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# Identifying trade secrets: strategic process and challenges in the UK

Oleksandra Ozcan<sup>a,b</sup>, David Pickernell<sup>a</sup> and Emily Bacon<sup>a</sup>

<sup>a</sup>School of Management, Swansea University, Swansea, UK; <sup>b</sup>School of Languages and Applied Linguistics, University of Portsmouth, Portsmouth, UK

## ABSTRACT

Trade Secrets (TS) constitute important elements in intellectual property (IP) portfolios, securing competitive advantage by preserving critical innovations and other confidential data. Identifying TS, however, creates numerous challenges, including a lack of established processes of TS identification at the organisational level in the UK and the absence of comprehensive academic studies. This study, therefore, aims to define a methodological process for TS identification within UK organisations. Leveraging a sequential qualitative mixed-method approach grounded in Knowledge Management (KM) theory, this research analyses 52 legal cases on TS misappropriation and 12 interviews with industry professionals. Findings highlight challenges in TS identification, introducing a four-step UVRIP framework as a strategic tool for organisations to assess informational assets based on usefulness, value, rarity, imitability and protection, enriching discourse on TS protection and management, IP audit processes and KM theory and offering theoretical and practical contributions.

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theory

## 1. Introduction

Critical within companies' intellectual property (IP) portfolios, Trade Secrets (TS) provide competitive advantages, safeguarding innovations, business processes and other forms of confidential information central to company success (Ubaydullaeva 2024). Identifying TS is, however, often marked by challenges due to the intangible, tacit nature of knowledge TS (Farnese et al. 2019). In the UK, a central challenge is distinguishing between general knowledge and information warranting legal protection as a TS (Desaunettes-Barbero 2023). Traditionally, TS are identified via IP audits within organisations (Liu and Chin 2010), focusing on patents and other forms of IP, overlooking other information having the capacity to become a TS. Therefore, a more targeted approach specific to TS identification is needed.

TS identification also remains underexplored in academia, despite recognition as crucial in broader discourses on TS management (Bos, Broekhuizen, and de Faria 2015; Hemphill 2004; Ozcan, Pickernell, and Trott 2023, among others). Existing literature acknowledges TS identification as foundational in the TS lifecycle (Bos, Broekhuizen, and de Faria 2015), discussed in studies of other countries (Dole 2016). To the best of our knowledge, however, comprehensive studies specifically addressing challenges and processes involved in TS identification in the UK are lacking.

**CONTACT** Oleksandra Ozcan  [oleksandra.ozcan@port.ac.uk](mailto:oleksandra.ozcan@port.ac.uk)

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Consequently, **our research aims to establish processes companies in the UK can follow to identify their TS**, achieved through the following research questions:

- (1) What are the challenges of TS identification?
- (2) What is the process of TS identification?

The study uses a sequential qualitative mixed-method approach based on Knowledge Management (KM) theory and the VRIO framework (Barney 1991; Morse 2010). Thematic analysis (Braun and Clarke 2014) is used to analyse 52 carefully selected legal cases on TS misappropriation and 12 interviews with industry professionals. Results identify challenges of TS identification and a four-step TS identification process.

The paper contributes to four distinct strands of literature (TS protection, TS management, IP audit and TS identification in other countries), also offering a TS identification process for the UK to serve as a template for TS identification in countries with similar legal jurisdictions. The paper also offers a practical guide to TS identification for innovative organisations in the UK, presenting processes for identifying TS facilitates organisations performing an in-depth assessment of their informational assets, considering factors of value usefulness, rarity, imitability and protection.

The remainder of the paper is structured as follows. Section 2 offers an overview of academic literature on the subject. Section 3 discusses the theoretical background. Section 4 outlines the chosen methodological approach. Section 5 presents the findings; Section 6 discusses these. Finally, Section 7 outlines conclusions, theoretical and practical contributions, limitations and areas for further research.

## 2. Literature review

Epstein and Levi (1987) distinguished TS strategy from general IP strategy frameworks, and Hemphill (2004) proposed a structured approach to TS strategy, including TS audit as a critical initial step. Studies on patent auditing (Grimaldi, Cricelli, and Rogo 2018) also continue to develop research on TS dichotomising between TS and other IP forms (Varadarajan 2018; de Weck 2022), strategies for TS protection (Crittenden, Crittenden, and Pierpont 2015; Delerue and Lejeune 2011; James, Leiblein, and Lu 2013; Ozcan, Pickernell, and Trott 2023) and nuances of TS misappropriation (Klein 2023).

There remains, however, a gap in the literature regarding detailed methodologies for TS *identification*. Ozcan, Pickernell, and Trott (2023) argued that TS identification is an initial step triggering the TS protection framework as a dynamic process. They also argue for a more in-depth exploration of the initial stages of the TS management framework. Similarly, Bos, Broekhuizen, and de Faria (2015) showed TS identification as the initial step of the TS lifecycle, arguing for further empirical studies into each TS lifecycle stage.

Patent auditing methodology presents a potentially robust framework for adaptation to TS identification needs; Liu and Chin (2010) argued that audits provide organisations with overviews of current IP management systems, strengths and weaknesses. IP audit entails cataloguing all IP owned by an organisation, its total input and outputs in relation to company core capabilities used to achieve competitive advantage. Gargate, Siddiquee, and Wingkar (2019) also provide a detailed exploration of IP audit practices, highlighting their importance in the efficient management and utilisation of Intellectual Assets (IA) within organisations. Gargate, Siddiquee, and Wingkar (2019) also differentiate general-purpose IP audits, event-driven IP audits and limited-purpose, focused IP audits. Finally, Grimaldi, Cricelli, and Rogo (2018) introduced a comprehensive framework to assist IP managers of large high-technology companies evaluate their patent portfolios to determine the most suitable exploitation strategies.

