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Trends in controller roles: longitudinal evidence from Finland

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Abstract

Purpose – Recent decades have witnessed changes in controller roles and tasks. Digitalization and automation, together with expanding sustainability reporting requirements, may further transform controller roles. Where the traditional controller role had been dominant in the past, recent research has highlighted the emergence of a business-partner role characterized by more active involvement in strategic issues. Motivated by the lack of large-scale, longitudinal research on controller roles, this study aims to identify evolving patterns and trends in role characterizations, as stated in controller job descriptions in an era marked by digitalization and emerging technologies.

Design/methodology/approach – To track these trends and patterns, the analysis longitudinally examines 7,426 controller-titled job advertisements from Finland, spanning the period 2016–2023.

Findings – The findings demonstrate a persistent emphasis on traditional controller responsibilities and provide limited evidence that business-partner language has increased over time. The results also reveal upward trends in digitalization- and sustainability-related role requirements, reflecting potential new layers to augment controller responsibilities.

Originality/value – This study contributes to the management accounting literature by identifying recent temporal trends in controller roles, as implied by the described tasks and skills and revealing that emerging themes of digitalization and sustainability may add layers to controller roles but do not replace traditional role expectations. It provides evidence of the roles and skills in demand, offering insights into the evolution of industry needs and organizational expectations in this new era characterized by interest in grand themes such as digitalization and sustainability.

Keywords Controller, Digitalization, Job advertisement, Management accountant, Management accounting, Professional role, Sustainability

Paper type Research paper

1. Introduction

Controllers as management accounting experts play key roles in organizations. However, multiple studies have reported shifts or modifications in controller roles, with many suggesting an increasing business orientation or strategic relevance, represented by their strengthening advisory function in strategic decision-making (Burns and Baldvinsdottir, 2005; Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Järvenpää, 2001, 2007; Pierce and O'Dea, 2003; Rautiainen *et al.*, 2024; van Slooten *et al.*, 2024; Yigitbasioglu *et al.*, 2023). Revolutionary changes, particularly technological advancement, have considerably shifted demands in the labor market and little is known about how these technological forces have altered controller roles (Arnaboldi *et al.*, 2017; Quattrone, 2016). The relatively recent rise of sustainability practices and reporting requirements (Baboukardos *et al.*, 2023; Chakhovich

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and Virtanen, 2023; Demaret and Molinari, 2025) represents a further issue whose implications for controller roles remain underexplored.

Controllers' (i.e. management accountants' [1]) changing roles have constituted a subject of interest in accounting literature (see, e.g. Andreassen, 2020; Burns and Baldvinsdottir, 2005; Goretzki *et al.*, 2013; Granlund and Lukka, 1998; Järvenpää, 2007; Oesterreich *et al.*, 2019; Rautiainen *et al.*, 2024). Many of these studies have suggested that controllers are becoming increasingly relevant actors assisting management in strategic decision-making and offering consultation on various issues, in addition to fulfilling traditional tasks such as providing data or reporting numbers. Due to this shift, studies have progressively referred to controllers as "business partners" (Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Järvenpää, 2007). Furthermore, the hybridization of these roles has been proposed, referring to tasks beyond the profession's conventional ones, thus crossing occupational boundaries (Arnaboldi *et al.*, 2017; Caglio, 2003). Complications may consequently arise, as controllers may not always succeed in becoming business partners in digitalized settings (Heinzelmann, 2018) and business partnering may not always materialize in intended ways (Morales and Lambert, 2013).

Although these shifts in controller roles have gained recognition, little longitudinal evidence of their evolution exists. Some research on changing controller roles has approached the issue from a qualitative perspective, including case studies and interviews, to better understand the underlying phenomenon (e.g. Andreassen, 2020; Goretzki *et al.*, 2013; Järvenpää, 2007; Rautiainen *et al.*, 2024). Motivated by the scarcity of large-scale, longitudinal empirical evidence and research on potential impacts of new forces on organizational roles, we pose this research question:

RQ1. What kinds of trends in controller roles do job descriptions reflect in this era characterized by digitalization?

Methodologically, we use text-mining techniques and statistical analyses to examine trends in controller roles, as implied by the described tasks and skill requirements, based on archival data obtained from Duunitori (2024), a Finnish job board and recruitment media company. The data set covers over 7,000 controller job advertisements from Finland, spanning an eight-year period (2016–2023). The findings reveal a consistent emphasis on traditional controller roles, uncovering little evidence supporting the focus on the business-partner role. Moreover, digitalization and sustainability seem to play roles here, increasingly providing new layers to controller roles.

Our study enriches the discussion regarding controllers' evolving roles. We draw on the previously suggested roles of controllers (e.g. Goretzki *et al.*, 2013; Granlund and Lukka, 1998; Järvenpää, 2007) and extend the discourse about roles, tasks and skills portrayed in job advertisements (e.g. Lepistö *et al.*, 2016; Oesterreich *et al.*, 2019; Rieg *et al.*, 2023). In addition to identified trends of the proposed "stereotypical roles," we offer novel insights into temporal patterns of digitalization and sustainability themes and controllers' positioning regarding these. As opposed to prior studies accentuating the business-partner role as the new important reality of controllers (Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Maas and Matějka, 2009), our paper shows no significant changes in references to this role in the data, while revealing rising trends of digitalization and sustainability themes. Methodologically, we respond to a recent call to use different approaches to text analysis and, particularly, role measurement (Rieg *et al.*, 2023). Our findings reflect a broader organizational perspective since job advertisements describe how the controller role is perceived, not necessarily by controllers themselves, but by the other organizational actors involved in hiring suitable applicants and setting their task

demands (e.g. managers, human resource departments). Therefore, our research highlights temporal changes in organizational expectations toward controllers.

2. Literature review and hypothesis development

Prior research has recognized the multiple roles that controllers can assume (Granlund and Lukka, 1998; Järvenpää, 2001; Vaivio and Kokko, 2006). The stereotypical controller roles have been described with the concept of "bean counters" versus "business partners." "Bean counter" refers to the traditional role focused on numbers and financial reporting; "business partner" represents the more forward-looking and strategic role into which the controllers' job has allegedly evolved, emphasizing their work with management (Byrne and Pierce, 2007; Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Granlund and Lukka, 1998; Vaivio and Kokko, 2006; van Slooten *et al.*, 2024). Management accounting literature has increasingly viewed controllers as business partners, performing a supportive function in decision-making processes (Goretzki and Messner, 2019; Morales, 2019). The suggested alternative role of a "watchdog" (e.g. Granlund and Lukka, 1998; Rieg *et al.*, 2023; Vaivio and Kokko, 2006) involves monitoring tasks and ensuring that goals are met, sharing similarities with and differences from the bean counter and business-partner roles. We acknowledge that controller identity profoundly underlies controller roles, following other researchers' insights (Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Morales, 2019; Morales and Lambert, 2013).

Traditionally, controller positions have required multifaceted knowledge of accounting practices and regulations, along with personal traits such as accurateness, trustworthiness and punctuality (Granlund and Lukka, 1998). The change to the business-partner role challenges controllers to acquire skills and knowledge that yield value for management and decision-making practices (Järvenpää, 2007) through qualities such as business or strategic orientation and self-motivation or self-initiative (Ala-Heikkilä and Järvenpää, 2023), resembling entrepreneurial attributes.

Particularly, top managers may recognize the need for accountants to become business partners (Maas and Matějka, 2009), but all managers do not always share this perspective (Goretzki and Messner, 2019; Morales, 2019). What may superficially appear as a business-partner role may not translate into the intended function; controllers designated as business partners may even end up being treated as scapegoats for management (Morales and Lambert, 2013). More than actual practices, the partner role may sometimes represent the financialization discourse (Morales, 2019), the strategy discussion (Goretzki and Messner, 2019, p. 16) and the hopes of accounting practitioners, educators and researchers to raise the accounting profile. However, due to prior research increasingly viewing and positioning controllers as business partners, we formulate our first hypothesis:

H1. The business-partner role has become more evident in controller job descriptions over recent years.

The impacts of contemporary digital technologies and automation on accounting work and task demands have been recognized as drivers of controllers' changing roles (Andreassen, 2020; Leitner-Hanetseder *et al.*, 2021; Oesterreich *et al.*, 2019; Rautiainen *et al.*, 2024; Rieg *et al.*, 2022; Yigitbasioglu *et al.*, 2023). Digital technologies are revolutionizing how information is processed and decisions are made, altering the types and sources of data used by controllers, thus making modern accounting practices highly data-driven (Arnaboldi *et al.*, 2017; Knudsen, 2020). Fähndrich and Pedell (2025) argued that digitalization expands the management accounting roles with more responsibilities and increased competency requirements. Traditionally, studies on controller roles and

information technology (IT) have focused on enterprise resource planning (ERP) systems that have been claimed to constitute a major factor in altering controller roles (Caglio, 2003; Dechow and Mouritsen, 2005; Jack and Kholeif, 2008; Quattrone and Hopper, 2005; Rikhardsson and Kraemmergaard, 2006; Sánchez-Rodríguez and Spraakman, 2012; Scapens and Jazayeri, 2003). Contemporarily, the IT landscape is broadening to include novel systems with diverse functions and the new role of a digital controller has been suggested (Trachsel and Bitterli, 2023).

