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The impact of ERP utilisation experience and segmental reporting on corporate performance in the UK context

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ABSTRACT

By adopting the Decision-Usefulness theory, this study investigates separately and jointly the impact of utilising Enterprise Resources Planning system (ERPs) and the information disclosure of Segmental Reporting (SR), following the implementation of IFRS-8, on Corporate Performance (CP) in the UK context. The research was drawn on the Financial-Times-Stock-Exchange (FTSE)-100 over the period 2013-2017 using textual analysis and Compustat, after accounting for endogeneity problems. The authors find generally direct relationships between CP indicators, ERP utilisation experience and SR dimensions. This paper has several implications for FTSE-100 companies, academics, practitioners and IFRS-setters regarding the ERP utilisation and the segmental information reporting.

1. Introduction

In 2006, International Financial Reporting Standard No.8 (IFRS-8) entitled 'Operating Segments' was issued by the International Accounting Standards Board (IASB), which is consistent with US Financial Accounting Standard No.131, especially in relation to its management approach (IASB 2006). IFRS-8 requires that a company's operating segments should be documented in its internal reports. IFRS-8 (2006, para.5) stated that, "*operating segments are to be identified on the basis of internal reports that are 'regularly reviewed by the Chief Operating Decision Maker (CODM) to make decisions about resources to be allocated to the segment and assess its performance*'. In terms of the SR items, in para.1 of IFRS-8 (2006), a company is required to '*disclose information to enable users of its financial statements to evaluate the nature and financial effects of the business activities in which it engages and the economic environments in which it operates*'. Such disclosure has articulated the importance of reporting mandatory and voluntary segmental information, which is consistent with André, Filip, and Moldovan (2016) and Crawford et al. (2012).

Due to the management approach, concerns were raised that the quality and quantity of SR might be decreased (Crawford et al. 2012). In particular, a company might manipulate the level of disclosure to the public due to CODM judgements, and the extent of its disclosure to the shareholders. In accordance with these concerns, in 2013, the IASB launched and completed its post-implementation review (PIR) of IFRS-8, by which the

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IASB adopted, for the first time, a review of its standards after the effective date with the ambition of defining the extent of IFRS-8's functionality, as intended (IASB 2013). The IASB staff also investigated the usefulness to the shareholders of the SR under IFRS-8's management approach through the empirical evidence that was driven by the academics around the globe. They found that the empirical studies about SR under IFRS-8 were not sufficient, and, as they argued '*current academic studies have generally not considered the usefulness of IFRS-8 based on the management approach*' (IASB 2013, 7).

ERPs considers a substantial decision on IT utilisation (Aubert, Léger, and Larocque 2012) to capture and evaluate accounting information (Morris 2011). It is a '*commercial software package[s] that promises the seamless integration of all the information flowing through a company – financial and accounting information, human resource information, supply chain information, customer information*' (Davenport 1998, 121). With this increased attention, the system is built around cross-functions holding managers and accountants alike accountable for their financial performance (Scapens and Jazayeri 2003) as a powerful tool in supporting the key functions of accounting. However, only scant attention was given to understanding not only the associations across ERP utilisation and CP (Grabski, Leech, and Schmidt 2011; Rom and Rohde 2007), but also the CP-SR link (Nichols, Street, and Tarca 2013). These previous review studies drew attention to inconsistency and a knowledge gap in understanding the separate impacts of ERP and SR, on CP. It has recently been found that the content of both mandatory and voluntary SR were raised following IFRS operationalisation (Mardini and Ammar 2019). However, understanding the extent to which this operationalisation may influence CP is underdeveloped. Additionally, previous research (Mardini and Ammar 2019; Grabski, Leech, and Schmidt 2011) has outlined the lack of research exploring the CP-ERP and CP-SR associations in the context of the FTSE index, which is one of the most efficient worldwide markets.

These motivations demonstrate a need for a research to respond to the IASB and to prior calls in the literature regarding the insufficiency of the number of empirical studies about the practicality of SR under IFRS-8 and/or ERP adoption, by tackling the objectives of SR and ERP utilisation. The implications of this have the potential to (a) contribute to existing literature in terms of fulfiling the research gaps, (b) assist policy makers by providing state-of-the-art PIR, and (c) update practitioners with insights drawn from the FTSE-100. Importantly, this study contributes to society through offering clarifications that advance the understandings of academics, policy makers, and practitioners regarding whether ERP utilisation broadens or limits SR variations, as well as information asymmetry. The current study therefore aims to empirically explore the impact of ERP utilisation and SR, following IFRS-8, on CP, using the lens of Decision-Usefulness theory to explain how the existing interplay between ERP, SR, and CP are developed. This perspective supports the corporate stakeholders in providing their proper judgements through the usefulness of information disclosure (represented by the value and volume of SR) and IT adoption (exemplified by the years of utilising ERPs) to enhance CP (Galutier and Underdown 2001).

The remainder of this paper is organised as follows: the next section highlights the implications of the adopted theoretical perspective and reviews the contribution of the existing literature on CP relating to both ERP and SR, respectively, including the development of research hypotheses. Section (3) completes the discussions of the research design by focusing on data collection and preparation, as well as on the examination's modelling. Section (4) presents the findings and discussions to facilitate the discovery of

the theoretical and practical implications. Section (5) draws out the key conclusions of this paper, while section (6) outlines the implications, alongside the limitations.

2. Theoretical background, literature review and hypotheses development

This paper contributes to bridging the research gap, mentioned above, by examining the interrelations across the ERP-SR-CP of FTSE-100 listed companies. It draws on Decision-Usefulness theory to sensitise the role of ERP in influencing segmental information and its joint implication for CP. Whilst rationality of use and the key elements of Decision-Usefulness theory relating to this study are articulated in Subsection (2.1), the literature review and research hypotheses are outlined in Subsection (2.2).

2.1. Theoretical background

The development of Decision-Usefulness theory began in 1955 (Berry and Robertson 2006). At that time, the financial statements were not helpful in supporting stakeholders in making their judgements (Chambers 1955). It claimed that financial information should be relevant to the decision-maker's (i.e., the user's) needs through its usefulness, as would be expected to facilitate the business environment; however, he argued that the relevant element is scarce within financial statements, which lead to the confusion of the stakeholder in financial statements, instead of their being beneficial. This perspective was thus developed to sustain the relevance level of financial statements (Chambers 1955), and to maintain the construction of the theory (Chambers 1972). More recently, Galutier and Underdown (2001) articulated the Decision-Usefulness perspective as being '*the provision of sufficient information to help investors to make predictions about the future performance*' (344). In accordance with this definition, the main objective of financial information is to add further clarifications of satisfactory details, in terms of the quality and the quantity of financial reporting that would support the decision makers in providing their judgements, including evaluations, analyses and recommendations.

Decision-Usefulness theory has been widely utilised, especially in understanding financial reporting. Identifying the decision-makers and the accounting information's relevance to various groups of users are two key fundamentals underpinning the theory (Schroeder, Clark, and Cathey 2013; Staubus 2000). Such principles led Staubus (2000, v) to re-emphasise the key objective of Decision-Usefulness as being: '*the base on which a coherent, broad structure of ideas has been built. No other such structure of accounting ideas has been developed ... it is made up of a mixture of normative and descriptive propositions [...] it is substantially accurate as a general description of current accounting practice*'. Indeed, the aforementioned principles and coherent structures are materialised in two conceptual frameworks of financial reporting (Berry and Robertson 2006; Gray 1996). The first conceptual framework was outlined by FASB in the US (Staubus 2000). Similarly, this theory shaped the foundations of the second conceptual framework, which was articulated by the International Accounting Standards Committee (IASC) (Davies et al. 1997). The ISAC framework defines users as being comprised of: '*investors, employees, lenders, suppliers and other trade creditors, customers, governments and their agencies and the public*' (IASC 1989, para. 9). The IASB[1], in its conceptual framework of 2010, employed a hierarchical approach to enhance the decision usefulness of financial information, and this was comprised of a

number of fundamental and enhancing qualitative characteristics. The fundamental characteristics concentrate on Relevance and Faithful Representation, whereas the enhancing characteristics are Comparability, Verifiability, Timeliness, and Understandability. These information characteristics shape the cornerstones of effective and efficient corporate disclosure and communication (Schroeder, Clark, and Cathey 2013).