Despite the critical importance of TS in contemporary IP landscapes, however, there is a noticeable absence of detailed methodologies for their specific identification within existing academic literature (Ozcan, Pickernell, and Trott 2023). While IP auditing concepts provide a potential framework, the application of such methodologies to TS remains underexplored. This gap represents an

opportunity to bridge divides between business and law, where TS identification methodologies could foster integration between organisational strategic management practices and legal compliance frameworks.

This study therefore contributes to the business and law sets of literature, through the application of KM theory in TS identification processes. KM theory offers a structured approach to managing intangible assets, focusing on identifying, storing and protecting critical knowledge within organisations (Nonaka & Takeuchi 1996; Santoro et al. 2019). By embedding KM principles into TS identification, businesses can effectively catalogue and classify their TS, ensuring alignment with strategic objectives while maintaining compliance with legal standards. KM theory, as argued by Tzortzaki and Mihiotis (2014), provides tools for managing resources in dynamic environments, emphasising the importance of contextualising knowledge assets to optimise organisational outcomes. Additionally, Dulipovici and Baskerville (2015) highlighted overlapping dimensions of KM and IP management, advocating methodologies integrating KM principles into IP strategies for enhanced organisational resilience.

Integrating KM into TS identification also addresses the critical need for effective strategies to assess the utility, value and rarity of TS within their operational environments. Mishra and Uday Bhaskar (2011) discussed the importance of aligning KM practices with strategic imperatives, providing a basis for structured processes capturing and protecting valuable knowledge. Furthermore, Santoro et al. (2021) emphasise KM fostering organisational capability to evaluate and secure IA, making it a natural complement to Resource-Based View (RBV) and Dynamic Capabilities (DC) theories in TS management.

Integration of KM into TS identification therefore represents a theoretical contribution connecting and enhancing business strategy and legal frameworks. By addressing gaps in TS identification methodologies, this study establishes a comprehensive process aligning with broader principles of IP auditing while leveraging KM to navigate the complexities of TS management. This intersection creates a unified approach supporting effective TS identification, protection, and strategic utilisation, ultimately advancing theoretical and practical understanding of IP management in modern organisational contexts.

### **2.1. Definition of TS in the UK**

TS is vital in safeguarding valuable knowledge generated through innovative activities (Hemphill 2004). The World IP Organization (WIPO) defines TS as IP rights on confidential information, which can be commercially exploited through sale or licencing. The UK definition of a TS is largely aligned with WIPO's definition and the European Union's TS Directive (EU 2016/943). Implemented into UK law as TS Regulation adopted in 2018, to be considered a TS, information must be commercially valuable due to its secrecy, known to a limited number of people, and actively kept secret by the rightful owner through reasonable measures, like confidentiality agreements.

On 11 July 2023; the National Security Act 2023 introduced a definition of TS differing from TS Regulation (2018). The 2023 Act's definition states TS includes any information or document not generally known or available to those with expertise in the relevant field, having actual or potential industrial, economic, or commercial value adversely affected if made public, and which could reasonably be expected to be kept secret. Notably, the scope of information protected as TS is broader than patents, including potential and actual commercial value, extending protection to experimental work, unreleased products or strategies, and even 'negative know-how' (Brant and Lohse 2014).

## **3. Theoretical background**

To answer the identified research questions, KM theory and Barney's VRIO Framework (1991, 1995) were selected. Both offer frameworks for understanding how organisations systematically identify and leverage TS for competitive advantage. Barney's VRIO Framework was selected to model a

unique process of TS identification as it offers the most suitable convergence with legal requirements for TS.

### 3.1. *KM theory*

The significance of knowledge in organisational contexts established the vital role of KM practices over recent years (Santoro et al. 2018). Organisations adept at generating and assimilating new knowledge often struggle with retaining it (Santoro et al. 2018). TS often reside within the broader spectrum of organisational knowledge such as documented procedures, electronic databases and tacit knowledge. Identifying TS within these repositories requires identification of the unique, valuable and confidential aspects of this knowledge (Hannah et al. 2019).

The potential for organisations to forget or lose track of such acquired knowledge, however, presents a risk for TS, effective management of organisational memory crucial to prevent erosion of competitive advantages TS' confer (Crittenden, Crittenden, and Pierpont 2015). The initial stages of KM theory are concerned with knowledge identification, categorisation and protection (Mishra and Uday Bhaskar 2011). Therefore, in line with KM theory, to identify a TS, an organisation needs to identify existing tacit or explicit knowledge within itself.

Often, TS can be acquired from the creation of new knowledge through innovation and learning. By applying KM theory principles, organisations can ensure critical knowledge, processes and innovations are adequately identified and classified, facilitating their protection under TS laws and preventing unintentional disclosure (Grant 1996; Halawi et al. 2005; Valdez-Juárez et al. 2016; Santoro et al. 2021).

