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Digitalisation and accounting language games in organisational contexts

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Abstract
The ambition of digitalisation to create centralised knowledge for all organisational actors may lead to the risk of de-contextualising that knowledge from the situation in which the information was generated, neglecting the specificities of local organisational contexts. To prevent such risk, digitalisation should promote the spread of a common language between its users who share rules and principles that lead to the same meanings. We refer to the concept of the language game to study how accounting reports receive meanings according to their use, and thereby how the use of accounting language helps in managing the specifics of organisational contexts. Considering complex organisations where different local accounting language games coexist, management accounting studies on digitalisation fail to explain how digital technology can promote the combination of those language games.

The present study aims to answer the question of how digitalisation, promoting a global accounting language game, favours the combination of the accounting language games arising from local organisational contexts.

This question is addressed by examining the case of the performance measurement of the new product development process in a multidivisional company. The case evidence highlights how a digital platform, promoting a corporate accounting language game for the whole organisation, favoured the combination of divisional accounting language games.

The paper points out how digitalisation affects the boundaries between local and global accounting language games in the production of knowledge for decision-making. Also, the paper shows how digital technology is beneficial only when it does not compromise interactions between the different organisational contexts.

Keywords Digitalisation · Accounting · Language game · De-contextualisation

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1 Introduction

Recent accounting literature has paid growing attention to the digitalisation phenomenon, trying to understand its impact on accounting practice (Knudsen, 2020; Quattrone, 2016; Rikhardsson & Yigitbasioglu, 2018; Rom & Rohde, 2007). Contributions have asked for more research on the relationship between digitalisation and accounting (Arnaboldi et al., 2017b; Payne, 2014; Bhimani & Willcocks, 2014) aimed at investigating the impact of digitalisation on the organisational context. 'Digitalisation is not only a technological innovation but implies a different philosophy in the way in which companies manage their business and processes' (Mancini et al., 2017, p. 3).

Digitalisation, on the one hand, increases the visibility of organisational actions, allowing companies to achieve significant improvements in the areas of time and cost savings (Brynjolfsson & Hitt, 1995, 2000; Davenport & Short, 1990). On the other hand, it requires new capabilities in selecting and scrutinising information to be quickly consumed to avoid a situation wherein 'people take wrong decisions much more quickly than before, with even less room for the exercise of wisdom' (Quattrone, 2016, p. 120).

The rise of user-generated reporting through digital technologies (Kornberger et al., 2017) creates mountains of "knowledge", the use of which risks becoming overly de-contextualised from the situation in which the information was generated (Knudsen, 2020).

More specifically, the ambition of digitalisation is to create mountains of data easily accessible to organisational actors. This ambition may exclude those actors from data manufacture, leading them to make decisions without discussing data (Quattrone, 2016). Indeed, using data as "knowledge" may lead to an illusionary, centralised truth, which neglects the specificities of local organisational contexts. Referring to accounting practices, in order to prevent such risk, digitalisation should promote the spread of a common language between its users who share rules and principles that lead to the same meanings. A common language is adopted in a specific local context, where actors construct common meanings according to how they use that language in their local practices. The use of a common language offers users the possibility of interacting by means of this language and of personalising it in relation to the specific context in which they are embedded. We refer to the concept of the language game conceptualised by Wittgenstein (1953) to study how accounting reports receive meanings according to their use, and thereby how the use of accounting language helps in managing the specifics of organisational contexts. In particular, an organisational context, articulated in local and global levels, could be characterised by the co-existence of specific language games: a local accounting language games related to a local-specific organisational context; a global accounting language game that combines local-specific accounting language games.

On this point, management accounting studies on digitalisation fail to explain how digital technology can promote the composition of accounting language games across organisational contexts. The related question is: how does digitalisation, promoting a global accounting language game, favour the composition of the accounting language games arising from local organisational contexts?

To address this question, we examined the case of the performance measurement of the new product development process in a multidivisional company operating in the semiconductor industry, referring to the introduction of a digital platform. The findings highlight how a digital platform, promoting a corporate accounting language game for the whole organisation, favoured the composition of divisional accounting language games.

The main contributions of the paper are twofold. Firstly, the paper contributes to the management accounting and information system literature on digitalisation referring to the issue of the possible de-contextualisation that may arise from the introduction of digital technologies. Adopting the concept of a language game in line with a pragmatist view, the paper shows how the global accounting language game interacts with local accounting language games without ignoring the peculiarities of local organisational contexts. In this respect, the paper points out how digitalisation allows the translation of a given amount of data into knowledge that differs according to the specifics of the organisational context. It is by using digitalised data in the different organisational practices that the boundaries between local and global accounting language games affect the production of knowledge for decision-making. Secondly, the paper shows how the meaning construction in the global context favours the combination of the local meanings highlighting the interdependence between local and global accounting language games. This evidence contributes to the literature that maintains that information technology is beneficial only when it does not compromise the dialectic and judgements characterising the organisational context (Knudsen, 2020; Nørreklit et al., 2019; Quattrone, 2016).