Certain controller roles can also boost the use of digital technologies or vice versa. For instance, some studies suggest that when controllers perform the business-partner role, they tend to wholeheartedly participate in IT development efforts to assist corporate management (Goretzki and Messner, 2019; Lambert and Pezet, 2011; Morales, 2019; Morales and Lambert, 2013). They are primarily concerned with obtaining accurate and timely data for tasks such as target setting, analysis, measurement and surveillance (Morales, 2019).

Previous studies imply that modern IT will allow, in turn, the evolution of more demanding and novel accounting and finance tasks (Bedford *et al.*, 2025; Caglio, 2003; Rikhardsson and Kraemmergaard, 2006; Sánchez-Rodríguez and Spraakman, 2012; Scapens and Jazayeri, 2003). IT can thus enable and enhance the business-partner role (Caglio, 2003; Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Karlsson *et al.*, 2019, p. 203; Lindvall and Iveroth, 2011; Sánchez-Rodríguez and Spraakman, 2012; Scapens and Jazayeri, 2003). For example, Goretzki *et al.* (2013) showed how the business-partner role has been upgraded with the deliberate introduction of new IT in the form of an ERP system. Such a system allows controllers to focus on demanding work tasks, such as data analysis and relations with managers, when the system reduces the need for routine data input and handling tasks (Sánchez-Rodríguez and Spraakman, 2012). Fähndrich and Pedell (2025) also supported the idea of relieving the management control function through the support of new technologies, enabling management accounting professionals to focus on tasks such as business partnering. Accounting professionals' roles are being further transformed by artificial intelligence (AI)-based technologies that can both replace and supplement human efforts (Leitner-Hanetseder *et al.*, 2021). Following the adoption of AI tools in accounting, controller roles can increasingly evolve from traditional information providers to trainers and monitors of AI-based technology and to business partners, supporting top management's decision-making (Leitner-Hanetseder *et al.*, 2021; Oesterreich *et al.*, 2019). Controllers could then be perceived as hybrid professionals who function within accounting yet possess a profound understanding of issues encountered in areas such as IT, communication and business strategy (Caglio, 2003, p. 145). Although general IT skills are already required from controllers (Oesterreich *et al.*, 2019), recent research has anticipated an increasing need for skills and knowledge related to modern digital technologies, data science and business analytics (Moll and Yigitbasioglu, 2019; Oesterreich and Teuteberg, 2019; Tsiligiris and Bowyer, 2021).

Conversely, in certain contexts, introducing IT may further promote the bean-counter role (Heinzelmann, 2018; Jack and Kholeif, 2008). The IT system, with associated guidelines and work templates, can dictate controllers' work and identity. It "reduces the professional space to a standardized set of techniques and reports", potentially pushing controllers to the bean-counter role by constraining their work into a predetermined technical "box" (Heinzelmann, 2018, p. 475). IT systems could thus standardize the profession. With decentralized systems such as ERP, controllers may lose their unique access to data and accounting processes, resulting in lost power and reduced data quality (Quattrone and Hopper, 2005). Controlling and management accounting can then occur in operations without controllers' assistance (Dechow and Mouritsen, 2005). Traditional bean counters have also been presented as

conforming to IT solutions and continuing "bean counting," induced by the IT system (Heinzelmann, 2018). Creativity, choice of accounting methods and professional judgment may therefore be limited (Heinzelmann, 2018, p. 475).

The impacts of digitalization and technology adoption have thus been well-established in the literature, although there is no singular understanding of which roles it boosts or vice versa. Therefore, we present our second hypothesis:

H2. Controller job descriptions have increasingly emphasized advanced digitalization-related themes and skills over recent years.

Sustainability is another prominent global trend and business concern. Heightened interest in and focus on sustainable development have shaped organizations' activities and reporting practices. In Europe, broader targets and agendas have led to new regulations and regulative developments, including the European Union's (EU's) Non-Financial Reporting Directive (NFRD, Directive 2014/95/EU; European Parliament and Council of the European Union, 2014), the Corporate Sustainability Reporting Directive (CSRD, Directive 2022/2464; European Parliament and Council of the European Union, 2022) and the Corporate Sustainability Due Diligence Directive (CSDDD, Directive 2024/1760; European Parliament and Council of the European Union, 2024). While recent regulation has begun to standardize sustainability reporting by mandating certain organizations to disclose relevant sustainability information in accordance with the European Sustainability Reporting Standards (ESRS; Baboukardos *et al.*, 2023; EU, 2022; Operato *et al.*, 2025), broader interest in sustainable development and societal pressure for transparency in and accountability for sustainability matters (Demaret and Molinari, 2025) have already driven organizations to voluntarily report such information for several years now. Particularly in light of these regulative developments, sustainability and related reporting increasingly concern controllers since disclosure can be regarded as their natural field of responsibility (Kunz *et al.*, 2025). In addition to disclosure, controllers can perform key roles in multiple sustainability-related processes, such as defining indicators or conducting materiality analysis, due to their ability to combine financial and sustainability expertise (Molinari *et al.*, 2025). However, controllers may remain uncertain about their role in sustainability matters or be reluctant to engage in such responsibilities (Kunz *et al.*, 2025). Given this increasing relevance of sustainability issues to controller roles, we posit our third hypothesis:

H3. Controller job descriptions have increasingly highlighted tasks and issues related to sustainability over recent years.

Most of the recent studies analyzing the controller demands based on job postings (Ala-Heikkilä and Järvenpää, 2023; Lepistö *et al.*, 2016; Oesterreich *et al.*, 2019; Ott, 2023; Rieg *et al.*, 2023; Trachsel and Bitterli, 2023; a summarizing table in Supplementary materials) have found that such advertisements largely portray the traditional controller tasks as the main responsibilities, although skill requirements may vary. Oesterreich *et al.* (2019) report that new roles (e.g. business partner or business analyst) appear more in controller job advertisements than conventional roles, but traditional activities (e.g. cost accounting or planning and forecasting) are the most frequently mentioned tasks compared to tasks related to data analytics or management support. Their analysis shows a high frequency of traditional competencies such as professional, soft and general IT skills. Thus, they conclude that the new roles proposed in the literature are not yet overly visible in controller job advertisements (Oesterreich *et al.*, 2019). Similarly, both Lepistö *et al.* (2016) and Trachsel

and Bitterli (2023) concluded that traditional tasks such as reporting, planning, analyzing and budgeting are the most prominent responsibilities of controllers, who particularly need technical, industry-specific knowledge, basic IT skills and a broad set of personal competencies (e.g. analytical thinking). Rieg *et al.* (2023) noted three roles in controller job advertisements, highlighting the watchdog function. In contrast, Ala-Heikkilä and Järvenpää (2023) found the business-partner role emphasized in a case firm's job advertisements, but they identify skill requirements (e.g. industry-specific knowledge, IT and communication skills) similar to those reported in other studies. Ott (2023) observed that skills and characteristics such as those related to analytical and conceptual thinking, result orientation, proactivity and communication pertain to management accountants' roles and professional identities. Adding to these, this study notes the importance of external themes, digitalization and sustainability, and examines how they appear in controller jobs in addition to and alongside the suggested stereotypes over an eight-year period.

3. Methodology

3.1 Data

A job advertisement can be considered a formal and explicit way to define a position's tasks and requirements (Ott, 2023; Pejic-Bach *et al.*, 2020). Although such advertisements express employers' ideas of ideal job candidates and may show conditional demands, these are highly informative about the key requirements for specific positions (Mýtna Kureková *et al.*, 2016). However, the absence of a skill or competence in an advertisement does not necessarily indicate its irrelevance to the position (Ott, 2023). Notwithstanding the recognized limitations, we base our longitudinal analysis of controller roles on public online job advertisements in Finland.

The archival data (2016–2023) for the empirical analysis were provided by Duunitori (2024), one of the largest recruitment media companies in Finland. The raw data set included job advertisements under the "financial administration" subcategory (belonging to the "financial administration and banking" category), covering the posting dates, job titles, organizations and job descriptions. The data were filtered to retain the advertisements including the term "controller" in their titles, yielding 7,426 advertisements for analysis. The most common titles were "controller," "business controller," "financial controller," "assistant controller" and "cost controller."

3.2 Initial text preprocessing for automated content analysis

Due to the job advertisements' multiple languages [2] and unstructured nature, we conducted several text preprocessing steps to enable a coherent and robust analysis. For consistency, we translated all advertisements into English using automated translation workflows (Free Google Translate API for Python; Python Software Foundation, 2024). We then preprocessed the advertisement texts (DiMaggio, 2015) by (1) performing base tokenization, (2) removing stop words and (3) detecting n-grams (joint tokens comprising multiple individual words) up to four terms long.