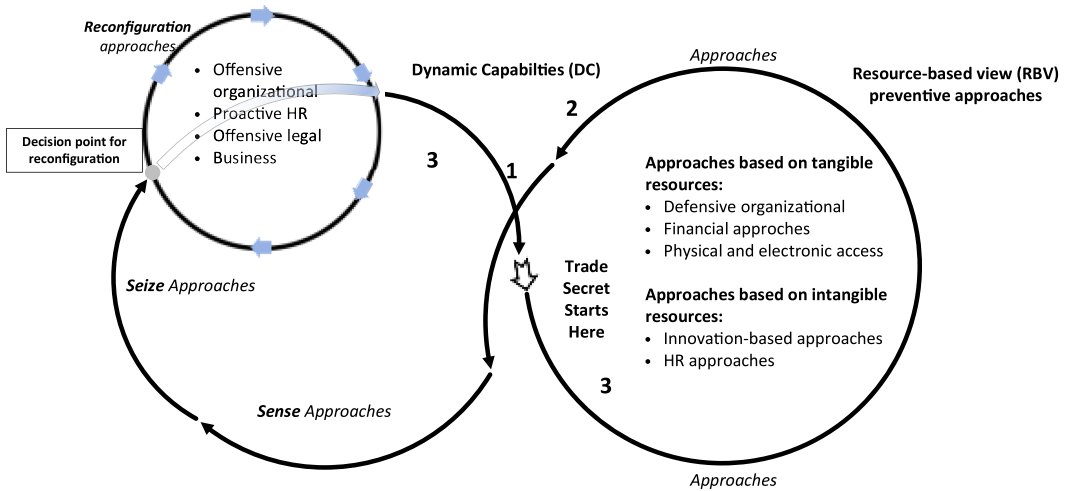
### 3.2. *VRIO framework*

From TS identification perspectives, Barney's (1991, 1995) VRIO framework is pivotal. To be strategically important, knowledge must be valuable, rare, inimitable and well-organised within the company. This framework enables companies to maximise the value derived from their assets, encouraging further innovation (Cohen et al. 2002). For innovative companies, the primary organisational resources meeting VRIO criteria are IP assets, particularly TS (Ozcan, Pickernell, and Trott 2023). When effectively leveraged, these facilitate the appropriation of innovation value (Hannah et al. 2019), and the TS identification process is integrated to reflect its valuable, rare, inimitable and confidential components.

### 3.3. *Integration with other theories*

TS management requires a multi-theoretical approach integrating KM, Resource-Based View (RBV) and Dynamic Capabilities (DC) to establish a continuously evolving trade secret identification and protection system. This perspective builds upon and extends the framework proposed by Ozcan, Pickernell, and Trott (2023), which primarily focuses on the dynamic nature of TS management (see Figure 1). We propose a structured **integration of KM, RBV and DC**, ensuring a more comprehensive framework for TS management.

As outlined in Figure 1, organisations owning TSs must engage in RBV-informed strategies to maintain and protect TS, adopt DC-driven proactive measures to mitigate potential misappropriation, and implement KM frameworks to enhance identification, protection and dynamic adaptation of knowledge assets. This integrated perspective recognises that safeguarding TSs requires a combination of overlapping and complementary measures to sustain competitive advantage amid changing environmental and threat conditions. While Ozcan, Pickernell, and Trott (2023) emphasise the dynamic nature of TS management, their framework does not explicitly integrate KM, critical for structuring and categorising knowledge assets within organisations. The integration of KM theory



**Figure 1.** Enhanced theoretical framework of TS management ( Author's own).

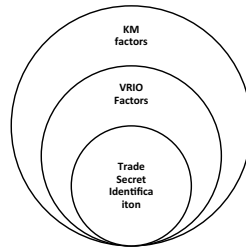
in this study provides a more actionable process for systematically identifying TS, ensuring firms move beyond ad hoc TS management to a structured, knowledge-driven approach.

The theoretical justification for this integration is grounded in existing literature. From an RBV perspective, TSs represent valuable, rare, inimitable and organisationally embedded (VRIO) resources enabling firms to sustain a competitive advantage (Barney 1991, 1995). Effective TS management requires firms to systematically assess which knowledge assets qualify as TSs and to implement structured methodologies for their identification and classification (Grant 1996; Newbert 2007). While RBV provides foundations for determining which knowledge assets are critical for sustaining competitive advantage, DC theory highlights the need for continuous monitoring and adaptation in response to external threats. TSs, by nature, exist within highly dynamic environments where risks such as misappropriation, employee mobility and industrial espionage necessitate continuous adjustments in protection mechanisms. Without adaptive identification and protection processes, firms risk losing their TSs to competitors, a challenge widely discussed in previous research on DC theory (Shiferaw and Amentie Kero 2024; Teece 2007; Tzortzaki and Mihiotis 2014). The ability to sense, seize and reconfigure TS identification and protection strategies is essential for organisations to retain control over their most valuable knowledge assets and respond to emerging threats effectively (Eisenhardt and Martin 2000).

The introduction of KM theory into the TS identification framework addresses a critical gap by ensuring that TSs are systematically recognised, stored and protected within organisational structures. While RBV and DC provide foundations for understanding the value and adaptability of TSs, KM operationalises these insights by establishing processes for TS identification and classification (Santoro et al. 2018; Zack 1999). Without a structured KM approach, firms may struggle to differentiate between general confidential information and TSs, ultimately weakening their ability to protect key knowledge assets (Liebeskind 1997). By bridging KM with RBV and DC, this research enhances understanding of how organisations can develop a robust TS identification process that aligns with both strategic business objectives and legal compliance requirements.

### 3.4. Conceptual framework

Consistent with the paper's research questions and theoretical foundations, Figure 2 presents an integrated view of the TS identification process. The process proposed is designed to guide the exploration of how knowledge assets are managed and how their value, rarity, inimitability and



**Figure 2.** Conceptual framework of trade secret identification (Author's own).

organisation (VRIO) contribute to competitive advantage, particularly in identifying TS (Hesterly and Barney, 2014).

According to Figure 2, the inclusion of KM factors – knowledge acquisition, categorisation and protection – highlights the foundational role of effective KM in identifying TS. This emphasises the need for systematic approaches to gather and sift organisational knowledge often scattered across various departments and embedded in different formats, including tacit knowledge possessed by employees. Challenges here lie in capturing this dispersed knowledge and recognising its potential value as a TS.

Applying VRIO also enriches the conceptual framework, to better evaluate these assets' strategic value, by identifying whether knowledge assets are valuable, rare, difficult to imitate and supported by organisational capabilities to be effectively exploited. This strategic evaluation is crucial for determining which knowledge assets genuinely contribute to sustained competitive advantage when protected as TS. VRIO analysis thus connects identification of potential TS (KM processes) and implementation strategies to protect and leverage them effectively (organisational capabilities). By addressing TS identification challenges, the process also acknowledges inherent difficulties in managing intangible assets, especially tacit knowledge.

## 4. Methodology

Table 1 demonstrates the step-by-step methodological process adopted, determined by the research questions and qualitative methodology used in similar studies (Bos, Broekhuizen, and de Faria 2015; Gargate, Siddiquee, and Wingkar 2019; Grimaldi, Cricelli, and Rogo 2018; Ozcan, Pickernell, and Trott 2023).