The potentiality of the aforementioned qualitative characteristics of IFRS-8 becomes achievable, since the emergence of ERPs (Rom and Rohde 2007). Aubert, Léger, and Larocque (2012) have noted that neighbourhood companies, listed on FTSE-100 as an instance, that have strong connections, may influence organisational decisions for ERP adoption, and this influence is shaped by major trading partners, such as Oracle, Microsoft Dynamics, SAP, Epicor, NetSuite ERP and Sage. This influence is attributed to the complex nature of the knowledge required for ERP adoption. Accordingly, the Decision-Usefulness perspective is adopted in this study to examine the extent to which that CP is enhanced by the information disclosed and reported by companies utilising ERPs, which is an underdeveloped research area and requires further investigation. The implications of SR and ERP on CP, by drawing on the Decision-Usefulness theory, are respectively reviewed and developed in the consequent section.

2.2. Literature review and hypotheses development

Since the emergence of ERPs (Grabski, Leech, and Schmidt 2011) and the introduction of IFRS-8 (Nichols, Street, and Tarca 2013), CP has not been given sufficient attention in prior studies in relation to both ERP utilisation and SR. More specifically, literature reviews give rise to (a) the FTSE-100 context; (b) CP-ERP; and (c) CP-SR being seen as overriding the issues (André, Filip, and Moldovan 2016; Leung and Verriest 2015). The existing evidence is thus critically reviewed and organised into the subsequent subsections.

2.2.1. ERP and corporate performance
Across the spectrum of empirical studies on the association between ERP and CP, overall the results are equivocal. Whilst a set of studies have reported direct associations (Wier, Hunton, and HassabElnaby 2007; Nicolaou and Bhattacharya 2006; Nicolaou 2004), another set found a mixed association, or none at all, when other interconnected indicators were taken into account (Maiga, Nilsson, and Jacobs 2014; Hendricks, Singhal, and Stratman 2007; Poston and Grabski 2001).

Generally, CP-ERP association in the UK context has been given no attention. The empirical research on ERP utilisation and its association with CP is not only inconclusive, but is also concentrated on the USA. While Hunton, Lippincott, and Reck (2003) and Poston and Grabski (2001) found no effect between the implementation of ERP and CP in a sample of 120 and 50 U.S. companies, respectively; Hendricks, Singhal, and Stratman (2007) yielded mixed results from a sample of 186 announcements of investments in ERPs. Additionally, Maiga, Nilsson, and Jacobs (2014) surveyed a sample of 518 U.S. managers, and concluded that the IT integration interface provided a plausible explanation for the conflicting results in prior studies that assessed the relationship between IT and CP. On the other hand, some U.S. research reported positive significant links between ERP and CP. For instance, Nicolaou (2004) and Nicolaou and Bhattacharya (2006) found that ERP-users might enjoy a superior performance, especially after two years following its adoption,

when compared non-ERP-users in the same sample of 247 companies. Tsai et al. (2015) suggested also that ERP adoption might improve corporate performance through enabling effective internal auditing. Beyond the current empirical studies, there is a set of literature review papers (Khallaf, Omran, and Zakaria 2017; Grabski, Leech, and Schmidt 2011; Johansson and Newman 2010) that supports the need for further investigation to address the influence of ERPs' implementation on CP, while controlling the results against the use of other company and industry initiatives.

Theoretically, the association between CP and ERP utilisation has frequently been the key axis of the debates in academia (Maiga, Nilsson, and Jacobs 2014; Hendricks, Singhal, and Stratman 2007; Nicolaou and Bhattacharya 2006). The Decision-Usefulness perspective is adopted to explain how CP will be enhanced when corporate management selects the appropriate approach, such as ERPs, to generate relevant accounting information in the best and most useful manner in the interest of both the internal and external users to allow them to make the correct decisions. This is consistent with Aubert, Léger, and Larocque (2012), whose conclusion was that companies listed on the FTSE-100 index may influence each other on the decision relating to ERPs' adoption. Consequently, the actions of top management should be aligned with the best interests of the investors, and of the company as a whole, to improve CP. We therefore anticipate that there is a positive relationship between CP and the ERP utilisation experience, as follows:

H1. *The Utilisation Experience of ERPs is positively and significantly associated with the level of corporate performance.*

2.2.2. SR and corporate performance

IFRS-8's emergence gave the guidance that companies should report mandatory and voluntary segmental information (André, Filip, and Moldovan 2016; Crawford et al. 2012). The impact of IFRS-8 on SR has been recognised in terms of (a) CP (Hope et al. 2008; Botosan and Stanford 2005; Hossain and Marks 2005), (b) the predictability of returns, risks and growth prospects (Behn, Nichols, and Donna 2002; Ettredge et al. 2005), and (c) the value relevance of decision-making (Kajüter and Nienhaus 2017; Mardini, Tahat, and Power 2018). However, scant attention has been given to understanding this relationship in the context of the FTSE-100 and by following a management approach-based IFRS-8. Generally, previous research (e.g., Botosan and Stanford 2005; Behn, Nichols, and Donna 2002; Johnston 2001) has argued that segmental disclosure is useful; it increases the liquidity of the market, decreases the gap between shareholders and management, and lowers the capital costs per company.

The effect of SR on CP, under IFRS-8, has received little attention. The focus was afforded to investigating the quality and quantity dimensions of SR under IFRS-8 (such as Lim et al. 2017; André, Filip, and Moldovan 2016; Bugeja, Czernkowski, and Moran 2015; Leung and Verriest 2015). They found that the reported segmental information was enhanced following the implementation of IFRS-8, as well as its decision-making usefulness. Further, they concluded that the adoption of IFRS-8 in a variety of different countries led to an increase in the number of reported segments. Moreover, the number of items provided per segment tended to increase under IFRS-8, especially post the implementation of the 2012 review (Mardini and Ammar 2019). On the other hand, some previous research (e.g., Mardini, Tahat, and Power 2018; Birt,

Joshi, and Kend 2017; Kajüter and Nienhaus 2017) has investigated the value relevance of SR under IFRS-8. For instance, Kajüter and Nienhaus (2017) found that the disclosures of German listed companies were value relevant. Mardini, Tahat, and Power (2018) provided cross-country evidence (Jordanian and Qatari listed companies) and yielded the result that the segmental information provided (including the number of segments and the amounts of disclosure) is value relevant and may explain the variations in companies' share prices.

In summary, prior studies have not investigated the impact of SR on CP in terms of accounting performance indicators. In other words, the current study fills the existing gap in the literature by investigating the effect of SR on CP and by adopting the Decision-Usefulness perspective. This theory, which focuses on assessing and presenting business information in an effective and efficient manner, is judged based on how well such disclosure and communication are concluded by the enterprise (Schroeder, Clark, and Cathey 2013). As a result, the more precise the users are in understanding the accounting information and predicting the forthcoming financial events, the more useful this information will be for them in allowing them to make proper decisions. In alignment with prior studies' discussions, we anticipate, therefore, that we will find a positive relationship between CP and SP:

H2. *The extent of segmental information disclosures is positively and significantly associated with the level of corporate performance.*

In a nutshell, the discussion in the current section concludes that H1 explores the ERP's effect on CP, while H2 investigates SR's effect on CP by drawing on Decision-Usefulness theory. Furthermore, the current research is the first of its kind to consider the impact of the quality and quantity dimensions of segmental information disclosures on the level of CP through the utilisation experience of ERPs as intermediate indicators. Hence, the study tests the following hypothesis:

H3. *Segmental information disclosures within ERPs utilisation experience are positively and significantly associated with the level of corporate performance.*

3. Research methodology

3.1. Data sample

The data sample is drawn from the constituent companies of the FTSE-100 index over the period 2013–2017. The initial sample included all of the FTSE-100 companies. However, some companies were excluded from the final sample. Specifically, eight companies were removed because they had not been listed in the FTSE-100 for the entire sample period, and/or due to data availability issues. To attain the research objectives of the current study, The SR and non-SR companies, as well as the ERP adaptors and non-adaptors, are included in the final sample of 92 companies to investigate the phenomenon that is being addressed, which leads to a balanced panel of 460 records from the sample period. 411 observations (89.35%) represent users of the ERPs, while the remaining 49 observations (10.65%) are non-users of the ERPs. The sample size is considerably larger than those utilised in previous US studies that reported CP-ERP or CP-SR results.