We conducted an additional check of the English translation to confirm that it captured the local idioms or nuances. We reviewed 1% ($n = 74$) of the controller advertisements in Finnish in terms of the business-partner theme, looking for such phrases and checking whether they were translated correctly and included in the text-mining dictionary that we developed (see Section 3.4). Based on this review, we found no local phrases that would be incorrectly translated or excluded from the dictionary in their translated form.

3.3 Topic models and trend analysis

As our source data contained several thousand units of varying lengths of text, we required a flexible method of interpreting and determining each text's content. Topic modeling (Hannigan *et al.*, 2019) is widely used to obtain bag-of-word representations of the latent topics found in large corpora as mixed distributions of words (topic analysis), while allowing the analysis of those topic structures over documents as mixed distributions of topics (document analysis). Following established conventions, we trained a latent Dirichlet allocation (Blei *et al.*, 2003) model with Gibbs sampling to infer the latent topics from our large sample (Griffiths and Steyvers, 2004). Adhering to common practice, we set the upper limit of topics to 100 to maintain human interpretability (Haans, 2019; Kaplan and Vakili, 2015; Taeuscher *et al.*, 2021) and excluded topics of minimal relevance to our RQ (Hall *et al.*, 2008).

We iteratively assigned and verified labels for each topic by investigating their most frequent and salient terms (Sievert and Shirley, 2014). Frequent terms are those commonly found across many documents and topics within the corpus. Salient terms are uniquely significant under a particular topic compared to others. Two authors independently assigned their labels based on a close examination of the topics and consideration of their relevance to the research topic. One author then determined which topics to retain by assessing the similarities between the two sets of independently assigned labels and further judging their relevance. This iterative process resulted in a keyword-derived, human-induced label for each latent topic (18 were retained). Sample terms of the topics are presented in Supplementary materials.

We then conducted trend analyses of each topic to identify hot, cold and reviving topics, highlighting those gaining or losing relevance over time (Antons *et al.*, 2016; Griffiths and Steyvers, 2004) and determining their relative importance by the number of allocated documents (Antons *et al.*, 2016). We followed Antons *et al.* (2016) in setting a threshold of topic proportions for consideration in trend analysis: any document with a topic proportion below the threshold of 0.01 was excluded from the trend analysis of that topic. Following Antons *et al.* (2016) and Griffiths and Steyvers (2004), we estimated trends by regressing specific topic proportions on a time index, in this case, quarters. We conducted linear modeling, where positive and significant coefficients indicate a growing popularity of the related vocabulary within a topic, while negative and significant coefficients denote a decline in popularity. We also included a quadratic specification to account for potentially nonlinear trends, following the logic of Antons *et al.* (2016). Where the linear model captures straightforward growth and decline, the quadratic specification finds both resurgences and dips in popularity and cases where a topic's initial upward trend suddenly reverses to a downward trajectory or vice versa. Topics with no trend are considered stable (Antons *et al.*, 2016). We limited our detailed analysis to topics exhibiting statistically significant temporal trends, excluding topics demonstrating no significant changes over the study period, resulting in 13 latent topics.

3.4 Dictionary-based text-mining and statistical analysis with robustness tests

We used dictionary-based text-mining techniques to extract specific key terms from advertisements and statistically analyzed their occurrences over time. This analysis allowed us to supplement the topic trend analysis with three themes that were pertinent in the literature and expected (*H1–H3*) but not comprehensively represented in the topics: the business-partner role, digitalization and sustainability (Figure 1). The traditional role (referring to the bean counter) was included in this analysis to be contrasted with the business partner as another stereotypical role, even if it was represented in the topic analysis and its

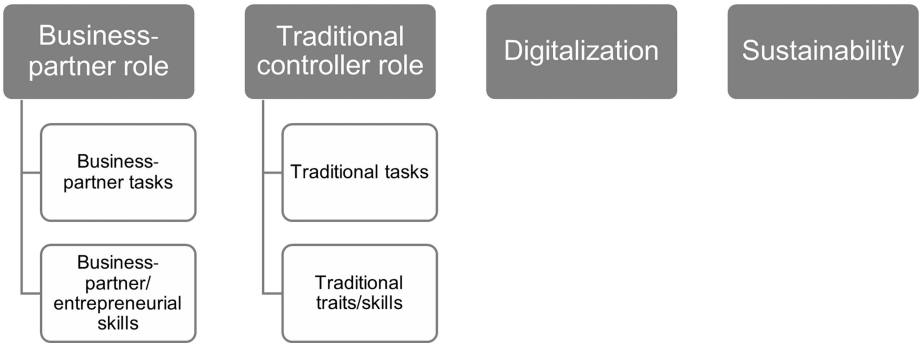

Figure 1. Themes for the dictionary-based analysis
Source: Authors' work

trends were not hypothesized (due to the well-established evidence of their persistence in prior literature). The stereotypical role themes were further grouped into subthemes by dividing them into tasks and skills to enable a more nuanced trend analysis. Digitalization and sustainability represented external themes and potential change forces; these were not considered for comparison or contrast to the two stereotypical roles but as supplementary to them.

We developed the text-mining dictionary based on relevant literature and an assessment of the most frequent terms in the data set. To gain insights from the data, we extracted a list of relevant keywords (based on their TF-IDF weight [3]) in the data set; all keywords ($n = 669$) with a weight above 25 were reviewed. Furthermore, a random 1% sample of translated advertisements was reviewed in terms of their full description texts, reaching saturation of new keywords.

The subthemes of the business-partner role included keywords such as "developing processes," "management partner" and "strategic decisions" (as tasks) and "entrepreneurial spirit," "self-directed" and "strategic thinking" (as skills). The subthemes of the traditional controller role encompassed keywords such as "analyzing information," "budgeting," "financial advice" and "supporting business" (as tasks) and "accurate," "analytical" and "MS Office" (as skills). The digitalization and automation theme comprised slightly more advanced digitalization-related tasks and tools than those that controllers have already used for years, such as "automate workflows," "data analytics" and "RPA implementation" (RPA referring to robotic process automation), reflecting the suggested digital controller role (Trachsel and Bitterli, 2023). In turn, the sustainability theme covered terms related to sustainability topics and reporting, such as "analyze footprint," "ESG knowledge" (ESG referring to Environmental, Social, Governance) and "sustainability reporting."

The full dictionary (presented in Supplementary materials) was used to extract the terms from translated, tokenized job description texts. The extraction encompassed strict string matching between the dictionary terms and the tokenized texts. To analyze the yearly relevance of each subtheme, we calculated (1) the advertisement-level occurrences (raw counts) of keywords belonging to each subtheme and (2) the average occurrence of each subtheme for each year using the following formula, slightly refined from that applied by Spada *et al.* (2022), to account for raw counts and yearly occurrences:

$$Average\ \ Occurrence_{ij} = \frac{o_{ij}}{n_j},$$

where o_{ij} denotes the total occurrence of keywords related to theme i in year j and n_j signifies the total number of job advertisements in year j.

Next, we used yearly occurrence mapping and Poisson regression models to analyze trends and determinants of theme occurrences. The advertisements of organizations that had disclosed their company identification numbers (IDs) or whose names directly yielded their company IDs in the Orbis database were matched with the respective years' sales and personnel numbers using the Orbis data. In addition, the information regarding those organizations' sectors was matched, enabling the identification of public administration organizations. The common recruiting agencies that usually search applicants for their client organizations were manually identified (based on the frequency of advertisements by a specific organization or recurring business IDs) and dropped from the regression analysis as their inclusion could lead to misleading results regarding the association between firm-level characteristics and controller requirements. These advertisements were excluded only from the regression models that used firm-level characteristics as predictors since otherwise they genuinely reflected the job market demands and were therefore included in the descriptive occurrence analysis (occurrence mapping).

We also conducted multiple robustness tests. The predetermined themes were primarily analyzed using Poisson regression as it is generally considered appropriate for modeling counts (Hutchinson and Holtman, 2005). The first robustness check involved performing ordinary least squares (OLS) regression with firm-clustered standard errors for each theme. Second, we conducted Poisson regression with firm fixed effects and robust standard errors to account for firm-specific variation in cases where the same organizations posted multiple job advertisements during the period under study. This analysis dropped all groups with only one observation per group (firms that posted only one advertisement) and all zero outcomes (no variation between the scores within the group), leading to a reduced number of observations per theme. For this reason, we considered the Poisson regression without firm fixed effects as the main analysis, considering the main goal of analyzing trends in the overall market demand, not particularly the change within firms.

Finally, we conducted a robustness check on the effects of the recent COVID-19 pandemic on theme occurrences because this major interruption impacted businesses and work globally. Fähndrich and Pedell (2025) argued that it may have caused restructuring of organizations' departments. Since the predetermined themes reflected roles as implied by tasks and skills, not the work arrangements or internal practices that the pandemic dramatically changed (e.g. Delfino and van der Kolk, 2021), we did not anticipate COVID-19 to substantially change the content of advertised controller roles. However, for an additional check, we aimed to account for the outbreak's potential impact on job market demands. Therefore, we performed an interrupted time series (ITS) analysis (Jebb and Tay, 2017; Lopez Bernal *et al.*, 2017) for each theme, using the Poisson regression specifications as in the main analysis but adding two explanatory variables. The first was a post-COVID-19 dummy (indicating whether the advertisement was posted after March 2020) to account for a potential level change (Lopez Bernal *et al.*, 2017) in theme occurrences at the time of the pandemic outbreak in Finland. The second addition reflected time in months after the COVID-19 outbreak (March 2020) to account for potential slope changes in theme occurrences (Lopez Bernal *et al.*, 2017). The year/month fixed effects were also accounted for in this analysis. The robustness test results are presented after the findings from the main analyses (Section 4.2.3).