The study employs a sequential qualitative mixed-method approach (Morse 2010) in two distinct phases. First thematic analysis of legal cases on TS misappropriation is carried out, allowing the discovery of elements of TS identification processes practiced by organisations. Second, semi-structured interviews with industry professionals (Tranfield et al. 2003) are undertaken, allowing in-depth discussion of the discovered TS identification processes.

### 4.1. Legal cases analysis

The first phase involves a thematic analysis of 52 legal cases pertaining to TS misappropriation in the UK. Utilising Tranfield et al.'s (2003) guidelines for case analysis and the PRISMA framework for systematic data selection (Moher et al. 2009), we conducted a detailed search in the BAILII and Lexis + UK databases using the keyword 'TS'. The inclusion criteria were:

- (1) Cases specifically related to TS breaches or breaches of confidential information qualifying as TS;
- (2) Cases within UK jurisdiction;
- (3) Cases from the past 25 years, considering relevance and availability in the databases.



**Table 1.** Research methodology.

Research method	Research steps
Legal cases analysis	<p><u>Step 1.</u> Initial search of legal cases on trade secrecy.</p> <p><u>Step 2.</u> Use of a keyword 'trade secret' to identify and screen data based on the PRISMA framework in both BAILII (<math>n = 5528</math>) and Lexis + Nexis + UK (<math>n = 1082</math>).</p> <p><u>Step 3.</u> Initial review of the cases and removal of duplicates (<math>n = 4520</math>) based on the exclusion and inclusion criteria (trade secret misappropriation, UK jurisdiction and no older than 25 years).</p> <p><u>Step 4.</u> Reading of the full cases (<math>n = 108</math>) and further exclusion of the cases based on the trade secret misappropriation and jurisdiction (UK) criteria (<math>n = 52</math>).</p> <p><u>Step 5.</u> Definition of themes by means of intercoder reliability (trade secret definition, trade secret identification, trade secret protection, etc).</p> <p><u>Step 6.</u> Review of themes in NVIVO (trade secret is defined differently across various organizations; trade secret identification possesses challenges).</p> <p><u>Step 7.</u> Initial synthesis of codes by means of structural coding (variations in trade secret definition; trade secret identification stages; barriers to trade secret identification).</p> <p><u>Step 8.</u> Consolidation of the results and writing up.</p>
Semi-structured interviews	<p><u>Step 1.</u> Identification of interview participants in LinkedIn. The identification was based on inclusion and exclusion criteria: (professionals in the field of trade secrets; with minimum 1 years' experience in the area of trade secret management; leading role in the company in the UK).</p> <p><u>Step 2.</u> Collection of interview data by means of semi-structured interviews with a duration of 30–60 min.</p> <p><u>Step 3.</u> Familiarisation with the collected interview data.</p> <p><u>Step 4.</u> Generating of initial codes in NVIVO (trade secret; protection approaches; identification; trade secret management, etc).</p> <p><u>Step 5.</u> Generation and review of themes (trade secret definition; trade secret management approaches; organizational attitude towards trade secrets, etc).</p> <p><u>Step 6.</u> Definition and naming of the themes (trade secret definition; trade secret identification process; trade secret identification challenges).</p> <p><u>Step 7.</u> Writing up and presentation of the results.</p>

NVivo software was then employed for thematic analysis, adopting Braun & Clarke's (2014) abductive approach and Saldaña's (2021) structural coding method. This analysis aimed to categorise processes and strategies involved in TS identification and its challenges.

#### 4.2. Semi-structured interviews

The second phase of the study consisted of semi-structured interviews with industry experts from various-sized companies in the UK, chosen via purposive sampling of professionals with at least one year's experience in TS management, and holding leading IP management positions within their organisations (Campbell et al. 2020). Contacted via LinkedIn (see Table 2), interviewees included legal experts in IP law and corporate executives responsible for strategy and compliance. This supplemented the thematic analysis of legal cases, supporting the depth, validity and reliability of results (Morse 2010).

**Table 2.** List of interviewees.

Interviewee	Age	Higher Level of Education	Position in Organization	Years of Experience
X1	60	BA	Head of IP	15+
X2	45	BA	Head of IP	20+
X3	50	BA	Head of IP	5+
X4	35	BA	Director	5+
X5	60	BA	Head of IP	20+
X6	35	MA	Director	10+
X7	50	PhD	Head of IP	20+
X8	50	PhD	Head of IP	15+
X9	60	PhD	Director	15+
X10	50	BA	Head of IP	20+
X11	50	PhD	Head of IP	20+
X12	45	MA	Head of IP	10+



Interviews lasted 30–60 minutes, focusing on open-ended questions about TS identification processes, allowing flexibility to explore specific areas of interest and room for participants to introduce new topics (Adeoye-Olatunde and Olenik 2021). Saturation was reached after five interviews. Using NVivo, interviews were analysed to validate and add depth to findings from legal case analysis (see Table 2). Thematic analysis followed Clarke and Braun's (2017) abductive approach, using structural coding techniques and intercoder reliability procedures outlined by O'Connor and Joffe (2020).

## 5. Findings

The first stage focuses on recognising challenges companies experience in TS identification. The second stage suggests a process and strategy of TS identification through VRIO-based TS identification processes.

### 5.1. Challenges of TS identification

Results show the main challenge of TS identification lies in a **lack of understanding** of what information constitutes a TS, companies often believing confidential information of the business and non-disclosure agreements are enough to claim the organisation possesses a TS. For example, company A found out their ex-employee started work with their former partner. Company A decided to stop the employee from disclosing their confidential information (design methods). The judge did not accept this confidential information to be a TS as the ex-employee was using '*his accumulated knowledge and expertise*'. The judge stated company A did not emphasise their confidential information possessing '*unique nature*' in the non-disclosure agreement, failing to see how it differed from any other confidential information within the organisation.