A significant reason underlying the selection of the FTSE-100 index is that the registered companies represent the top 100 UK companies listed on the London stock exchange, based on their market capitalisation. The reason behind the choice of the five-year period 2013–2017 is that it enables an investigation period of SR starting from the year 2013, when the IASB was launched and completed its post-implementation review of IFRS-8. Accordingly, the IASB adopted, for the first time, a review of its standards after the effective date, for the purpose of defining the extent of IFRS-8's functionality as intended (IASB 2013). Since 2013 is the last year of the pre-implementation review of IFRS-8's adoption by the FTSE-100, this year of IFRS-8's pre-implementation has been utilised as a reference point to address SR while, beyond this year the situation is considered as being a post-implementation review of IFRS-8 era. Due to the diversity of the data employed, a variety of different sources was utilised, and these are outlined in the following section.

3.2. Research variables and modelling

In this section, the research variables, as well as examination modelling, are discussed. Table 1 summarises the names, codes, and definitions of all of the variables utilised.

Table 1. List of indicators, variables, codes and definitions.

Indicators	Variables	Codes	Definitions
Corporate Performance	Tobin's Q	TQ	Natural log of percentage of total corporate market value on the stock market to its total book value assets in a financial year (Manually measured based on indicators from Compustat database).
	Return on Assets	ROA	Natural log of percentage of corporate income before extraordinary items to its total book value assets in a financial year (Compustat database).
Enterprise Resource Planning (ERP)	Utilisation Experience of ERP	ERP	Number of years of utilising the Enterprise Resource Planning system by FTSE-100 companies (Manually measured from different sources and provided score of (0) to non-ERP adaptors).
Segmental Reporting (SR)	Mandatory Segmental Reporting	MSR	Percentage of Mandatory Segmental Reporting disclosure out of 18 segments by FTSE-100 companies (Manually measured by adding the disclosed individual firm's score of mandatory items divided by the total number of mandatory items, which is 18).
	Voluntary Segmental Reporting	VSR	Percentage of Voluntary Segmental Reporting disclosure out of 5 segments by FTSE-100 companies (Manually measured by adding the disclosed individual firm's score of voluntary items divided by the total number of voluntary items, which is 5).
	Total Segmental Reporting	TSR	Percentage of Total Segmental Reporting disclosure out of 23 segments by FTSE-100 companies (Manually measured by adding the disclosed individual firm's score of total items divided by the total number of total items, which is 23).
	Number of Operating Segments	NOS	Number of operating segments reported by FTSE-100 companies (Manually measured by counting annually the number of the disclosed segments in corporate annual reports).
Control Variables	Corporate Size	TA	Natural log of total corporate book value assets. It is presented in millions' Stirling Pounds (Compustat database).
	Corporate Growth	CTA	Natural log of change in total corporate book value assets (Manually measured by subtracting the previous-year total corporate book value assets from the current-year total corporate book value assets).
	Debt Ratio	DA	Percentage of corporate total assets financed by debts in a financial year (Compustat database).
	Year	YR	The 5-year time period from 2013 to 2017 inclusive.
	Industry	IND	Dummy variable of the Two sections of FTSE-100 industries representing the sectors 'Financials and Utilities' by 1 and the non-financial sectors by 0.

3.2.1. Research variables

This study examines the impact of the ERP utilisation experience, as well as of the quality and quantity dimensions of SR on CP, on companies listed in the FTSE-100 index. This makes ERP, SR and CP the key variables that shape the process of data collection in this paper.

The first indicator represents the process of reporting ERP deployment by companies that are listed on the FTSE-100 in the period under examination (Aubert, Léger, and Larocque 2012). The data relating to ERP variables were manually collected in two stages. The first stage focused on companies that have adopted and implemented the full ERP package, or finance module, which is a fundamental component in enabling an organisation's capabilities for accounting and financial reporting (see also Morris 2011; Granlund and Malmi 2002). The alternative cases are companies that have implemented other modules than finance, and/or that are still in this progress, who are considered as non-ERP adopters (Hunton, Lippincott, and Reck 2003; Poston and Grabski 2001). This was collected from different resources of major partners to ensure data triangulation (Lukka and Modell 2010). The first source of major partners was the news release of: (a) vendors[2] supplied ERP (e.g., Oracle, Microsoft Dynamics, SAP, Epicor, NetSuite ERP, Sage, and others), and/or (b) consultants involved in ERP implementation (e.g., Capgemini, Deloitte, and LogicaCMG) (Aubert, Léger, and Larocque 2012). This news, third, are validated through a further two sources, which are (a) the announcements and interviews published by Bloomberg, ComputerWeekly.com and Gartner, and/or (b) the websites of the FTSE-100 listed companies, to discover when ERPs was adopted and went live, to provide substantial endorsement (Morris 2011; Brazel and Dang 2008). This has resulted in the selection of a set of companies that is drawn from different sectors of the FTSE-100 and who have utilised different components of ERPs. In complement to this, the second stage involved differentiating between companies in which we could not find any evidence of ERPs' utilisation (i.e., a value of 0 was given), and companies in which the ERP utilisation process finally went live (i.e., a value of 1 was provided), and this was consistent with the research of Hunton, Lippincott, and Reck (2003). Following (Johansson and Newman 2010) argument relating to ERP development, the FTSE-100 companies' experiences of using ERPs were also measured to discover the number of years they had used ERPs, using 2013, the year of IFRS-8's effective implementation, as a cut-off point. In other words, earlier adoption, prior to 2013, means more experience, and *vice versa* for companies that adopted ERP in, or later than 2013.

The second variable relates to the process of disclosing the SR variables. Prior studies employed the disclosure index method to measure the extent of segmental information disclosures, while using an unweighted approach to score the index (Lim et al. 2017; André, Filip, and Moldovan 2016; Bugeja, Czernkowski, and Moran 2015; Franzen and Weißenberger 2015). The current study has taken into account both the quality and quantity dimensions of SR under IFRS-8. The quality of SR is considered by articulating the mandatory, voluntary and total segmental disclosures as proxies with which to tackle the current study's objectives. The disclosure index checklist combines data relating to 18 mandatory items for the operating segments that are reported in relation to IFRS-8's requirements, and 5 voluntary items that were provided over and above IFRS-8's requirements. Table 2 outlines the mandatory and voluntary segmental items utilised. These items are captured as scores from the annual reports of the FTSE-100 companies.

Table 2. Disclosure index checklist.