4. Findings

4.1 Trends based on topic models

The topics were interpreted as thematic groups and, based on their trends, classified into hot, cold (Griffiths and Steyvers, 2004) and reviving topics (Antons *et al.*, 2016) (Table 1). In topic modeling, individual words can appear under multiple topics, which means that a word may have a high probability in more than one topic, thus carrying relevance to multiple themes. This potential overlap reflects the non-exclusivity of the topic boundaries, instead reflecting the different nuances of a theme. In our analysis, this overlap can be observed in both financial accounting and management accounting tasks.

Two topics, combined under the theme "group consolidation and finance," showed hot trends, having increased in relevance in controller job advertisements. The quadratic analysis suggested a reviving trend in group reporting and calculation. These trends might be related to globalization since the need for consolidated financial reporting across subsidiaries increases when firms expand to multiple regions and markets. However, they could also be explained by increasingly stringent regulatory frameworks and compliance demands, such as the development of international standards and heightened non-financial reporting expectations. These may add more layers to standard accounting tasks in general and to group reporting tasks in particular.

The thematic group of "financial accounting tasks" displayed consistently cold, decreasing trends in routine financial accounting and invoicing, routine financial accounting and credit collection tasks and financial statement and tax tasks. These topics reflected rather routine tasks and the cold trends might depict implications of technology-enabled automation, which could support humans in rule-based processes (Cooper *et al.*, 2019; Leitner-Hanetseder *et al.*, 2021). It is worth noting that the thematic group of "group consolidation and finance" also included individual topics that strongly related to financial accounting and had contrasting, hot trends but was separated in this analysis for clarity.

The theme "management accounting tasks" indicated a variety of trends. Both the linear and quadratic analyses revealed cold trends for cost accounting, a rather traditional management accounting task. The linear trend analysis also showed cold trends for tasks involving decision-making support, analyzing, forecasting and monitoring (topics 8 and 9; "group development and monitoring" was placed here due to the nature of the words reflecting management accounting). These kinds of tasks can be regarded as typical controller duties but may entail fewer routine features and more discretion. While they might not be as easily automatable as routine financial accounting tasks, new digital tools might ease human work and optimize human performance of these functions, which could explain the decline. These trends contrasted with the reviving one observed in operational control and planning tasks (topic 12). This topic seemed to emphasize control, which might be reviving in importance during more uncertain times. Furthermore, two topics related to public sector accounting and planning (topics 10 and 11) demonstrated hot trends. Again, the strict financial demands that also extend to public organizations could explain this finding.

One topic was assigned to "sustainability" because it included terms related to ESG and sustainability reporting. Considering the ongoing, expanding regulations on corporate sustainability and sustainability reporting, the topic's hot trend is not surprising and aligns with *H3*. The changes may imply anticipatory responses to further designed regulatory changes at the time of the job posting, such as the development of and debate on the EU's recently adopted CSRD and CSDDD. Thus, it seems that the effects of the heightened focus on sustainable practices and reporting demands have extended to controllers.

Table 1. Topic descriptives and trends

Theme	No.	Topic	Trend: linear	Trend: quadratic	Trend	*n*	Mean	SD	Min.	Max.
Group consolidation and finance	1	Group consolidation and regulation compliance	0.0004*		*Hot*	1,450	0.07	0.07	0.01	0.39
	2	Group finance and controlling tasks	0.0005**	0.00005*	*Hot*	1,244	0.06	0.06	0.01	0.45
	3	Group reporting and calculation		0.00005*	*Reviving*	1,597	0.07	0.06	0.01	0.52
Financial accounting tasks	4	Routine financial accounting and invoicing tasks	−0.0005**		*Cold*	1,572	0.08	0.07	0.01	0.43
	5	Routine financial accounting and credit collection tasks	−0.0011***		*Cold*	875	0.05	0.07	0.01	0.57
	6	Financial statement and tax tasks	−0.0013***		*Cold*	1,647	0.07	0.07	0.01	0.49
Management accounting tasks	7	Cost accounting	−0.006***	−0.0002*	*Cold*	635	0.13	0.23	0.01	0.90
	8	Decision-support and analytical tasks	−0.0004*		*Cold*	1,772	0.07	0.08	0.01	0.75
	9	Group development and monitoring	−0.0005***		*Cold*	1,387	0.05	0.05	0.01	0.56
	10	Public sector financial administration	0.0008*		*Hot*	1,088	0.09	0.10	0.01	0.59
	11	Public sector planning and development	0.0019***		*Hot*	987	0.09	0.12	0.01	0.56
	12	Operational control and planning tasks		0.00006**	*Reviving*	1,259	0.06	0.06	0.01	0.47
Sustainability	13	Sustainability	0.0007***		*Hot*	1,461	0.06	0.05	0.01	0.39

Note(s): *p-value < 0.05, **p-value < 0.01, ***p-value < 0.001; *n* reflects the number of advertisements exceeding the 0.01 topic-proportion filter threshold
Source(s): Authors' own work

4.2 Dictionary-based analyses of contemporary themes and trends

4.2.1 Descriptive occurrence analysis. To supplement the topic-specific trend analysis, we conducted dictionary-based analyses. Table 2 presents an overview of the theme variables. Since the theme dictionaries contained unequal numbers of keywords, the basic statistics between themes were not directly comparable. On average, the advertisements mentioned multiple traditional tasks and skills and less than one business-partner task or skill, digitalization or sustainability-related keyword per advertisement.

The average occurrences of subthemes related to the business-partner role (Figure 2) did not show consistent trends, although small increases could be observed. The yearly average of the task subtheme ranged from 0.50 (2017) to 0.80 (2022) and that of the skill subtheme from 0.44 (2017) to 0.58 (2023). The most frequently mentioned task-related keywords were development project (1,393 in 1,186 advertisements), business partner (677 in 507 advertisements) and business development (595 in 514 advertisements). The skill-related keywords with the highest occurrences were self-initiated (572 in 548 advertisements), self-initiative (523 in 517 advertisements) and solution-oriented (503 in 475 advertisements).

The occurrences of subthemes pertaining to the traditional role (Figure 3) showed distinct trends: the task-related subtheme displayed a largely increasing trend after 2017, with yearly occurrences ranging from 3.14 (2017) to 5.07 (2023), while the trait- or skill-related

Table 2. Descriptive information on theme variables (n = 7,426)

Theme variables	Mean	SD
Business partner tasks	0.67	1.00
Business partner and entrepreneurial skills	0.52	0.74
Traditional tasks	4.35	3.01
Traditional traits/skills	2.74	1.96
Digitalization and automation	0.32	0.67
Sustainability	0.07	0.64

Source(s): Authors' own work

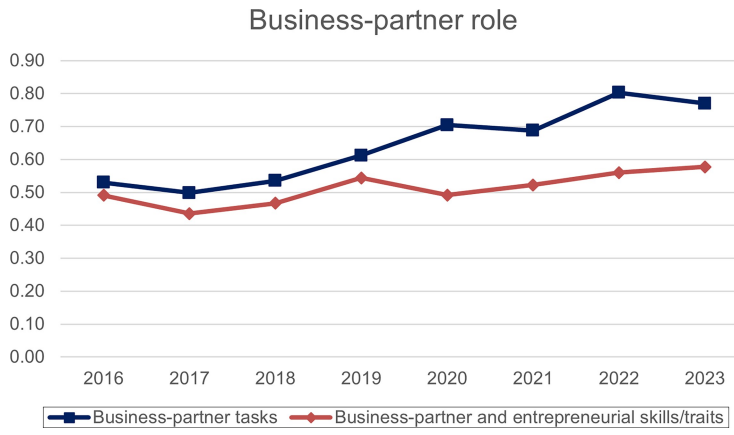

Figure 2. Frequency trends of subthemes related to the business-partner role

Source: Authors' own work

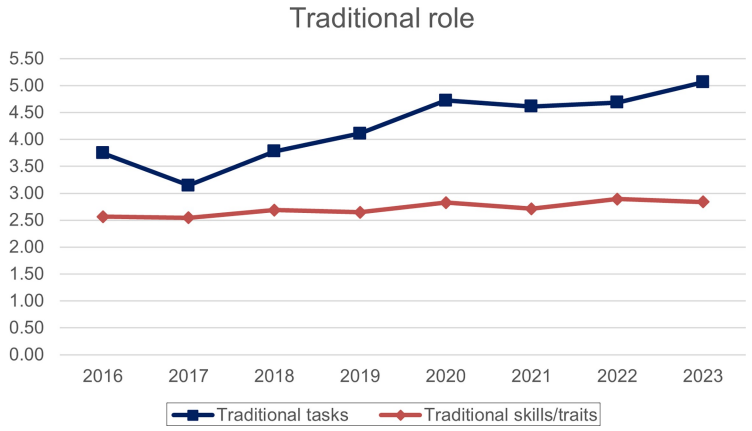

Figure 3. Frequency trends of subthemes related to the traditional controller role
Source: Authors' own work

subtheme exhibited a steady trend, with occurrences ranging from 2.55 (2017) to 2.90 (2022). The most frequently mentioned task keywords were controlling (3,444 in 1,619 advertisements), budgeting (2,496 in 2,139 advertisements) and financial control (2,491 in 1,401 advertisements). The most frequently mentioned traits and skills were Excel (7,417 in 4,681 advertisements), analytical (3,310 in 2,841 advertisements) and SAP (2,236 in 1,707 advertisements).