The remainder of the paper is organised as follows. After reviewing management accounting studies that have investigated the relationship between digitalisation and accounting, underlining the connected opportunities and risks (Sect. 2), the potential of digitalisation is examined, drawing on the concept of a language game (Sect. 3). The paper proceeds by outlining the case company profile and the research methodology (Sect. 4), and describing and illustrating the case evidence (Sect. 5). The discussion and conclusions complete the paper (Sect. 6).

2 Digitalisation and accounting

The relationship between accounting information and technology has long been studied by accounting scholars, who have distinguished three phases of technological advancement. Firstly, the emergence of computerised information systems offers accountants a detailed record of data and more accurate analyses. Secondly, the advancement of internet technology and integrated information systems allows accountants to produce and share information more efficiently across organisations. Thirdly, the last wave of technological advancement, which is currently evolving, combines the use of technological artefacts bundled with social technical properties, mostly referred to as 'digitalisation' (Knudsen, 2020).

Technical advancement is just one element of digitalisation, which also entails profound changes to socio-technical structures related to the design and use of digital technologies (Thorseng & Grisot, 2017; Yoo et al., 2010). Besides these advance-

ments in information technology, digitalisation can lead to the reconfiguration of power relations (Scott & Orlikowski, 2012) and the introduction of novel decision-making practices (Quattrone, 2016). Facilitating data collection, analysis and information delivery to support decision-making, digitalisation has an obvious link with accounting (Arnaboldi et al., 2017a; Rikhardsson & Yigitbasioglu, 2018).

Research has long investigated the impact of various information technologies on accounting, focusing on how the adoption of digital solutions affects management accounting tasks and techniques. Rikhardsson & Yigitbasioglu (2018) reviewed studies focused on digitalisation's impact on: (i) how information is presented; (ii) the ability to select, navigate and drill down into information; and (iii) the type of feedback provided.

Knudsen's (2020) findings show that digitalisation influences accounting practice in three ways: (i) it makes the boundaries of accounting increasingly elusive; (ii) it redefines power relations; and (iii) it raises new issues related to the production of knowledge for decision-making.

The digitalisation literature stresses that accountants view the predictive possibilities of data analytics as useful for internal decision-making but that they need additional skills to use data analytics to make a contribution in practice (Al-Htaybat & von Alberti-Alhtaybat, 2017). Also, studies have looked at the changing role of the management accountant, becoming more business-oriented and strategic (Granlund & Malmi, 2002; Quattrone & Hopper, 2001). At the same time, improved access to information is leading to decentralisation of the management accounting function (Caglio, 2003; Rom & Rohde, 2007).

Other studies have highlighted that digitalisation may create an illusion of control, making users believe that they can interrogate an accounting system and get answers out of it (Burchell et al., 1980; Quattrone, 2016). Digitalisation makes accounting numbers apparently ready to use. This perception might exclude decision-makers from the manufacture of accounting numbers, entailing that 'management reports are often tabled rather than discussed' (Quattrone, 2016, p. 120).

Quattrone (2016) claims that accounting numbers and their visualisations drawn from data analytics are perceived as the truth, limiting the space for judgement. This entails the risk that the production and use of information becomes de-contextualised from the situation in which the information was generated (Knudsen, 2020), creating misunderstandings between producers and users of information. In line with Knudsen (2020), we believe that '[t]hese issues feed into the discussion on the language of accounting and raise relevant questions regarding the extent to which accountants are able to engage in "successful reality constructions"' (Kure et al., 2017, p. 211, as cited in Knudsen 2020, p. 11).

Mentioning accounting as a language evokes the persuasive power of accounting and its narrative nature (Carruthers & Espeland, 1991), which helps accounting users to construct different courses of action from which to choose (Quattrone, 2016). Therefore, accounting cannot be interpreted as an answer machine (Burchell et al., 1980) which leads to decisions drawn by calculation, but it enables communicative actions useful for decisions.

An acritical faith in digital technology can risk a de-contextualisation from specific practices with dysfunctional consequences in terms of the aptitude of accounting

calculations to capture specific factual situations and future possibilities. Therefore, a more careful examination is needed of the potential of digital technology combined with the use of accounting language for the control of organisational activities.

3 Accounting language game and organisational contexts

Acknowledged as a form of communication, accounting could be interpreted as a language that, combined with the digital technology, requires its users to share the same rules and principles that lead to common meanings in a specific context. More particularly, accounting language can differ according to its use, in line with the specifics of the organisational context where it is practised. This view is coherent with the notion of a language game conceptualised by Wittgenstein (1953). Management studies have proposed some useful definitions of this concept. In line with Astley & Zammuto (1992) highlighted that 'words derive their meaning not from the actions or objects that they denote, but from the historical context of discourse, or language game, in which they are used' (Astley & Zammuto, 1992, p. 444). Thus, linguistic interpretations of reality are derived from a set of rules embedded in the institutional context in which language is employed. Any concept has a meaning within such a language game only because its sense is identified by its role in the particular language game (Wittgenstein, 1953).