No.	IFRS-8 Mandatory Disclosures for Operating Segments (if reviewed by the CODM)
1	Profit
2	Assets
3	Liabilities
4	Revenue (external)
5	Depreciation & amortization
6	Other non-cash expenses
7	Reconciliation to consolidated accounts
8	Revenue (internal)
9	Basis of inter-segment pricing
10	Profit from associates and joint ventures
11	Basis of measurement
12	Interest revenue
13	Interest expense
14	Income tax expense
15	Factors used to identify the entity's segments
16	Entity-Wide (major customers)
17	Entity-Wide (products and services)
18	Entity-Wide (Geographic Information)
	Voluntary Disclosures
19	Number of Employees by Segment
20	Capital Expenditure on plant and equipment
21	Intangible Assets by Segment
22	Non-Current Assets
23	Investment Activities

Accordingly, three quality disclosure indices were developed: (i) the mandatory SR (MSR), (ii) the voluntary SR (VSR), and (iii) the total SR (TSR), which includes both mandatory and voluntary information. The scoring process for each FTSE-100 company was calculated by adding the individual company's score (mandatory, voluntary, or total disclosures) divided by the total number of items (mandatory, voluntary, or total) that were included in the disclosure index checklist.

$$\text{MSR; VSR; TSR} = \sum_{i=1}^{m;v;t} s_{ii}/m;v;t \qquad [1]$$

where $s_i = 1$ if the item is disclosed, and 0 otherwise, and m, v, and t make up the total number of items applicable to any company. This total number is made up of m, mandatory items, v, voluntary items, and t, the total number of items of segmental information that were provided.

The quantity of SR is deemed to be arrived at by the number of segments reported, and these are counted in the segmental note within the corporate annual reports. In accordance with prior studies, an unweighted disclosure index approach was adopted[3]. This approach considered that if an item were disclosed in the financial statements of a company, a value of 1 was recorded; if an item was not disclosed, it was given a value of 0. The sampled companies were not penalised when an item from the disclosure index was not disclosed due to its applicability to their operations and circumstances. The absence of the item was investigated to improve the relevance and reliability of the disclosure index. In other words, some of IFRS-8's mandatory items may not be applicable

to all companies' operations. For instance, the inter-segmental sales item is not applicable to all companies, and not all companies have internal sales across their segments; thus, this item is not relevant to that particular company. This also led us to consider the basis of inter-segmental sales in the same particular company as not being applicable, because it is linked to the existence of internal segment sales. Another example is that not all companies necessarily have joint ventures, associate or partner companies; thus, the segmental item for profit from associates and joint ventures may also not be relevant. The annual reports were re-read to carefully identify the non-applicable items for each year's observation. However, the segmental items included in the disclosure index were regularly published in the financial statements of the sample companies; while extraordinary or specific sector items were not included in the checklist, as these would only be specific to certain companies.

The third variable in this study focuses primarily on two different performance measures (Tobin's Q and ROA) taken separately, with the ambition of checking the robustness of the results. Both measures have widely been used in prior studies to capture aspects of investment and the efficiency of CP (Elsayed and Elbardan 2018; HassabElnaby, Hwang, and Vonderembse 2012; Abdullah and Page 2009). First, Tobin's Q (TQ) is a common accounting metric that compares the company's market value with the book value of its total assets (Elsayed and Elbardan 2018). This may capture the usefulness of performance information, from the viewpoint of the external users (Staubus 2000), as a high level of corporate Q ratio would encourage shareholders to invest more. Second, the return on assets (ROA) is an accounting indicator that has been adopted to measure corporate efficiency in managing the available resources (Elsayed and Elbardan 2018). From a theory perspective, this indicator may capture internal users' perceptions of information usefulness as reported by ERPs (Staubus 2000). Data related to CP have been collected from the Compustat database.

Apart from the key adopted variables, a number of common company-dependent effects, as represented by the influences of company size, growth, and debt leverage, are likely to be influential in respect of ERP, SR, and CP. Understandably, company size, growth, and debt leverage are variables that have received considerable attention in the literature. Hunton, Lippincott, and Reck (2003) and Elsayed and Elbardan (2018) observe a direct relationship between size and growth opportunities, from one side, and CP from the other. Debt leverage provides a good indication of the long-term solvency of the company, which indicates the use of debt to acquire additional assets. It reflects the differing risk taking profiles of managers and shareholders (Bebchuk and Spamann 2009). The data for specific company characteristics have been extracted from the Compustat database.

3.2.2. Research modelling

This research aims to examine the relationships between CP, ERP, and SR by showing the impact of these latter variables, both separately and jointly, on the former. Using a quantitative method, the underlying data are gathered and structured, based on a longitudinal time-based horizon, by adopting a fixed-effect model to capture any unobserved effect of an estimated interception, and this therefore allows for a comparison of results, consistent with Woolridge (2002). This therefore provides the support with which to control the correlation across companies, in addition to the time-invariant company effect. Additionally, this technique

has the benefit of not needing the corporate effect to be unrelated to other regressors, unlike the random effects technique, as well as providing help by removing all cross-sectional variations from the data sample. The adoption of panel data structuration and fixed-effect modelling thus provide support to overcome the issues relating to omitted variable bias, consistent with Black, Jang, and Kim (2006), and thus the problem of endogeneity is considered.

To test Hypothesis 1, we regressed the CP indicators for all of the FTSE-100 companies on ERP utilisation experience only, as follows:

$$CP = \beta_0 + \beta_1 ERP + \beta_2 TA + \beta_3 CTA + \beta_4 DA + \beta_5 YR + \beta_6 IND + u \qquad (1)$$

For H2, we tested the impact of mandatory, voluntary, and total SR separately, with the number of segments on CP variables, through differentiating the companies that utilised them from those that did not utilise ERPs. This was done for all FTSE-100 companies, as follows:

$$CP = \beta_0 + \beta_1 MSR + \beta_2 NOS + \beta_3 TA + \beta_4 CTA + \beta_5 DA + \beta_6 YR + \beta_7 IND + u \qquad (2a)$$

$$CP = \beta_0 + \beta_1 VSR + \beta_2 NOS + \beta_3 TA + \beta_4 CTA + \beta_5 DA + \beta_6 YR + \beta_7 IND + u \qquad (2b)$$

$$CP = \beta_0 + \beta_1 TSR + \beta_2 NOS + \beta_3 TA + \beta_4 CTA + \beta_5 DA + \beta_6 YR + \beta_7 IND + u \qquad (2c)$$

Regarding H3, Equation (2) is re-run by considering the regression of the CP indicators for all of the FTSE-100 companies, independently, on the reporting of mandatory, voluntary, and total segments through the ERP utilisation experience as an intermediate indicator, as follows:

$$CP = \beta_0 + \beta_1 MSR + \beta_2 NOS + \beta_3 ERP + \beta_4 TA + \beta_5 CTA + \beta_6 DA + \beta_7 YR + \beta_8 IND + u \qquad (3a)$$

$$CP = \beta_0 + \beta_1 VSR + \beta_2 NOS + \beta_3 ERP + \beta_4 TA + \beta_5 CTA + \beta_6 DA + \beta_7 YR + \beta_8 IND + u \qquad (3b)$$

$$CP = \beta_0 + \beta_1 TSR + \beta_2 NOS + \beta_3 ERP + \beta_4 TA + \beta_5 CTA + \beta_6 DA + \beta_7 YR + \beta_8 IND + u \qquad (3c)$$

where, CP = corporate performance in the time period t, ERP = the number of years the company had used the ERPs, SR = segmental reporting, NOS = the number of segments disclosed, TA = total assets at time t, CTA = change in total assets at time t, DA = operating debt ratio at time t, YR = time t, IND = industry, and u = error term. The research model is presented in Figure 1.

4. Empirical results and discussion

The outcomes from investigating the separate and joint impact of ERP and SR after IFRS-8 operationalisation, on the CP of the FTSE-100 companies, are articulated here. This begins with the descriptive and correlating results, which are followed by theoretically informed models and the findings and discussion.

4.1. Descriptive statistics

Table 3 summarises the overall descriptive statistics for all of the variables adopted.[4] Tobin's Q has a mean of 1.17, while ROA has a mean of 8.8, which implies the profitability
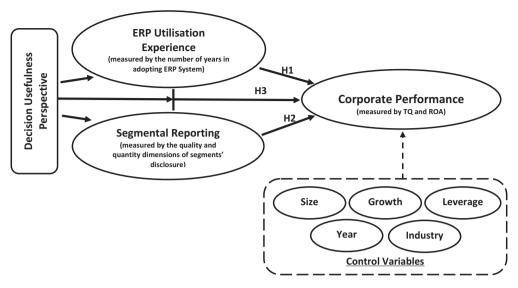
Figure 1. Research model of CP in relation to ERP system and SR.
Source: constructed by the authors

Table 3. Summary of basic explanatory statistics.