Company B went through a similar experience, going to court to stop their ex-employee joining a competitor. The company argued their employee had access to protected travel databases and customer lists, application of knowledge and know-how on how to use these programmes constituting a TS providing their company with a competitive advantage. The judge rejected their arguments, stating company B failed to '*identify adequately what material constituted the TS*'.

Company C, a software development company, started proceedings for breach of a TS and confidential information by former directors and team members. The object of the dispute was a complete software system. To protect their IP, company C required employees to sign confidentiality agreements with non-solicit and non-compete provisions. Company C, however, did not define specifically which part of the information is confidential and which is IP, the judge ruling the entirety of the software system could not be considered confidential and a TS.

Hence, key issues with TS identification based on case law focused on the nature of confidential information and TS. Low awareness of TS is also found to be related to a general **lack of government support and coherent policy** around IP parameters. For example, according to interviewee X9:

If you go to the Government and Patent Office and ask for support with TS, they will ignore you.

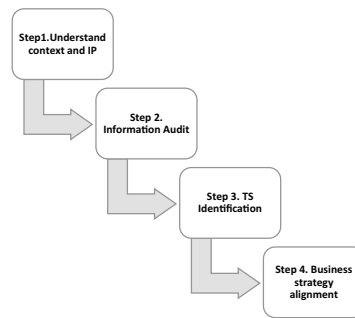
Given this lack of TS definition understanding and lack of government support, we suggest a four-step process generated from data in the following sections.

### 5.2. The process of TS identification

Based on legal case analysis and interview data the process of TS identification is sequential, beginning with understanding contexts and notions of IP (see Figure 3).

#### 5.2.1. Step 1: understand context and IP

Analysing interview data, findings reveal TS identification processes begin with understanding organisational context, specifically mission, vision, main activities, and main competitors



**Figure 3.** The process of trade secret identification (Author's own).

(Interviewees X6, X7, X9 and X12). According to Interviewee X7 *'you need to focus on the important areas'*, identifying areas of operation capable of creating valuable commercial input. The second component of context relates to understanding IP, Wilson and Decarlo (2003) arguing this is vital for the organisation, where 'IP' entails patents, trademarks, copyright, TS, etc (WIPO 2021).

Findings demonstrate basic knowledge and awareness of various forms of IP allowing organisations to identify TS faster and more efficiently (Interviewees X3, X4, X12). According to Interviewee X7, organisations need to *'get educated and/or work with someone who has understanding of IP and can help them grasp an in-depth perspective of the area'*.

### 5.2.2. Step 2: conduct valuable information audit

After understanding context and IP, the organisation can conduct an internal audit to identify valuable information. While not legally mandated, an audit is an exercise organisations must undertake to maintain competitiveness and extract value from the knowledge they possess (Grimaldi, Cricelli, and Rogo 2018). Audit of valuable information begins with scope definition (Interviewee X8), the majority of interviewees articulating audit of valuable information as a discipline at the start of getting the right kind of behaviours in place to identify their own property. According to interviewee X2, information audit requires:

Listing of different things you have done (relationships, presentations, lists, key people, documents what not).

Interviewee X4 agrees, stipulating audit as paramount to identifying important elements to the business. Interviewee X4 suggests thinking about specific questions:

"If this part of information escapes what should the company do?"; "What is the real competitive advantage the company has?"; "What is the really sensitive information you have?"; "What are the barriers to entry could be broken down by giving away some information?".

Interviewee X4 concludes information audit is

About understanding your business and where your strengths come from.

Information audits can be top-down and bottom-up, broad and narrow audits, and internal and external (Gargate, Siddiquee, and Wingkar 2019; Grimaldi, Cricelli, and Rogo 2018; Wilson and Decarlo 2003). Findings demonstrate information audit approaches can be combined, or used sequentially, depending on organisational needs and objectives. Organisations may start with a broad, top-down audit to assess overall IP management practices, followed by a narrow, bottom-up audit of a specific product line or business unit. Choice of audit type depends on a range of factors, including size and complexity of organisation, industry, organisation's IP maturity level, and specific audit goals (e.g. risk mitigation, portfolio optimisation, due diligence for mergers and acquisitions, etc.). Finally, information is collected across various departments through interviews, access to documents, evaluation of contracts, IT, etc.

### 5.2.3. Step 3: identify a TS

The next step involves understanding requirements for a TS. After the information audit, companies will possess a list of identified information valuable to the organisation, providing it with a competitive advantage. Identification of a TS is consistent with legal definitions and requirements for TS of EU Directive 2016/943 and the IP Organization (WIPO). Both entities ensure TS receive uniform and balanced protective measures based on accepted requirements (Malone, 2021). In line with the conceptual framework introduced earlier, Table 3 below provides a TS identification guide based on data and legal requirements for TS and the VRIO Framework by Barney (1991, 1995). According to Interviewee X9:

You've got to ask yourself, is the information I'm now looking at meets the requirements? Is it secret? Does it have value? Can I take reasonable steps to protect it?

The table also aligns with unique, valuable, confidential, features of information as a TS in accordance with KM theory (Hannah et al. 2018). The framework demonstrated in Table 3 is adjusted to fit TS specifically, with added classification of the type of information identified.

The UVRIP framework asks questions about specific types of information as sources of sustained competitive advantage. The question of usefulness is: 'Can the information in question be used to achieve company strategic objectives?' (Interviewees X5, X6, X9-11). If a firm answers 'yes', then information has the potential to be useful to an organisation as a source of competitive advantage, but if it does not also satisfy the other four requirements, then information remains public information only.

Questions of information value directly link to requirements of commercial value, information possessing commercial value when it has the capacity to generate increasing net revenues and exploit market opportunities and threats (Hesterly and Barney 2014). However, according to EU Directive 2016/943, information must derive actual economic advantage or future expected value from being kept confidential and not publicly known. If the company answers 'yes' to this question and 'no' to the rest, however, it possesses unused valuable information only providing it with competitive parity (Barney 1991, 1995).