The theme related to digitalization (Figure 4) showed an increasing trend after 2017, with yearly averages ranging from 0.12 (2017) to 0.45 (2023), while the sustainability-related theme demonstrated a rising trend after 2020, ranging from 0.01 (2016–2017) to 0.23 (2023). The most common keywords in the digitalization theme, comprising system development tasks and slightly more advanced or modern technologies and tools than the traditional ones,

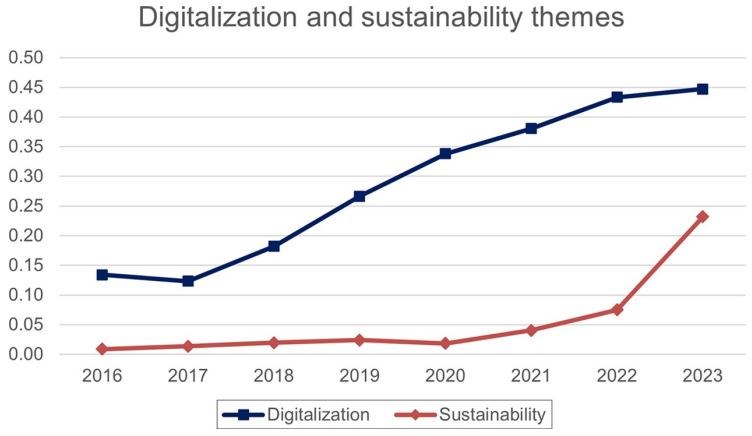

Figure 4. Frequency trends of themes related to digitalization and sustainability
Source: Authors' own work

were Power BI (1,101 in 998 advertisements), Qlikview (209 in 191 advertisements) and system development (192 in 177 advertisements). The most frequent sustainability-related keywords were sustainable development (130 in 122 advertisements), sustainability report (74 in 29 advertisements) and sustainability reporting (73 in 28 advertisements).

The advertisements of the most common recruiting agencies were dropped before further analyses, which included firm-specific factors as explanatory variables for theme frequencies. For comparison, we also mapped the average occurrence trends for the data set without the identified recruiting agency advertisements ($n = 5,447$). The differences in yearly average occurrences compared to the above presented ones remained small. We did not identify constant, meaningful differences in any theme based on the calculated differences or trend figures. The average occurrence analysis was repeated for an expanded sample of titles to account for potential title-selection bias. In addition to titles mentioning "controller," the expanded sample included titles that could reflect similar jobs. We assessed the titles and chose those closest to "controller" in the expanded sample: "financial planning/planner," "taloussuunnittelija" (financial planner in Finnish) and "fp&a" (financial planning and analysis). Using this sample ($n = 8,182$), we re-calculated the average occurrences and analyzed trends across years. The occurrence patterns of the expanded sample remained similar to those of the controller sample. The small deviations in a few individual years' occurrences may reflect the differences of the jobs' focus areas. These comparisons are illustrated in the Supplementary materials.

4.2.2 Regression analysis. We further conducted Poisson regressions of the trends and determinants of the subtheme keyword frequencies. In these models, we clustered standard errors at the firm level to account for possible within-firm dependence arising in cases where the same firm had posted multiple job advertisements over years. The models included the following as explanatory variables: a binary variable identifying organizations operating in the "public administration, education and health and social services" sector; firm sales and number of employees in the posting year; and years (2016–2023) as categorical variables to track trends and capture broader time-varying factors.

The regression results (Table 3) indicated increasing trends during the latter half of the timespan for themes revolving around traditional tasks, digitalization and sustainability. Meanwhile, the subthemes related to business-partner tasks and skills (*H1*) as well as traditional skills exhibited more steady trends, although some years significantly differed from 2016 (base value). None of the themes had significantly declined in keyword frequency over the years. In this regard, the models supported the descriptive results of the average occurrences. Based on these results, *H1* would be rejected while *H2* and *H3* would be largely supported.

The organizations operating in public administration, education and health and social services tended to mention fewer traditional skills than those from other sectors. Larger firms by sales referred to almost all themes (except business-partner and entrepreneurial skills) more than smaller ones. Meanwhile, firm size as measured by the number of employees did not appear to be a significant predictor for theme frequencies.

Since extant literature suggested that certain roles may boost or promote other roles, the themes related to digitalization and sustainability were used as predictors for business-partner and traditional tasks, whereas the latter themes were included in the models explaining digitalization and sustainability. According to the results, only the business-partner and digitalization themes seemed to be associated with each other; the higher the frequency of the digitalization theme, the higher the frequency of the business-partner tasks.

The number of observations decreased from the descriptive occurrence analysis (Section 4.2.1) to the regression analysis because of the lack of company IDs for some

Table 3. Main analysis: Poisson regression models

Variables	Business partner tasks	Business partner/ entrepreneurial skills	Traditional tasks	Traditional traits	Digitalization	Sustainability
Year (base: 2016)						
2017	−0.001 (0.154)	0.058 (0.168)	−0.060 (0.078)	0.091 (0.095)	0.056 (0.304)	1.422 (1.133)
2018	−0.023 (0.165)	0.213 (0.168)	0.046 (0.071)	0.087 (0.097)	0.434 (0.309)	1.729 (1.126)
2019	−0.065 (0.149)	0.133 (0.158)	0.112 (0.071)	0.102 (0.082)	0.795* (0.324)	1.860 (1.123)
2020	0.150 (0.145)	0.050 (0.172)	0.198** (0.072)	0.155 (0.086)	1.024*** (0.284)	1.846 (1.084)
2021	0.021 (0.150)	0.127 (0.162)	0.212** (0.068)	0.101 (0.082)	1.054*** (0.294)	2.505* (1.073)
2022	0.235 (0.140)	0.322* (0.154)	0.223** (0.069)	0.173* (0.082)	1.013*** (0.273)	3.117** (1.103)
2023	0.188 (0.140)	0.205 (0.154)	0.343*** (0.068)	0.168* (0.082)	1.059*** (0.277)	4.359*** (1.075)
Public adm.	−0.020 (0.151)	−0.241 (0.141)	0.015 (0.059)	−0.214* (0.086)	0.144 (0.171)	−0.409 (0.668)
Sales (ln of 1,000 EUR)	0.068* (0.033)	−0.013 (0.025)	0.037*** (0.010)	0.044*** (0.012)	0.100* (0.039)	0.264** (0.088)
Employees (1,000)	−0.008 (0.013)	−0.014 (0.012)	0.002 (0.003)	−0.001 (0.003)	0.003 (0.010)	−0.041 (0.028)
Constant	−1.252** (0.405)	−0.648* (0.315)	0.884*** (0.129)	0.414** (0.160)	−3.263*** (0.534)	−8.107*** (1.487)
Theme predictors						
Digitalization	0.157** (0.051)	n/a	0.033 (0.021)	n/a	n/a	n/a
Sustainability	−0.019 (0.028)	n/a	−0.029 (0.016)	n/a	n/a	n/a
Business partner tasks	n/a	n/a	n/a	n/a	0.145** (0.051)	−0.071 (0.136)
Traditional tasks	n/a	n/a	n/a	n/a	0.012 (0.013)	−0.096 (0.050)
Wald $chi^2(10)$ /Wald $chi^2(12)$	36.55	17.25	93.35	55.38	98.34	65.67
Prob > chi^2	0.000	0.069	0.000	0.000	0.000	0.000
Pseudo R^2	0.020	0.008	0.024	0.017	0.053	0.156
Observations	3,599	3,599	3,599	3,599	3,599	3,599

Note(s): Firm-clustered standard errors reported in parentheses; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source(s): Authors' own work

advertisement publishers or due to some organizations' missing sales or personnel information in the database. The models can be considered indicative since model fits could have been better, although most of them still showed statistical explanatory power.