Indicators	Variables	Codes	Mean	Standard Deviation	Min. (Max.)	Skewness	Kurtosis	Obs.
Corporate	Tobin's Q	**TQ**	1.168269	1.295023	−3.89222 (2.39835)	4.008766	24.92203	454
Performance	Return on Assets	**ROA**	8.803142	13.45951	0.0085 (133.22)	5.482276	40.63196	460
Enterprise Resource Planning	Utilisation Experience of ERP	**ERP**	6.486957	4.686913	0 (18)	0.61066	2.668831	460
Segmental Reporting (SR)	Mandatory Segmental Reporting	**MSR**	0.616478	0.230931	0 (0.94)	−0.623275	2.157753	460
	Voluntary Segmental Reporting	**VSR**	0.233478	0.219746	0 (0.8)	0.395592	2.01415	460
	Total Segmental Reporting	**TSR**	0.526978	0.196721	0 (0.85)	−0.630041	2.23797	460
	Number of Operating Segments	**NOS**	4.080435	2.17333	0 (11)	0.225552	2.524848	460
Control Variables	Corporate Size	**TA**	82,952.34	301,252.6	1.929 (2,671,318)	6.333052	48.85826	460
	Corporate Growth	**CTA**	21,445.64	147,504.3	.0669994 (2,568,324)	14.21545	238.9516	453
	Debt Ratio	**DA**	23.84149	16.43497	0 (73.3)	0.450733	2.637187	430
	Year	**YR**	2015	1.415753	2013 (2017)	0	1.7	460
	Industry	**IND**	0.141304	0.348714	0 (1)	2.059485	2.24148	460

The descriptive statistics of all the diverse variables are based on the FTSE-100 registered companies between 2013 and 2017 according to the availability of ERP systems' utilisation for those Companies. Identical data sources have been used for all the FTSE-100 companies in the sample. Amounts are in Stirling Pound. Corporate size is presented in millions. Table 1 fully defines all the variables used. Identical data sources have been used for the majority of the FTSE-100 companies in the sample.

rate that these FTSE-100 companies earn, on average, in relation to their overall resources. The utilisation of an ERPs by FTSE-100 companies ranges from zero to 18 years of experience, reflecting the composition of the sample, with a mean of 6.5 years, which

had experience of utilising an ERPs, whereas the companies with a zero value indicate that they had not utilised ERPs. In terms of the statistical description of segmental information reported by these FTSE-100 companies, mandatory disclosure ranges from 0% to 94%, with an average of 61.65%; while voluntary disclosure ranges from 0% to 80%, with an average 23.35% disclosure only. Due to the non-applicability of some of the IFRS-8 mandatory segmental items, as described in the methodology section, the average of 11 items (61.65%*18) is considered to be a medium-high level of disclosure. This implies a fine level of disclosure compared with the prior studies (Mardini, Tahat, and Power 2018; Lim et al. 2017; André, Filip, and Moldovan 2016; Bugeja, Czernkowski, and Moran 2015; Leung and Verriest 2015). On the other hand, this result implies that less attention has been given by FTSE-100 companies to encourage them to report segmental information on a voluntary basis. Overall, total disclosure ranges from 0% to 85%, with an average of 12 disclosures (52.7%*23), while the number of counted segments ranges from zero to 11, with an average of 4 segments. According to the company's characteristics, corporate assets' leverage ranges from 0% to 73.3%, with an average of 23.84%. Over the period, the average individual company's total assets were about £82.95 billion, whereas the overall growth of FTSE-100 companies was approximately £21 billion, on average. The average length of time for a FTSE-100 company to be in the index with a separate identity was three years, while the industry dummy variable has a mean of 0.14, indicating that the majority of FTSE-100 companies belong to the non-financial sector.

In line with tests for skewness and kurtosis, CP indicators, size, and growth are positively or right skewed and are therefore non-normally distributed, as the data does not fall within the ranges ±1.96 and ±3 for standard skewness and kurtosis statistics, respectively (Haniffa and Hudaib 2006). As a result, the estimated standard errors, and the results of test statistics, are more likely to be biased and inconsistent. The problem of non-normality can be solved, or at least mitigated, by using either data transformation, or by means of running regression equations with the robustness of standard errors (Woolridge 2002). In the current study, these two alternative statistical approaches are adopted by using natural logarithmic transformations, as well as by utilising a multiple regression modelling that incorporates robust standard errors.

4.2. Correlation analyses

Table 4 shows the degrees of association between the utilised variables in an attempt to identify the extent to which the underlying variables are interrelated over the time-period. The findings indicate the existence of a positive association (19%) between the TQ and ERP utilisation experience. It can be observed also that a majority of the correlation coefficients were small. For instance, SR indicators are positively related to TQ, while total SR and the number of segments, perhaps surprisingly, are negatively associated with ROA. The results show that the ERP indicator of these FTSE-100 companies is positively related to mandatory SR, whereas it is negatively associated with voluntary and total SR. The findings also indicate that there are positive associations between the variables of SR. Total SR seems to be moderately associated, at 27%, with voluntary SR, while it is associated strongly (at 60%) with mandatory SR; whereas the latter is weakly associated (at 19%) with voluntary SR. Corporate size and growth are positively related to the

Table 4. Correlation matrix – FTSE-100 corporate performance, ERP, SR and controls.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) TQ	1											
(2) ROA	0.5378	1										
(3) ERP	0.1918	0.0290	1									
(4) MSR	0.0502	0.0279	0.2557	1								
(5) VSR	0.0461	0.0038	-0.0466	0.1883	1							
(6) TSR	0.0236	-0.1495	-0.3109	0.5964	0.2669	1						
(7) NOS	0.0599	-0.0356	-0.1851	0.3021	0.1065	0.4535	1					
(8) TA	0.2507	0.1472	0.0394	0.1146	-0.0385	0.0548	-0.0520	1				
(9) CTA	0.1297	0.0738	-0.0015	0.0524	-0.0207	-0.0023	-0.0215	0.5433	1			
(10) DA	0.0775	-0.0722	-0.0523	0.0843	0.2618	0.0568	0.0261	-0.1697	-0.0858	1		
(11) YR	-0.0460	0.0049	0.3197	0.1232	0.1327	0.1626	0.0762	0.0019	-0.0761	0.0129	1	
(12) IND	-0.2415	-0.1674	-0.0769	0.1348	-0.1220	0.0662	-0.0538	0.5271	0.2740	-0.2415	0.0040	1

The correlation degrees of association for the variables of corporate performance, ERP, SR and control are based on the FTSE-100 registered corporations between 2013 and 2017. The table shows the correlation coefficients.

performance indicators and mandatory SR, while they are negatively associated with voluntary SR. Corporate debt leverage is positively associated with TQ and all SR variables.

Table 5 shows the levels of significance between the utilised variables that should be considered for the purpose of examination, and whether, as significance levels increase, the potential collinearity introduces instability into the regression model.[5] The results of significance analysis (Table 5) are generally aligned with the findings from the association analysis (Table 4). The significance analysis clearly shows that the ERP indicator of the FTSE-100 companies is positively and significantly associated with TQ (15%) and mandatory SR (37%), while it is negatively and significantly related to voluntary SR (−11%). As would be expected, total SR is positively and significantly associated with both mandatory (67%) and voluntary (31%) SR. The reason behind this is that total disclosure (23 items) is a combination of mandatory (18) and voluntary (5) SR. It is noted that the voluntary SR is negatively correlated with the ERP indicator. This correlation finding suggests that the number of disclosures provided on a voluntary basis tended to be lower for companies in competitive sectors due to concerns about adverse action, especially among those who are operating in a highly competitive market. Corporate size is positively and significantly related to the TQ (21%), ROA (15%) and mandatory SR (12%). Corporate debt leverage is positively and significantly associated with voluntary SR (26%), while it is negatively and significantly related to corporate size (−17%). Although the pairwise correlation analyses show that no correlation coefficient is greater than 80%, the possibility of a multicollinearity issue is examined by reporting the variance inflation factor (VIF)[6] for each regression analysis.