The next UVRIP framework parameter is a rarity. Rare information is not common nor controlled by other organisations (Hesterly and Barney 2014). Useful, commercially valuable, and rare information provides an organisation with temporary competitive advantage. Our findings indicate, if it is not protected by a company and can be easily imitated, it only serves as strategic company information (Interviewees X3 and X5), remaining so only until a competing organisation learns about it (Halawi et al. 2005). While strategic information itself might be similar or identical across companies, value and competitive advantage come from how companies interpret, prioritise and act upon, this information (Venkitachalam and Willmott 2017).

**Table 3.** UVRIP framework of trade secret identification (Adapted from Barney 1991; 1995).

Is information useful?	Is information valuable?	Is information rare?	Is information inimitable?	Is information protected?	Type of information identified	Value to the company
Yes	No	No	No	No	Public information	Potential Competitive advantage
Yes	Yes	No	No	No	Unused valuable information	Competitive parity
Yes	Yes	Yes	No	No	Strategic information	Temporary competitive advantage
Yes	Yes	Yes	Yes	No	Unidentified potential trade secret	Unused competitive advantage
Yes	Yes	Yes	Yes	Yes	Trade secret	Sustained Competitive advantage

The next question in the UVRIP framework is related to information inimitability, relating to competitors' capacity to produce direct duplicates or substitutes. Useful, commercially valuable, rare, inimitable, information possesses most of the qualities of a TS. However, if it is not protected, it is only a matter of time before it is misappropriated by employees or competitors (Prosoft v Griffiths, 1999; FSS Travel v Leisure Systems Ltd., 1998; Nautech Services Ltd. v CSS Ltd., 2013; Allfield UK Ltd. v Eltis & Ors, 2015).

The final stage of the UVRIP framework is therefore related to information protection. Only when the organisation takes 'reasonable steps' to protect its useful, valuable, rare, and inimitable information can it be considered a TS (Interviewees X1-9, X12). The UK IP Office's TS guidance elaborates 'reasonable steps' as 'appropriate efforts, in view of particular circumstances, to keep information confidential' (Searle 2021), for example, restricting physical access to documents or marking documents confidential. Consequently, only when the information in question satisfies all UVRIP framework requirements, can it be considered a TS (Hesterly and Barney 2014). To evaluate and validate TS using the UVRIP framework, the following step-by-step guidance could be implemented:

- (1) Conduct workshops with key stakeholders (HR, R&D, legal, IT).
- (2) Assign identified knowledge a scorecard based on UVRIP metrics to assess strategic competitive value.
- (3) Develop KPIs (Key Performance Indicators) to measure UVRIP framework effectiveness to ensure monitoring and continuous improvement (for example: TS portfolio growth, framework adoption rate, audit effectiveness, stakeholder satisfaction, policy to UVRIP integration level, etc.).

Table 4 below represents a number of UVRIP implementation scenarios across various corporate contexts.

The UVRIP framework is applied across industries to identify and safeguard TSs based on sector-specific needs. Technology firms protect proprietary software and AI models through encryption, NDAs and access controls. Pharmaceutical companies secure drug formulations and clinical data via strict lab controls, internal monitoring, and compliance checks. Manufacturers safeguard production techniques and industrial designs with restricted employee access, encrypted design files and physical security measures. Service providers rely on TS audits, NDAs, and encrypted cloud storage to protect client data and proprietary methodologies. Each industry integrates UVRIP to assess the strategic importance of its TSs and implement tailored protection mechanisms, ensuring long-term competitive advantage.

#### 5.2.4. Step 4: align strategic objectives for IP

The final TS identification process step entails establishing IP strategy objectives, requiring alignment with overall business objectives (Interviewees X1, X3, X4, X7, X11). This allows the establishment of a comprehensive IP asset management strategy (Wilson and Decarlo, 2003). Once information after audit is identified, the company needs to decide on its importance to overall business objectives. Based on overall importance the company then needs to develop protocols to protect valuable TS.

To evaluate the potential of each TS, IP managers must consider its impact, including the level of advancement over existing publicly known methods, the existence of alternative technologies or knowledge, and the maturity stage or lifecycle position of protected knowledge or process (Tseng

**Table 4.** Examples of UVRIP Implementation Scenarios (Author's own).

Industry	Key Focus	UVRIP Application
Technology Firms	Software codes, AI models	Algorithms, access control, and NDA agreements.
Pharmaceuticals	Drug formulations, clinical data	Research data, secrecy protocols, and lab controls.
Manufacturing	Production processes, designs	Catalogue processes, physical/digital protection.
Service Providers	Client databases, processes	Audits, client access policies

et al. 2011). By integrating TS evaluation into strategic planning processes, organisations can better leverage IP assets to achieve business objectives, gain competitive advantage, and drive long-term success (Grimaldi, Cricelli, and Rogo 2018). Comprehensively assessing the significance and value of their TS thus enables informed decisions regarding protection, commercialisation, and competitive positioning strategies.

### **5.3. Case study on the application of the UVRIP framework**

Cases X and Y illustrate the importance of structured TS identification and protection in legal disputes involving misappropriation. Case X concerns a medium-sized enterprise in the fuels industry where a former employee allegedly misused sensitive business information. Case Y revolves around unauthorised transfer of a customer database. While involving different industries, both cases demonstrate how the UVRIP framework helps establish TS status and strengthens legal claims.

In Case X, a company in the fuels sector accused a former employee of taking confidential business information, including customer relationships, supplier agreements, pricing models and proprietary operational processes. These TSs were essential for maintaining supplier negotiations, optimising logistics and structuring competitive pricing. Applying UVRIP, the company demonstrated that its confidential information was critical to business operations, commercially valuable, unique to its market and difficult for competitors to replicate without access to internal records. Protection measures included employment agreements with restrictive clauses, encryption protocols and limited employee access to digital and physical records. Despite these precautions, the employee allegedly extracted sensitive information and transferred it to a competitor. The court ruled in favour of the company, recognising the economic value and uniqueness of the TSs and granting an injunction to prevent further misuse.

