes.

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