4.3. Modelling analyses

4.3.1. ERP and corporate performance

Table 6 reports the results of Equation (1) the examined impact of ERP on CP measured by TQ, as an external performance indicator, and ROA as an internal achievement measure, controlled by the number of related variables. We found CP indicators are positively and significantly associated with the ERP utilisation experience. More specifically, the results strongly indicate a positive flow of influence from the market-based indicators of the FTSE-100 CP to ERP variable. This not only endorses the existing conclusions that there is a higher performance associated with ERP users, but also shows consistency with the existing findings of US context (Nicolaou 2004). The findings of this model therefore support H1, and we conclude that the ERP utilisation experience has a positive and significant impact on CP. As expected, corporate size and leverage are positively and significantly associated with CP indicators.

The overall insight into Model (1) advances our understanding of the ERP utilisation experience and its impact on CP. Firstly, it materialises the theoretical assumptions held by Decision-Usefulness theory, which are articulated in section (2.1). That is, that more experience in providing higher quality information, based on the utilisation of ERPs, would enhance the decisions that are made by external users, thus leading to better CP (Staubus 2000). Secondly, this model reinforces the existing understanding, which claims that ERP is ontologically defined by daily utilisation and exploitation of the existing features (Quattrone and Hopper 2006; Rikhardsson, Rohde, and Rom 2006). However, utilisation and exploitation are contingent to companies' size, as argued by Nicolaou and Bhattacharya

Table 5. Pairwise correlation – FTSE-100 corporate performance, ERP, SR and controls.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) TQ	1											
(2) ROA	0.5078*	1										
(3) ERP	0.1490*		1									
(4) MSR			0.3669*	1								
(5) VSR			−0.1127*	0.2574*	1							
(6) TSR		−0.1138*	−0.4121*	0.6669*	0.3107*	1						
(7) NOS			−0.2695*	0.3774*	0.1622*	0.5373*	1					
(8) TA	0.2145*	0.1517*		0.1213*				1				
(9) CTA	0.1122*							0.5415*	1			
(10) DA			0.2804*		0.2586*			−0.1682*		1		
(11) YR				0.1505*	0.1429*	0.1725*			0.2525*		1	
(12) IND		−0.1081*	−0.0995*	0.1122*	−0.1187*	0.1136*		0.4859*		−0.2392*		1

The correlation levels of significance for the variables of corporate performance, ERP, SR and control are based on the FTSE-100 registered corporations between 2013 and 2017. The table shows the significant values. * denote significance at 5% significance level. If there is no value, no significant correlation was found.

Table 6. TQ and ROA as functions of ERP.

	TQ	ROA
Constant	5.7311949 (0.11)	56.535729 (0.74)
ERP	0.04313764*** (5.21)	0.0208677* (1.8)
TA	0.22587875*** (10.11)	0.2818018*** (9.35)
CTA	0.01114479 (0.56)	0.02770244 (1.00)
DA	0.00876745*** (3.85)	0.00784084** (2.49)
YR	−0.00187609 (−0.07)	−0.02613331 (−0.69)
IND	−1.1241551*** (−9.58)	−1.3287635*** (−8.07)
VIF 1/VIF	1.58 0.6329	1.55 0.6452
Observations	420	426
F-value	86.96***	56.27***
Adjusted R^2	0.5518	0.4383

This table presents the results based on the estimation of equation (1) by using Stata. The model is estimated using fixed-effects by showing the impact of ERP utilisation experience on corporate performance indicators through considering a number of control variables. Table 1 fully defines all the variables used. Standard errors are adjusted by clustering the FTSE-100 companies. T-statistics are presented in parentheses. ***, **, and *denote significance at 1%, 5%, and 10% significance levels, respectively. If there is no sign, no significant relationship was found.

(2006), who say that the greater the corporate size, the more likelihood there is of demonstrating a superior performance. This is endorsed by the positive and significant impact of leverage (debt-to-assets) on CP in testing Model (1), and this is consistent with Bebchuk and Spamann (2009). Thirdly, the notable associations between ERP and CP may challenge existing understandings, which have reported that ERO has had no impact on performance (Hunton, Lippincott, and Reck 2003; Poston and Grabski 2001).

4.3.2. SR and corporate performance

Table 7 shows the outcomes from examining the impact of SR (mandatory, voluntary and total) on CP, through differentiating between ERP users and non-users, utilising fixed-effect modelling. The results indicate that TQ is positively and significantly (at 1% level) associated with both mandatory and total SR for ERP users, while no significant associations are reported for ERP's non-users. Although such a finding could be driven by the difference in sample size, it reflects Decision-Usefulness theory, and it provides robust support for the value of disclosing SR in alignment with the utilisation of an ERPs, to enhance CP. Regarding ROA, there is a positive and significant (at 10% level) relationship with total SR for ERP users. These findings reinforce the existing understanding of SR's influences on CP measured by TQ (Elsayed and Elbardan 2018; Abdullah and Page 2009), and on the prediction of risks and growth prospects (Behn, Nichols, and Donna 2002). However, the case is *vice versa* with voluntary SR, and this could be ascribed to the nature of voluntary items. Another interpretation is that companies are more likely to put greater interest into disclosing mandatory segments, rather than voluntary segments. This is further endorsed by the Coefficient of most of the control variables, which showed the expected signs. Corporate size, growth, and leverage positively and significantly influenced the CP of these FTSE-100 companies. The former finding would support the perspective that larger companies with higher growth opportunities seek to hire talented board members to enhance the progress of their companies, while the latter finding is aligned with the perception that institutional investors may prefer greater leverage levels, since this may increase the amount of their expected earnings.

Table 7. TQ and ROA as a function of SR under ERP users and non-users.

	ERP Users			ERP Non-Users		
	TQ-MSR	TQ-VSR	TQ-TSR	TQ-MSR	TQ-VSR	TQ-TSR
Constant	88.585031* (1.66)	67.85727 (1.25)	100.9931* (1.87)	110.78974 (0.70)	24.07563 (0.15)	91.077482 (0.59)
MSR	0.7255008*** (3.72)			0.5038141 (1.02)		
VSR		−0.1056502 (−0.61)			−0.4088445 (−0.71)	
TSR			0.8223,797*** (3.51)			0.8132915 (1.08)
NOS	−0.00922206 (−0.52)	0.0168756 (0.93)	−0.0211416 (−1.03)	0.0821222* (1.97)	0.0694346 (1.59)	0.0768735* (1.86)
TA	0.1953981*** (8.67)	0.1865166*** (8.17)	0.1948217*** (8.63)	0.5843219*** (7.44)	0.5951379*** (7.65)	0.6011574*** (7.84)
CTA	0.00291923 (0.14)	0.0034782 (0.17)	0.0015681 (0.08)	0.0600162 (1.02)	0.0598935 (1.01)	0.0557832 (0.95)
DA	0.00216054 (0.84)	0.0039274 (1.48)	0.0031123 (1.22)	0.0024903 (0.36)	0.0027684 (0.39)	0.001677 (0.25)
YR	−0.04341267 (−1.64)	−0.0330022 (−1.22)	−0.0495581 (−1.55)	−0.05268402 (−0.67)	−0.0093685 (−0.12)	−0.0428907 (−0.56)
IND	−1.411566*** (−10.68)	−1.334927*** (−10.04)	−1.352024*** (−10.34)	−0.2627042 (−0.77)	−0.2698865 (−0.78)	−0.2899627 (−0.85)
VIF 1/VIF	1.61 0.6211	1.56 0.6410	1.65 0.6061	1.78 0.5618	1.85 0.5405	1.73 0.5780
Observations	374	374	374	46	46	46
F-value	64.62***	60.48***	64.16***	29.32***	28.85***	29.43***
Adjusted R²	0.5442	0.5275	0.5424	0.8150	0.8124	0.8156