In Case Y, former employees allegedly took confidential customer data when they left the company to join a competitor. The stolen data, which included client names, contact details, and booking history, was integral to the company's business operations and customer retention strategy. Applying UVRIP, the claimant argued the customer database provided a competitive advantage, had commercial value, and was not readily available to competitors. The information could not be reconstructed without unauthorised access, and while some protection mechanisms existed, gaps in enforcement allowed employees to misuse the data. The court ruled in favour of the claimant, confirming that the client database met the legal definition of a TS. The former employees were found to have breached their duty of confidence, and the new employer was also held liable for misusing unlawfully obtained data.

Both cases reinforce the need for structured TS identification and comprehensive protection. The UVRIP framework played a crucial role in proving that the misappropriated information met the legal criteria of a TS. In Case X, the company successfully demonstrated that supplier, pricing, and operational data were unique and commercially valuable, justifying the granting of an injunction. In Case Y, the identification of customer databases as valuable TSs and the clear evidence of unauthorised use resulted in a favourable legal ruling.

Case X and Case Y demonstrate how the UVRIP framework can strengthen legal claims in TS misappropriation disputes. Both cases show that businesses must take structured, proactive steps to identify, classify, and protect their TSs. The legal outcomes confirm that courts evaluate both the nature of the TS and the organisation's commitment to its protection.

## **6. Discussion**

The findings of this study address a critical gap identified in the literature by extending existing frameworks of TS (TS) management to focus specifically on processes of TS identification. Prior studies, such as those by Bos, Broekhuizen, and de Faria (2015), Hannah et al. (2019), and Ozcan, Pickernell, and Trott (2023), emphasise the importance of a lifecycle approach to TS management but

lack in-depth examination of its early stages. While these models provide insights into TS protection and mitigation, they often assume organisations can readily identify what constitutes a TS without detailing the systematic steps required for this process. Our research builds upon and refines these lifecycle models, positioning TS identification as a foundational step underpinning all subsequent protection and mitigation activities. This approach is reinforced by integrating KM theory as a complementary framework that enables structured identification, classification and strategic management of TS within organisations (Santoro et al. 2018; Zack 1999).

The study supports existing literature on the interconnectedness between TS identification and protection mechanisms. Ozcan, Pickernell, and Trott (2023) argue the identification of TSs activates broader protection frameworks, prompting firms to implement legal, technical and administrative safeguards. This research reinforces that premise, illustrating how systematic identification of TS as valuable assets enables tailored organisational, legal and HR strategies to protect them effectively. By linking TS identification to IP strategy formulation, the study advances prior research highlighting the role of IP audits in ensuring effective IP protection. Liu and Chin (2010) and Grimaldi, Cricelli, and Rogo (2018) emphasise the role of systematic IP audits in cataloguing and evaluating IA. This study further integrates IP audit principles into the TS identification process, ensuring organisations move beyond ad hoc approaches and adopt structured evaluation mechanisms that align TS with broader business and legal frameworks.

The study also addresses practical challenges associated with identifying TS, a persistent issue noted by Searle (2021). Many organisations lack awareness and structured processes to distinguish TS from other forms of confidential information, leading to gaps in protection. This research highlights the importance of incorporating mechanisms such as employee training, awareness programmes and strategic use of legal tools, aligning with recommendations by Delerue and Lejeune (2011) and Hannah et al. (2019). By emphasising HR initiatives and confidentiality culture-building, the study demonstrates how organisational capabilities can be mobilised to support TS identification and protection. This perspective strengthens the argument that TS management requires a cross-functional approach, integrating contributions from legal, HR, IT, and business strategy teams to create a robust framework for safeguarding competitive knowledge assets (O'Donoghue and Croas-dell 2009).

Findings further illustrate TS identification is not a static process but a dynamic capability that evolves alongside changes in the competitive environment (Teece et al. 1997). This study applies dynamic capabilities (DC) theory to TS management, demonstrating that firms must continuously assess and reclassify TSs as they develop new innovations and respond to external threats. Similarly, findings confirm that TSs must first be correctly identified as VRIO resources before firms can effectively protect and integrate them into competitive strategies (Barney 1991, 1995).

In summary, this study enriches academic and practical understanding of TS identification by positioning it as an integral component of TS management, rather than an incidental step. By integrating systematic audit practices, HR-led confidentiality initiatives, and strategic adaptation capabilities, organisations can enhance their TS identification strategies as part of a broader IP governance framework. These insights offer a clearer view of how organisations can approach TS identification not only as a compliance requirement but as a strategic enabler for sustaining long-term competitive advantage.

## 7. Conclusions

Our study revealed three challenges to TS identification: insufficient understanding of TS, lack of government support, and absence of coherent TS policy. These findings align with KM theory, emphasising the importance of understanding and categorising knowledge assets within organisations (Santoro et al. 2021). Difficulty in distinguishing between general confidential information and specific, valuable TS, as evidenced in legal cases, emphasises the need for more structured approaches to knowledge asset identification and protection.

To address these challenges, we developed a four-step strategic process for TS identification, grounded in KM theory and the VRIO framework, creating strategic mechanisms to systematically audit information within organisations, facilitating identification and classification of knowledge assets. By categorising company information based on usefulness, value, rarity, imitability and protection (UVRIP) criteria, firms can more effectively identify and protect their TS.

Our proposed identification process mirrors the KM cycle, emphasising the need for organisations to identify and protect valuable knowledge assets, and integrate them into strategic planning to achieve sustained competitive advantage (Crittenden, Crittenden, and Pierpont 2015). Importantly, our study highlights TS identification as an organisation-wide endeavour, requiring involvement at all employee levels. The study contributes theoretically and practically to academic literature and industry practices, bridging gaps between KM theory and TS management. Offering a structured approach to identifying and leveraging knowledge assets for competitive advantage, findings highlight the importance of holistic approaches to TS management, involving clear identification processes, strategic alignment, and organisation-wide participation (Halawi et al. 2005).