4.2.3 Robustness tests. We conducted multiple robustness tests, whose results are presented in Appendix (robustness tests). The first test included estimating the models using OLS regression with firm-specific predictors and years. OLS models strongly supported the descriptive occurrence and main regression analyses, showing significant, increasing coefficients across years for traditional tasks, digitalization and sustainability themes. For sustainability, OLS suggested significant coefficients starting from the year 2020, while Poisson indicated them starting from 2021. In line with Poisson regression, OLS also showed positive, significant impacts of firm size (as measured by sales) on most theme frequencies and a negative effect of public sector on the frequency of traditional traits. The themes related to business-partner tasks and digitalization were positively associated in this analysis as well, but OLS regression also showed a negative association between traditional tasks and sustainability (when the latter was the predictor). Overall, this check largely confirmed the results of the main analysis, with *H1* rejected and *H2* and *H3* mostly supported.

The second test involved estimating the models using Poisson regression with firm fixed effects. All advertisements posted by firms that only published once over the period under study were dropped in this analysis, leading to decreased observation numbers. The models showed fewer significant associations, which is reasonable, given that the models with firm fixed effects focus on explaining within-firm variation, absorbing the between-firm variation (e.g. making firm size by sales insignificant in these models). Year coefficients were significant only for digitalization, while for sustainability and especially traditional tasks, only at the end of the analysis period. The business-partner task theme remained positively associated with the digitalization theme. The results thus supported the main analysis but, as expected, with more restrained significance of coefficients. In line with OLS regression, this analysis also suggested a negative association between traditional tasks and sustainability, as well as a similar negative association between business-partner tasks and sustainability when the sustainability frequency was used as a predictor.

An interesting feature of the fixed-effects regression models was that in each theme model, multiple firm-level observation groups and thus, observations, were automatically dropped for zero outcomes. Two plausible explanations would account for this finding: either the outcome (frequency score) was very sparse – which seemed to be the case with the sustainability theme – leading to nonexistent variation within a firm's advertisements or a firm had the same score in theme frequency (can also be 0 across years) in every advertisement it posted. The latter case may refer to firm-level inertia where a firm reuses templates or previous advertisements, leading to persistence in description texts and thus, steady trends. The numbers of dropped groups and observations varied across themes, from only nine firms (28 observations) dropped from the traditional tasks model to 495 firms (2,514 observations) dropped from the sustainability model (see Appendix for all models).

The third test comprised the ITS analysis (using Poisson regression) to account for potential level and slope changes in theme frequencies associated with the COVID-19 pandemic. The models included COVID-19-related variables, firm-specific predictors, theme score predictors and year/month fixed effects. For the sustainability theme, we used a simpler model with year (instead of month) fixed effects because many months (quarters were also tested) had no variation since the theme's occurrence was so sparse, leading to models with missing coefficients and Wald statistics.

The results of the ITS analysis supported the main analysis by showing firm size (by sales) as a significant positive predictor of most themes, with the public sector negatively

associated with traditional traits' frequency and the business-partner tasks positively associated with the digitalization theme. We found no significant level changes (Lopez Bernal *et al.*, 2017) in theme frequencies at the time of the interruption (the COVID-19 outbreak) nor significant slope changes (Lopez Bernal *et al.*, 2017) following the interruption. The only exception was the sustainability theme, for which the model showed a significant, positive slope change after the interruption. This observation matched those drawn from the descriptive occurrence analysis and the main regression analysis since they also pointed out an increasing trend for "sustainability" since 2021. However, this increase was not necessarily caused by the COVID-19 outbreak. Logically, the updated regulations regarding sustainability reporting and organizations' preparation for CSRD-compliant reporting may be better envisioned causes for this observed change. While the COVID-19 predictors likely absorbed some effects of other time variables in the ITS analysis, three theme models showed a few separate significant month coefficients and a few months being dropped due to collinearity.

5. Discussion

5.1 Discussion on the findings

Based on the topic trends and keyword frequencies, we identified patterns in controllers' tasks and skill requirements, reflecting their organizational roles. The topic analysis revealed several topics encompassing traditional accounting tasks for controllers, in line with those reported in prior studies, suggesting that job advertisements continue to emphasize traditional controller tasks (Lepistö *et al.*, 2016; Oesterreich *et al.*, 2019; Trachsel and Bitterli, 2023). The topics reflected the inclusion of both financial and management accounting tasks in controller roles; this close connection between financial and management accounting has been recognized in Finnish companies (Granlund and Lukka, 1998). However, the topics did not include many nontraditional words, providing more evidence of the continued relevance and strong presence of traditional controller roles over those of a more strategic, business-partner role. This finding may reflect the issue that to date, not all organizations or managers view controllers as business partners (Goretzki and Messner, 2019; Morales, 2019), which may also depend on the perceptions of controllers themselves (Morales and Lambert, 2013). The business-partner talk may reflect the financialization discourse (Morales, 2019) or strategy discourse (Goretzki and Messner, 2019, p. 16) more than prevalent practices, as discussed by Rieg *et al.* (2023).

Nonetheless, some topics reflected other recent changes in the business environment. For instance, globalization and the increased regulatory and disclosure demands may explain the increasing thematic trends related to group finance and reporting, public sector accounting and sustainability. The regulatory uncertainty and new reporting developments, such as those related to sustainability (EU, 2022, 2024; Garcia-Torea *et al.*, 2024), may result in more extensive, internal and external reporting work for controllers.

In terms of the declining trends of routine tasks, observed in both financial and management accounting themes, digitalization could well be regarded as a potential explanation. Digital technologies have enabled computerized processes and task automation, facilitating a shift in human focus to nonroutine tasks (Cooper *et al.*, 2019; Kokina and Blanchette, 2019; Leitner-Hanetseder *et al.*, 2021). Although financial accounting tasks such as invoicing, credit collection or preparation of financial statements and tax may still require human expertise to some extent, digital systems and automated workflows can efficiently assist humans in performing these functions, requiring less input from controllers. In management accounting, analyzing and figure-producing tasks are likely increasingly supported by digital technologies and novel software. Such influences are backed by

earlier literature (e.g. Leitner-Hanetseder *et al.*, 2021; Moll and Yigitbasioglu, 2019; Rautiainen *et al.*, 2024) that describes digital tools' assistance in enriching controllers' roles and helping them take on more challenging roles.

The dictionary-based frequency analysis revealed a consistently high and even slightly increasing occurrence of traditional controller tasks. Contrary to our primary hypothesis (*H1*), similar increasing trends were not identified in the business-partner themes. These findings suggest that the business-partner role might not be independently emerging but could require the use of IT systems for its existence, as the analyses indicated an association between these themes. However, controllers in business-partner roles should also be competent in working with people (e.g. because of extensive interactions with managers), not only with technologies. These are some of the complexities that those preparing job advertisements are forced to address so they could receive the most suitable job applications. Possibly, those responsible for generating advertisements also consider controllers to be in more traditional roles. Controllers may subsequently grow in their professional area and eventually attain the business-partner role even if it is not explicitly sought at the outset.

The regression analysis also showed an increase in the relevance of more advanced digitalization-related tasks and skills, as hypothesized (*H2*), albeit not mentioned with high frequency. These increases may be partly explained by technological advancement and new, useful digital tools but may also reflect a hybridization toward information systems (IS) and IT roles, as suggested by Caglio (2003). These roles were also more evident in advertisements emphasizing business-partner tasks. In this era characterized by digitalization and adoption of diverse digital technologies, basic technology is likely also embedded in traditional tasks. In general, the accelerated advancement of digital technologies has probably caused basic IT skills to be assumed in controller roles since earlier studies (Ala-Heikkilä and Järvenpää, 2023; Lepistö *et al.*, 2016; Oesterreich *et al.*, 2019; Rieg *et al.*, 2022; Trachsel and Bitterli, 2023) have suggested their prevalence in controller positions for a long time. However, new competence requirements have emerged, such as those related to business analytics (Oesterreich and Teuteberg, 2019), making the controller competence portfolio more versatile.

Both topic- and dictionary-based analyses also revealed an increasing emphasis on sustainability matters in controller roles, as hypothesized (*H3*), indicating that controllers' jobs have expanded toward broader responsibilities beyond mere financial perspectives. Prior research supports this view, implying that controllers can play a valuable role in sustainability reporting (Kunz *et al.*, 2025) and related processes such as materiality analysis (Molinari *et al.*, 2025). Given their function in managerial sensemaking of accounting information (Järvenpää *et al.*, 2023), controllers may also be regarded as sensemakers of sustainability-related data. However, controllers themselves may still perceive their role in sustainability issues unclear or remain reserved toward such responsibilities, preferring the financial orientation (Kunz *et al.*, 2025). The job advertisements may be designed to encourage controllers to be more actively involved in these issues.

In terms of firm-specific predictors, we found that larger organizations (by sales) accentuated almost all themes more than smaller ones and that organizations in public administration, education and health and social service sectors emphasized traditional traits less than other organizations did. Larger firms might assign multiple roles to controllers, many of which might be relatively more specifically and narrowly task defined. In contrast, smaller firms might expect controllers to assume more encompassing roles, making the job descriptions more generic. In addition, more capital-intensive organizations may have highly complex organizational structures that increasingly require diversified work of controllers. Regarding the public administration sector, a potential rationale for less emphasis on traditional traits could be traced to the use of formal eligibility criteria (e.g. education)

instead of personality traits and standardized templates; we saw examples of this in our manual review of job advertisements when forming the dictionary.