	ERP Users			ERP Non-Users		
	ROA-MSR	ROA -VSR	ROA -TSR	ROA-MSR	ROA -VSR	ROA -TSR
Constant	83.830003 (1.06)	71.610004 (0.91)	56.714783 (0.71)	54.758204 (0.33)	−37.506882 (−0.23)	49.32406 (0.31)
MSR	0.1001692 (0.35)			0.1822979 (0.35)		
VSR		−0.3388102 (−1.36)			−0.7867569 (−1.36)	
TSR			0.66842181* (1.93)			0.34355296 (0.44)
NOS	0.0129601 (0.46)	0.021721 (0.82)	0.04602399 (1.52)	0.0471233 (1.09)	0.0281132 (0.64)	0.04511568 (1.04)
TA	0.2584506*** (8.04)	0.257533*** (8.10)	0.2499092*** (7.83)	0.5390016*** (6.58)	0.5336917*** (6.78)	0.5451003*** (6.81)
CTA	0.0435769 (1.48)	0.0420427 (1.43)	0.0421003 (1.43)	0.0512993 (0.84)	0.0567035 (0.94)	0.0497299 (0.81)
DA	0.0017267 (0.46)	0.0029701 (0.79)	0.0022804 (0.62)	0.0046343 (0.65)	0.0073567 (1.01)	0.0043756 (0.62)
YR	−0.0398761 (−1.02)	−0.0337705 (−0.86)	−0.0263199 (−0.67)	−0.0240439 (−0.29)	0.0219017 (0.27)	−0.0213575 (−0.27)
IND	−1.623234*** (−8.30)	−1.626421*** (−8.42)	−1.595869*** (−8.28)	−0.4292439 (−1.21)	−0.4758631 (−1.36)	−0.4420302 (−1.24)
VIF 1/VIF	1.58 0.6329	1.53 0.6535	1.62 0.6172	1.78 0.5618	1.85 0.5405	1.73 0.5780
Observations	380	380	380	46	46	46
F-value	40.65***	41.08***	41.55***	23.07***	24.36***	23.12***
Adjusted R²	0.4227	0.4254	0.4282	0.7745	0.7842	0.7748

This table presents the results based on the estimation of equation (2) by using Stata. The model is estimated using fixed-effects by showing the impact of segmental reporting under mandatory (MSR), voluntary (VSR) and total (TSR) separately on corporate performance indicators for ERP Users and Non-Users through considering a number of control variables. Table 1 fully defines all the variables used. Standard errors are adjusted by clustering the FTSE-100 companies. T-statistics are presented in parentheses. ***, **, and *denote significance at 1%, 5%, and 10% significance levels, respectively. If there is no sign, no significant correlation was found. Industry-code is omitted due to collinearity.

The overall insight drawn from Model (2) advances our understanding of IFRS-8's operationalisation, and the impact it has had on CP. Firstly, it materialises theoretical assumptions held by the Decision-Usefulness theory in regard to internal users, as articulated in section (2.1). That is, the more effective and efficient the utilisation of accounting information, and the disclosure of segments in the annual reports by the board of directors are, the more likelihood there is that the companies will have better CP. More specifically, Model (2) findings support H2, and we conclude that CP may be enhanced by SR following the operationalisation of management approach-based IFRS-8. Secondly, this study contributes to existing knowledge by offering evidence that is drawn upon FTSE-100 companies (Hope et al. 2008; Botosan and Stanford 2005; Ettredge et al. 2005; Hossain and Marks 2005; Herrmann and Thomas 2000).

4.3.3. SR on corporate performance through ERP utilisation

Table 8 articulates the outcomes of examining the impact of mandatory, voluntary, and total SR on CP, through the utilisation experience of ERPs as an intermediate indicator. The findings from Model (3) are consistent with the results obtained from Models (1) and (2). These showed that mandatory and total SR have had positive impacts on CP measured by TQ and ROA in alignment with ERP. The overall insight into Model (3) advances our understanding of the impact SR may have on the CP of these FTSE-100 companies through ERP. Firstly, it materialises the theoretical assumptions held by Decision-Usefulness theory about internal users, as has been articulated in section (2.1). Supporting Hypothesis H3 means that the qualitative information characteristics of SR, either mandatory or voluntary, were enhanced in alignment with the ERP implementation and the utilisation of FTSE-100 companies, and this leads eventually to higher performance (Staubus 2000). In other words, considering the Decision-Usefulness perspective in IFRS-8-based SR provides a relevant and faithful representation of the CP of the FTSE-100 companies to supply useful and detailed corporate financial information to support the decision makers in their decision-making process (i.e., shareholders). Secondly, these insights, drawn from FTSE-100 companies, lends support to the existing evidence demonstrated in the US existing findings regarding SFAS-131 (Hope et al. 2008; Botosan and Stanford 2005; Ettredge et al. 2005; Hossain and Marks 2005). Furthermore, it supports both the conclusions of prior studies, that: (a) SR has improved the companies' performance; and (b) vice versa for voluntary SR, and this is due to the competitive disadvantage (Birt, Joshi, and Kend 2017; Kajüter and Nienhaus 2017; Mardini, Tahat, and Power 2018; Nichols, Street, and Cereola 2012). Again, as anticipated, and as in almost every empirical study that is related to companies, corporate size and leverage are positively and significantly related to the CP of these FTSE-100 companies.

5. Conclusions

Our results demonstrate that the CP of the FTSE-100 is directly and significantly associated with either ERP users and/or SR publishers. The findings of this study provide also a significant contribution to the Decision-Usefulness perspective whereby corporate management are encouraged to provide relevant accounting information in the most useful manner, for the use in making decisions, which, in turn, will be reflected in the improvement of corporate achievements. This is endorsed by solid evidence about the impact of

Table 8. TQ and ROA as functions of SR through the utilisation of ERP system.

	Mandatory Segmental Reporting		Voluntary Segmental Reporting		Total Segmental Reporting	
	TQ	ROA	TQ	ROA	TQ	ROA
Constant	33.554256 (0.60)	60.917355 (0.78)	−4.6724794 (−0.08)	40.474023 (0.52)	34.519719 (0.61)	17.10675 (0.22)
MSR	0.4940826** (2.57)	0.0143595 (0.05)				
VSR			−0.2560983 (−1.51)	−0.4267181* (−1.81)		
TSR					0.4794044** (1.99)	0.7507839** (2.22)
NOS	−0.0090226 (−0.50)	0.0074477 (0.29)	0.00484896 (0.28)	0.0112428 (0.46)	−0.01273 (−0.66)	0.03213763 (1.20)
ERP	0.0373749*** (4.29)	0.0198478 (1.61)	0.0437709*** (5.13)	0.0216254* (1.81)	0.0372197*** (4.16)	0.0287677** (2.30)
TA	0.2308258*** (10.34)	0.2817641*** (9.27)	0.2264382*** (10.13)	0.28244*** (9.39)	0.2299589*** (10.27)	0.274468*** (9.10)
CTA	0.0121633 (0.61)	0.0272324 (0.98)	0.0120938 (0.60)	0.0256838 (0.93)	0.0104633 (0.52)	0.0256551 (0.93)
DA	0.0082612*** (3.63)	0.0078332** (2.47)	0.0096258*** (4.10)	0.0092193*** (2.85)	0.0086002*** (3.78)	0.0080934** (2.58)
YR	−0.0158058 (−0.57)	−0.0283297 (−0.73)	0.0033053 (0.12)	−0.0181385 (−0.47)	−0.01162653 (−0.58)	−0.0064358 (−0.16)
IND	−1.155497*** (−9.81)	−1.325383*** (−7.96)	−1.130688*** (−9.59)	−1.338863*** (−8.10)	−1.133673*** (−9.64)	−1.307473*** (−7.93)
VIF 1/VIF	1.52 0.6579	1.50 0.6667	1.48 0.6757	1.46 0.6849	1.57 0.6369	1.55 0.6452
Observations	420	426	420	426	420	426
F-value	66.78***	42.03***	65.56***	42.76***	66.03***	43.14***
Adjusted R^2	0.5567	0.4357	0.5521	0.4401	0.5539	0.4423