### **7.1. Contributions to literature and theory**

Our study primarily contributes to the practical development of structured processes for TS identification, aligning with and extending relevant theoretical frameworks. This contribution, primarily grounded in practical challenges of implementing TS management processes, is situated within four overlapping strands of academic literature. First, we contribute to TS protection literature (Crittenden, Crittenden, and Pierpont 2015; Delerue and Lejeune 2011; James, Leiblein, and Lu 2013). Our findings suggest, beyond identification, that the effectiveness of TS protection is contingent upon organisational commitment to implementing robust security measures, fostering confidentiality cultures, and aligning these with firm strategic imperatives.

Second, we contribute to TS management studies (Bos, Broekhuizen, and de Faria 2015; Hemphill 2004; Ozcan, Pickernell, and Trott 2023), answering calls for research of stages of TS management (Bos, Broekhuizen, and de Faria 2015; Ozcan, Pickernell, and Trott 2023). Offering a comprehensive four-step process of TS identification aligned with the VRIO framework, the interconnectedness of these frameworks in our analysis accentuates the importance of a knowledge-centric approach to TS identification (Barney 1991, 1995; Halawi et al. 2005).

Third, our study contributes to KM theory literature (Halawi et al. 2005; Mishra and Uday Bhaskar 2011; Santoro et al. 2021; etc), emphasising understanding IP-industry context, aligning with KM theory's directive to contextualise knowledge assets within broader organisational strategic objectives (Santoro et al. 2021). Finally, we contribute to IP Audit literature (Gargate, Siddiquee, and Wingkar 2019; Grimaldi, Cricelli, and Rogo 2018; Liu and Chin 2010; and many others), building on IP Audit and integrating it into overall processes of TS identification, expanding on IP audits with a specifically designed process for TS identification. While these contributions span multiple strands of literature, they are unified by practical emphasis on developing actionable processes for TS identification, reflecting intersections of theoretical advancement and applied relevance.

### **7.2. Contributions to practice**

Offering several practical contributions, the study clarifies TS identification processes, distinguishing them from general confidential information, a common challenge for many organisations in the UK. The study also highlights the necessity for strategic alignment between TS management and broader organisational goals, offering a roadmap for managers to leverage IA for competitive advantage. We also discuss practical legal and organisational consequences of inadequate protection and TS identification, key for organisations to understand the legal consequences and importance of maintaining secrecy to avoid costly litigation. Additionally, the study emphasises the importance



of developing coherent policies (governmental and organisational) and raising employee awareness regarding TS.

Lastly, the study advocates innovative business practices, showcasing how strategic management of TS can unlock growth and innovation opportunities, encouraging organisations to view their TS as assets to be guarded AND sources of innovation and strategic development. This study equips organisations with insights and methodologies to improve IP management practices, offering a holistic framework for TS identification, guiding UK organizations toward achieving sustained competitive advantage.

### 7.3. Limitations and further areas of research

Several limitations of this study need to be acknowledged, generating areas for further research. First, whilst this research has generated a structured theoretical framework, the full practical application has not been tested using empirical evidence across multiple organisations. Hence, further studies could be focused on developing cohesive frameworks of TS management, using data from across a greater range of organisations, to provide more comprehensively supported guidance to organisations on managing TS throughout all lifecycle, from identification to loss of TS.

Second, the study's reliance on a qualitative approach, whilst it provides deeper, more detailed insights, does not provide the generalizability of a quantitative study, needed to confirm findings across industries. Because the limited number of legal cases and industry interviews do not fully represent the broader landscape of TS protection challenges across the UK, further quantitative studies are therefore required.

Third, the lack of longitudinal data in the study suggests the need for longitudinal research to assess the longer-term effectiveness and sustainability of the proposed framework in real-world applications. Another limitation of this study is its geographical scope limited to the UK. Additional empirical research on TS identification and TS management is therefore needed across geographical landscapes, industries, and jurisdictions.

### Author contributions

CRediT: **Oleksandra Ozcan:** Conceptualization, Formal analysis, Methodology, Visualization, Writing – original draft, Writing – review & editing; **David Pickernell:** Supervision, Writing – review & editing; **Emily Bacon:** Supervision.

### Disclosure statement

No potential conflict of interest was reported by the author(s).

### Notes on contributors

**Oleksandra Ozcan** is a Ph.D student in the School of Management at Swansea University. She is also a Lecturer in International Business in the School of Languages and Applied Linguistics at the University of Portsmouth. Current research interests lie in intellectual property management, knowledge management, innovation appropriation and trade secrecy, in particular.

**David Pickernell** is a Professor of Small Business and Enterprise Development Policy at the School of Management at Swansea University, having previously been a Professor of Small Business and Enterprise Development in the Business School at the University of Portsmouth, and a Professor of Economic Development Policy and Director of the Centre for Enterprise at the University of South Wales. Current research interests revolve around enterprise development policy, economic clustering and the role of universities in innovation and enterprise. He has over 100 articles published in refereed journals, and undertaken research and consultancy for a range of organisations, including the OECD, EU, Welsh Assembly Government, Queensland Government, Victorian Government (Australia), Welsh Development Agency, Cardiff Council, Isle of Wight Council, Council of Mortgage Lenders, Associated British Ports, Shaw Trust, Federation of Small Businesses, Colleges Wales, Wales Social Partners Unit and Enterprise Educators UK.

**Emily Bacon** is a Post-Doctoral Affiliate based in the School of Management. Her PhD research focused on the conditions for knowledge transfer success within innovation ecosystems. She has published on knowledge transfer success within ecosystem partnerships and cooperative relationships in internationally renowned academic journals utilising the analytical technique of fsQCA. Emily has attended leading academic conferences to disseminate her research. Her recent submission to the INEKA (2019) conference received an award from Technological Forecasting and Social Change. With a teaching background, she currently teaches in the School of Management at both Undergraduate and Masters level.

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