We also found that organizations might use job advertisement templates, which could introduce inertia. Using similar language or reusing prior advertisements could lead to an impression of persistence in job advertisements even with the evolving job descriptions or job market demands. Job advertisements might also function as organizational artifacts that shape, instead of merely reflect, role expectations. Such advertisements may provide a picture that the divide between traditional and business-partner roles is no longer as valid as previously and that more important issues are currently the consideration of digitalization and sustainability. These two themes and controllers' positioning toward them may increasingly direct the way that controller roles are being shaped at present. This phenomenon may even reflect a wider organizational or institutional change where certain employees' proximity to management and strategic issues is no longer that important in itself, but the knowledge in the areas of digitalization and sustainability is more essential to qualify applicants for interesting and relevant positions.

Overall, the changes we observed in controller roles mostly related to digitalization and sustainability, although traditional tasks also appeared to be persistently relevant. These findings reflect the increasing inclusion of new tasks and themes in controller roles, while keeping the traditional role in demand. Thus, these novel responsibilities and focus areas may add layers to controllers' jobs, making them increasingly hybrid professionals and key actors in several processes, supplementing, not replacing, traditional tasks. However, digital technologies can partially relieve the burden (Fähndrich and Pedell, 2025). Furthermore, these changes may lead to shifts in the controller role or to a defensive position toward such changes, resulting in a willingness to maintain the controller profession the way it is even when many issues around it seem to change. Nonetheless, it may be reasonably assumed that if large enough changes eventually require alterations in controller roles, these changes would be implemented.

5.2 Contributions and implications

With this study, we contribute to the literature on controller roles by providing evidence of their trends spanning multiple years, in times of expanding opportunities arising from digital technologies and sustainability imperatives. Specifically, we show how the traditional, bean-counter role continues to be emphasized but provide little proof of the business-partner role that prior literature (Goretzki and Messner, 2019; Goretzki *et al.*, 2013; Maas and Matějka, 2009) has considered an important emergent role category. More advanced IT roles have also gained some relevance in the occupation and seem to be connected with business-partner demands, while sustainability matters have increasingly been highlighted in controller jobs. Adding to the job advertisement-based research on the topic (see Supplementary materials), the insights from our study are based on a recent, longer period, combining external themes with suggested stereotypical roles. Moreover, we enrich the discussion on new approaches to text-based role measurement (Rieg *et al.*, 2023) by adopting a combined method that integrates topic modeling and dictionary-based analysis.

We particularly contribute to the understanding of organizations' expectations of controller roles. Rieg *et al.* (2022) argue that potential differences in the expected roles across management levels of the accounting function or between the expected and actual roles might imply conflicts or tensions. We acknowledge that such expectations may vary, depending on the organizational role. Contrasted with studies on controllers' views of their role, our research reflects organizations' perspective, extending the knowledge of these roles

by highlighting those that employers expect controllers to fulfill, as implied by the described tasks and skills.

By highlighting the relevance of traditional roles and potential new layers of digitalization and sustainability-related responsibilities, the practical implications of this study extend to educational discussions. Our findings emphasize the continued need to retain traditional, key elements in accounting programs. Eventually, these core skills may allow effectively building business-partner and IT-related, task-specific knowledge. Education could also more concretely address the issue of versatile roles and how controllers could strive for business-partner roles, IT system specialists or sustainability reporting professionals. These responsibilities might not be explicitly given or assigned but taken by controllers with certain characteristics and a development-oriented mindset, or they might relate to the question of how the tasks (instead of which ones) are performed. Moreover, this study could spark a discussion on how organizations might engage controllers and support their development and role identity toward a more business partnering-oriented role through on-the-job experiences.

Regarding generalizability, the role evolution driven by digitalization and sustainability imperatives is not unique to the empirical context of this study. Similar shifts have been examined and observed in controller roles across various geographical settings (Oesterreich *et al.*, 2019; Trachsel and Bitterli, 2023; van Slooten *et al.*, 2024) and more broadly within the accounting profession (Knudsen, 2020; Wanderley and Horton, 2024). However, Granlund and Lukka (1998) argued that in Finland, the management accounting practice is shaped by the national culture and involves the integration of financial and management accounting systems. This convergence might be facilitated or even driven by IT (Taipaleenmäki and Ikäheimo, 2013). Finland's high scores in international comparisons related to digitalization and technology (e.g. Ali-Yrkkö *et al.*, 2023; European Commission, 2022) further point to the prominence of these skillsets. Thus, our findings are tied to a setting where financial and management accounting systems are partly intertwined and digital technologies are strongly integrated, making the results generalizable, primarily to similar settings, as opposed to contexts where financial accounting tasks and systems are more strictly separated from management accounting tasks and digital technologies are not as widely adopted.

6. Limitations and future research directions

In general, job advertisements as data contain limited information regarding advertised positions. Advertising can be used to manage the impression of positions like recruitment materials (Jeacle, 2008) and can thus be designed to convey a positive message about the employer and the position specifications. Considering controllers' jobs, this aim might result in striving to provide an impression of involved, inspiring jobs. This study indicated a high occurrence of traditional controller tasks and a rather low, although increasing, frequency of advanced digitalization and sustainability-themed roles. Thus, if the advertisements were designed to depict promotional imageries, the actual jobs might in reality emphasize traditional tasks even more and other tasks less so. Even if formal job descriptions do not clearly portray certain roles (e.g. business partner), implicit responsibilities or organizational expectations may still represent them. Formal descriptions may not fully capture the nature or scope of the role nor tell the whole story of the market demand since some jobs are not publicly advertised.

The automated content analysis using text-mining techniques contains steps that might introduce limitations or bias (Pejic-Bach *et al.*, 2020). For instance, topic models produce probabilistic collections of terms. Thus, the specific topics extracted from a sample might vary across diverse model trainings using the same data. Varying the number of topics would

entail different levels of concentration of terms within the estimated topics; where the choice of 100 topics is well established in the literature, it is not uncommon to estimate models below the 100-topic threshold for deriving more concentrated topics. Similarly, the preprocessing steps to simplify the unstructured descriptions might result in lost information or nuances. Minor variations in the tokenization procedure could yield downstream differences in the types of model-generated topics and decisions about creating collocations would lead to prioritizing certain links between terms over others. The dictionary-based technique also poses a false-positive risk, where a keyword identified and interpreted as a task or a skill may eventually relate to something else in the description field in the surrounding context. Conversely, the technique also entails a false-negative risk because interesting aspects of job descriptions may be overlooked if they are not captured by the dictionaries or if the dictionary items are phrased slightly differently from the tokenized advertisement phrases. However, automated content analysis has the advantage of analyzing trends (over time) and larger data sets than would be possible via classical qualitative analyses. We mitigated the methodological risks and biases by deriving keywords from both the literature and the data, as well as manually reviewing and validating the procedure of extracting keywords from both the original Finnish and preprocessed English text columns.

For future research, we identify two directions of interest to extend discussions on evolving controller roles. First, a thorough understanding of the effects of increased regulations – regarding corporate sustainability and sustainability reporting – on controller roles merits further examination. Although the relation has been identified here and previously (Hoang *et al.*, 2020), recent changes might indicate controller roles that have not yet been fully considered. Future studies could explore whether the new regulations would lead to novel roles or the mechanisms on how they substantiate those of bean counters or business partners. Second, the impacts of fast-paced technological developments, such as (generative) AI, on controller tasks would be of substantial interest. In-depth knowledge of which controller tasks could be relatively easily automated or largely supported by AI-based technologies would help anticipate controllers' future tasks and enable informed planning of educational strategies. Further research could analyze the changes in specializations within the controller occupation, for example, by differentiating between business, financial and cost controllers and examine different parties' (e.g. controllers', managers') expectations of those specializations. Future studies could also add value to the discourse on the stereotypical role divide by investigating to what extent these roles are depicted by the existence of certain tasks versus the manner in which these are performed.

7. Conclusion

Emerging external themes shape the roles of controllers, while traditional tasks remain essential. By examining trends in both stereotypical controller roles and digitalization- and sustainability-related themes in job descriptions, this study extends the discussion on the evolving nature of controller roles and provides longitudinal evidence spanning an eight-year period. Contrary to expectations, the business-partner role has neither been particularly visible nor significantly increased in relevance in controller job advertisements. Traditional role elements have remained persistently relevant, despite a decline in some highly routine conventional tasks. At the same time, the themes of digitalization and sustainability have gained prominence in job advertisements and have become increasingly integrated into controller roles based on the data from the advertisements. Overall, controller job advertisements depict organizational change by progressively framing controllers as hybrid professionals who need to integrate tasks and knowledge related to digitalization and sustainability into traditional roles that continue to form the core of the profession.

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Notes

[1.] Both the terms "controller" and "management accountant" have been used in prior literature. While not strictly synonymous, they are often used interchangeably in practice due to their overlapping roles and responsibilities (Ahrens and Chapman, 2000; Goretzki *et al.*, 2013; Oesterreich *et al.*, 2019). We use the term "controller" for clarity and coherence since it is the keyword used in the empirical analysis of Finnish job advertisements. When reviewing prior literature, we consider discussions about management accountants as applying to controllers.