This table presents the results based on the estimation of equation (3) by using Stata. The model is estimated using fixed-effects by showing the impact of segmental reporting under mandatory (MSR), voluntary (VSR) and total (TSR) separately on corporate performance indicators through considering the utilisation of ERP system and a number of control variables. Table 1 fully defines all the variables used. Standard errors are adjusted by clustering the FTSE-100 companies. T-statistics are presented in parentheses. ***, **, and *denote significance at 1%, 5%, and 10% significance levels, respectively. If there is no sign, no significant correlation was found.

the reporting of mandatory, voluntary, and total segments on the CP of FTSE-100 companies, through the utilisation experience of ERPs as intermediate indicators over the study period teasing out key insights, which are as follows:

First, findings suggest positive and significant relationships between ERP utilisation experience and CP measured by TQ and ROA. These performance indicators may stem from the realisation of the value creation of ERP utilisation, such as add-ons and/or adding more applications overtime (Johansson and Newman 2010; Hendricks, Singhal, and Stratman 2007; Davenport 2000). This conclusion not only reinforces the existing knowledge in regard to the market's reaction to the initial announcement of ERPs' adoption in US-based manufacturing companies (Hayes, Hunton, and Reck 2001), but it also manifests the extent of such impact, post-ERP implementation, on the usefulness of performance information from the perspective of external (TQ) and internal (ROA) users. These positive associations also lend support to the conclusion drawn from the US market, in terms of a positive reaction to the utilisation process, which is orchestrated by the big ERPs' vendors, who have dominated the research sample of this paper (Wier, Hunton, and HassabElnaby 2007; Nicolaou and Bhattacharya 2006; Nicolaou 2004). This may explain the existing understanding that financial markets differentiate among the technologies in which companies to invest to integrate their information systems; demonstrating (a) technology maturity, (b) the financial health of the investing company, and (c) stock market conditions, which are all important factors that influence the stock market reaction.

The second insight of this study concludes that there is positive and significant impact from SR on CP, measured by Tobin's Q, in FTSE-100 companies through distinguishing between ERP users and non-users. Whilst TQ positively and corresponds to MSR following IFRS-8's post-implementation review for ERP users, there is a negative association, with no significance level, between CP and VSR, which was ascribed to a small number of voluntary items. This concern overcame the positive and significant impact that total (both mandatory and voluntary) SR has had on the CP, either by use of TQ or ROA, of these FTSE-100 companies. This suggests that the more segmental information that is reported through the utilisation of ERPs, the higher the corporate progress. This might be a strategy that has been utilised by FTSE-100 companies to signal positive messages to (a) attract the attention of the existing and prospective investors regarding CP, and (b) reduce the information asymmetry for capital providers.

The impact of SR on CP through the utilisation experience of ERPs as an intermediate indicator was another insight drawn from the FTSE-100 listed companies and there were marked positive and significant relationships. This may suggest the indirect role that ERP is undertaking in moderating the interrelations between SR, represented by the quality and quantity dimensions of segmental information disclosures, and CP. This finding endorses Scapens and Jazayeri (2003) argument that ERP's characteristics open opportunities for change and standardisation, in particular, and offer a spectrum of best practices that enable companies to report on their segmental information efficiently, consistent with the Decision-Usefulness perspective. The moderating role of ERP is also reported in the interrelations between the management control system and organisational performance (Elbashir, Collier, and Sutton 2011). Such a role also makes sense of the higher performance that has been found to be associated with larger corporate size and higher debt usage.

6. Implications and limitations

These conclusions, overall, contribute to the existing literature, practitioners and regulators. They draw attention to the significant interrelations across accounting-based performance, the ERP utilisation experience, and the SR of an efficient UK market (i.e., the FTSE-100). The importance of the aforementioned conclusions is therefore in addressing the practical implications for academics, practitioners and IFRS setters. In accordance with the extant literature, these findings respond to research calls regarding the variations in SR (Mardini and Ammar 2019; Mardini, Tahat, and Power 2018) by referring this matter not only to the operational context, but also in bringing the roles of ERP and CP to light (Nichols, Street, and Tarca 2013). Furthermore, the results contribute to the literature on CP by employing variables relating to the association with segmental information and ERP, individually; and with SR, by providing evidence of the impact on CP through the utilisation experience of ERPs. Whilst this conclusion endorses prior studies, in terms of the indirect impact that ERPs have had on CP (Hunton, Lippincott, and Reck 2003), the indirect impact is extended to include SR as an organisational practice (HassabElnaby, Hwang, and Vonderembse 2012). Regarding the practitioners, this study draws the attention of non-ERP adaptors to think about and evaluate the implications of ERP adoption in facilitating SR; and longer utilisation leads to gain more benefits. Additionally, it provides some insights for both external and internal users of financial statements, in terms of the ability to attain valuable understandings into how SR and ERP perceive the CP, about which their investors' companies are notified. In relation to the regulators, it has been concluded that the findings should be aligned with the interests of the FTSE-100 decision-makers in general, and specifically those within each FTSE-100 company's board of directors, since they propose that SR elements are considered as a measurement of CP. However, it is ERPs' impact on CP that is unfolded over time, concluding that the more experience of utilisation is, the greater the CP. Moreover, the findings should offer insights for the London Stock Exchange on the performance of FTSE-100 companies, after they have utilised the ERPs, by setting a code that represents the minimum level of information system governance.

Some limitations were noted in relation to this research. The study employs a disclosure index in which errors may have occurred, although the researchers were very careful with the scoring process. The annual reports were read twice by the researchers, moreover, the annual reports were read by a research assistant, who is not one of the researchers who have written this paper; this approach was adopted to reduce the element of subjectivity, as well as to avoid any mistakes and to ensure the consistency of the index through the scoring process. Furthermore, other factors that are beyond ERP's and IFRS-8's implementation may have an influence on associations with CP, but these are not considered here. This therefore motivates calls for further research to be carried out to explore the impact of ERP on CP through the examination of the blackbox in relation to how ERP utilisation influences the financial and/or non-financial information in regard of the operating segments. This includes not only different contexts, but also exploring how decision-makers assess the adverse action of competitors before SR is published. This extends to exploring the influence of their personnel characteristics on ERP utilisation, or not, in addition to SR publishing, or not, through utilising different research approaches, such as qualitative methods, or including case studies that are supported by semi-structured interviews. Future studies may

consider further factors that may have affected CP, such as the corporate governance mechanisms, and the SR consequence of deriving a competitive disadvantage.

Notes

1. In 2000, the IASC restructured its foundation, which led it to change its name to the International Accounting Standards Board (IASB).
2. Vendors can be found at the following website: https://financesonline.com/list-of-erp-software-companies/.
3. This approach considers all of the segmental reporting items as being equally important; this, in turn, has avoided any potential subjectivity in the scoring process, and has increased the validity of the disclosure index checklist (Cooke 1989; Cooke and Wallace 1989).
4. Variables' names, codes, and definitions used in the empirical analyses are summarised in Table 1.
5. According to Woolridge (2002), it is proposed that multicollinearity may perhaps statistically threaten or violate the sensitivity analyses if the correlation level exceeds 80%.
6. Based on Woolridge (2002), multicollinearity issues are likely to be relatively unimportant if the value of VIF is less than 10, and the tolerance factor (1/VIF) is greater than 0.10.

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