[2.] Job advertisements in Finland are generally written in Finnish or Swedish as official languages, but English descriptions are also commonly used.

[3.] TF-IDF means *term frequency-inverse document frequency*, a statistical measure that evaluates the importance of a term within a document relative to a corpus of documents. It combines two components: TF, which reflects how often a term appears in a document and IDF, which discounts terms that are common across many documents. By balancing these two factors, TF-IDF assigns higher weights to terms that frequently occur in a document but are rare across the corpus, making it useful for tasks such as information retrieval and text-mining (Salton and Buckley, 1988).

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Supplementary material

The supplementary material for this article can be found online.

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Appendix. Robustness tests

Table A1. Robustness test 1, OLS regression with firm-clustered standard errors

Variables	Business partner tasks	Business partner/ entrepreneurial skills	Traditional tasks	Traditional traits	Digitalization	Sustainability
Year (base: 2016)						
2017	0.001 (0.100)	0.024 (0.072)	−0.223 (0.295)	0.239 (0.249)	0.013 (0.053)	0.012 (0.014)
2018	−0.009 (0.106)	0.098 (0.076)	0.199 (0.280)	0.236 (0.253)	0.095 (0.063)	0.029 (0.016)
2019	−0.039 (0.096)	0.059 (0.069)	0.462 (0.290)	0.270 (0.214)	0.195* (0.083)	0.026 (0.017)
2020	0.101 (0.102)	0.021 (0.073)	0.853** (0.300)	0.423 (0.226)	0.290*** (0.075)	0.035* (0.016)
2021	0.010 (0.101)	0.056 (0.070)	0.923** (0.285)	0.281 (0.210)	0.304*** (0.083)	0.065** (0.022)
2022	0.173 (0.102)	0.157* (0.071)	0.980** (0.291)	0.488* (0.213)	0.289*** (0.061)	0.108** (0.041)
2023	0.132 (0.098)	0.094 (0.067)	1.577*** (0.297)	0.468* (0.213)	0.304*** (0.065)	0.304** (0.089)
Public adm.	−0.017 (0.103)	−0.116 (0.063)	0.034 (0.272)	−0.533** (0.203)	0.043 (0.071)	−0.040 (0.038)
Sales (ln of 1,000 EUR)	0.046* (0.021)	−0.008 (0.013)	0.164*** (0.047)	0.118*** (0.032)	0.034* (0.013)	0.021** (0.008)
Employees (1,000)	−0.005 (0.009)	−0.005 (0.003)	0.016 (0.015)	0.000 (0.008)	0.003 (0.006)	−0.003 (0.002)
Constant	0.090 (0.255)	0.549** (0.160)	1.798** (0.561)	1.159** (0.406)	−0.341*(0.160)	−0.194* (0.076)
Theme predictors						
Digitalization	0.156* (0.063)	n/a	0.176 (0.109)	n/a	n/a	n/a
Sustainability	−0.015 (0.019)	n/a	−0.131* (0.061)	n/a	n/a	n/a
Business partner tasks	n/a	n/a	n/a	n/a	0.075** (0.028)	−0.005 (0.013)
Traditional tasks	n/a	n/a	n/a	n/a	0.005 (0.006)	−0.009 (0.006)
F (10,956)/F (12,956)	2.43	2.13	7.16	6.07	6.55	1.89
Prob > F	0.004	0.020	0.000	0.000	0.000	0.032
R^2	0.035	0.013	0.059	0.051	0.062	0.019
Obs	3,599	3,599	3,599	3,599	3,599	3,599

Note(s): Firm-clustered standard errors reported in parentheses; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$
Source(s): Authors' own work

Table A2. Robustness test 2, Poisson regression with firm fixed effects

Variables	Business partner tasks	Business partner/ entrepreneurial skills	Traditional tasks	Traditional traits	Digitalization	Sustainability
Year (base: 2016)						
2017	−0.079 (0.168)	0.102 (0.178)	−0.100 (0.089)	0.043 (0.105)	0.066 (0.287)	1.144 (1.249)
2018	−0.039 (0.180)	0.157 (0.184)	−0.033 (0.083)	−0.086 (0.102)	0.460 (0.307)	1.777 (1.223)
2019	−0.035 (0.160)	0.109 (0.167)	0.061 (0.080)	−0.030 (0.085)	0.788* (0.348)	1.644 (1.118)
2020	0.110 (0.162)	0.150 (0.189)	0.124 (0.081)	0.069 (0.095)	0.940** (0.272)	1.177 (1.166)
2021	0.068 (0.169)	0.190 (0.185)	0.112 (0.083)	0.037 (0.097)	1.039*** (0.290)	2.251* (1.080)
2022	0.191 (0.156)	0.322 (0.173)	0.138 (0.077)	0.132 (0.095)	1.002*** (0.286)	2.576* (1.062)
2023	0.201 (0.160)	0.337 (0.183)	0.211** (0.079)	0.086 (0.094)	0.975** (0.290)	3.655*** (1.018)
Sales (ln of 1,000 EUR)	0.028 (0.073)	−0.035 (0.057)	0.042 (0.023)	−0.034 (0.033)	0.006 (0.051)	0.258 (0.998)
Employees (1,000)	0.014 (0.026)	−0.023 (0.035)	0.005 (0.016)	0.015 (0.015)	0.020 (0.022)	−0.125 (0.115)
Theme predictors						
Digitalization	0.178*** (0.040)	n/a	0.029 (0.027)	n/a	n/a	n/a
Sustainability	−0.048** (0.014)	n/a	−0.044* (0.019)	n/a	n/a	n/a
Business partner tasks	n/a	n/a	n/a	n/a	0.159*** (0.039)	−0.109 (0.080)
Traditional tasks	n/a	n/a	n/a	n/a	0.007 (0.016)	−0.116 (0.072)
Wald chi^2 (9)/Wald chi^2 (11)	47.360	10.680	44.520	20.340	64.760	75.63
Prob > chi^2	0.000	0.299	0.000	0.016	0.000	0.000
Observations	2,643	2,609	3,157	3,124	2,190	671
Groups	369	367	534	522	254	48
Groups dropped: only 1 obs	414	414	414	414	414	414
Groups dropped for zero outcomes	174	176	9	21	289	495
Obs dropped for zero outcomes	542	576	28	61	995	2,514

Note(s): Robust standard errors reported in parentheses; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
Source(s): Authors' own work

Table A3. Robustness test 3, ITS analysis; Poisson regression with COVID-19 variables and firm-clustered standard errors

Variables	Business partner tasks	Business partner/ entrepreneurial skills	Traditional tasks	Traditional traits	Digitalization	Sustainability (*simpler model, years fixed*)
Post-COVID-19 dummy (post)	0.544 (4.589)	0.165 (3.907)	−0.882 (1.685)	0.895 (2.206)	0.141 (5.177)	−0.987 (2.463)
Interaction of time and interruption (time_post)	−0.025 (0.315)	−0.026 (0.271)	0.083 (0.114)	−0.044 (0.152)	0.056 (0.353)	0.394* (0.160)
Public adm.	−0.018 (0.142)	−0.254 (0.141)	0.021 (0.057)	−0.208* (0.084)	0.139 (0.165)	−0.405 (0.687)
Sales (ln of 1,000 EUR)	0.064* (0.031)	−0.017 (0.025)	0.038*** (0.010)	0.044*** (0.012)	0.103** (0.039)	0.260** (0.087)
Employees (1,000)	−0.007 (0.013)	−0.013 (0.011)	0.002 (0.002)	−0.001 (0.003)	0.003 (0.010)	−0.043 (0.030)
Constant	−1.061* (0.535)	−0.164 (0.406)	0.967*** (0.182)	0.369 (0.264)	−3.028*** (0.723)	−8.024*** (1.481)
Theme predictors						
Digitalization	0.180** (0.056)	n/a	0.027 (0.022)	n/a	n/a	n/a
Sustainability	−0.027 (0.027)	n/a	−0.031 (0.016)	n/a	n/a	n/a
Business partner tasks	n/a	n/a	n/a	n/a	0.151** (0.052)	−0.100 (0.132)
Traditional tasks	n/a	n/a	n/a	n/a	0.009 (0.013)	−0.097 (0.050)
Wald chi^2 (98)/Wald chi^2 (100)	234.31	141.75	351.13	286.35	11,701.79	72.04
Prob > chi^2	0.000	0.003	0.000	0.000	0.000	0.000
Pseudo R^2	0.036	0.026	0.036	0.026	0.078	0.176
Observations	3,599	3,599	3,599	3,599	3,599	3,599
no. of y/m (or years) omitted due to collinearity	2	2	2	2	2	1
no. of significant y/m (or year) coefficients	0	2	2	0	4	0

Note(s): Firm-clustered standard errors reported in parentheses; *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$; not all year/month coefficients are listed in the table for the sake of simplicity, but the numbers of months with significant coefficients are reported
Source(s): Authors' own work