In each language game, a language has particular meanings and produces a particular kind of world in which certain objects are made to exist in certain relations (Mauws & Philips, 1995). Accordingly, language games produce stories in which people develop social characters, knowledge and skills embedded in a physical and cultural environment (Nørreklit et al., 2019).

A useful analysis is accomplished by Mantere (2013), who defines a language game as 'a rule-governed practice, integrating communication and action' (p. 1413). Constituting and regulating social practice, a language game enables meaningful social interaction and supports the accomplishment of collective goals. However, organisations are not homogeneous but consist of different local contexts where specific rules govern social interactions. Therefore, there is not just one language game in an organisation but multiple language games (Shotter, 2005). This suggests that language games can be perceived at various levels of analysis in an organisation: namely, micro and macro levels, respectively related to local and global organisational contexts.

On this issue, Samra-Fredericks (2003, 2005) argues that not all micro language games can be reduced to an organisational language game, since they are connected to the organisational level through a network of similarities.

Management studies on language games suggest that the primary function of the managerial language game is to facilitate practical action. Managers espouse their own 'theories' about the way their world works, and the conceptual language they use establishes a context within which organisational life is constructed and reconstructed. 'The role of management, consequently, becomes one of using words and ideas to shape conceptions of organizational reality' (Astley & Zammuto, 1992, pp. 449–450).

Following the language game view, language could become a way to make reality visible to social actors (Kure et al., 2017). However, language is understood not as a stable overarching system, but rather as consisting of 'a multitude of locally constituted language games in which meaning is constructed, negotiated and learned' (Kure et al., 2017, p. 216).

From a pragmatic constructivist perspective, the process of meaning construction is performed by establishing a system of concepts that enables the social coordination of actions and activities in order to create meaningful and functioning practices. In doing so, people need to be able to develop and adjust the meaning of the concepts in relation to a specific context. This reconceptualisation is related to a particular setting in which reality construction occurs (Nørreklit et al., 2016), and requires an alignment of the structural dimensions of meaning to ensure the accordance of the concepts to the specific context in which they are embedded. Thus, one needs to look into the dimensions of meaning: abstract meaning, criteria and exemplary reference (Kure et al., 2017). Firstly, actors have to define the abstract meaning of their concepts, clarifying the conceptual content associated with the concept they want to use. This could avoid some misunderstandings in terms of what the organisational actors are referring to. In addition, criteria help to define when the abstract meaning of the concept becomes practice. Thus, criteria help to transform subjective judgements into numbers, which should improve the correspondence between the meaning of a concept and its pragmatic use. Organisational actors have to agree on a set of exemplary references that provide common understanding of a concept, helping its practical well-functioning (Kure et al., 2017; Mitchell et al., 2017). For example, 'the abstract meaning of the concept of variable cost might be delineated by costs that change in total in proportion to changes in manufacturing volume over short period of time' (Kure et al., 2017, p. 218). In practice, the concept of variable cost needs to be defined by degrees of proportionality and numbers of days or weeks (criteria). Finally, 'actors need to agree on a specific set of exemplary references that establish a shared horizon of understanding and thereby add meaning to the concept' (Kure et al., 2017, pp. 218–219). In this sense, the variable costs could represent the payments to individual employees for piecework and raw material costs.

As pointed out in the previous section, the ambition of digitalisation to create a centralised truth could overlook the specificities of local organisational contexts. That may entail the risk that the production and use of information might be decontextualised, creating misunderstandings between actors operating in global and local organisational contexts. Digitalisation favours the spread of a global accounting language as a means of accounting control by the global over local organisational contexts. This requires a process of meaning construction aimed at creating meaningful and functioning practices in all organisational contexts. Consequently, different accounting language games can coexist and need to be effectively composed in order to guide functional practices in any organisational context.

On this point, the extant management accounting literature on digitalisation fails to explain how digital technology promotes the process of meaning construction across organisational contexts. Therefore, the related question is: how does digitalisation, promoting a global accounting language game, favour the composition of the accounting language games arising from local organisational contexts?

4 Company profile and research methodology

Addressing the question posed above required an in-depth investigation that entered the complexity of the business reality and its local specificities. A case study was thus judged as the most appropriate approach. To deal with the topics discussed in the theoretical section, the selected company needed to be a large company, articulated into organisational areas, and needed to adopt advanced accounting information systems. Hence, a multidivisional company was chosen. The company's pseudonym is Semicom.

Semicom operates in the semiconductor industry; it is a company with 45,500 employees worldwide and oriented to continuous innovation. Indeed, in 2017 it had 7,400 people working in R&D, 17,000 patents, 9,500 patent families and 500 new patent filings. Semicom's production plants are widespread in different areas of the world. The company's product portfolio requires a complex organisation, the structure of which distinguishes the various product groups which reflect the main company's market segments, namely communications, consumer, computer, automotive, industrial, medical and aerospace. Semicom presents a matrix organisation chart, crossing the main business functions on the one hand, while, on the other, organisational units represent product families and geographic areas. Within the product families, the organisation chart distinguishes three hierarchical levels: product groups, product divisions and business units.

Given Semicom's acknowledgement of the strategic relevance of product innovations, new product development (NPD) projects are managed through a certified protocol supported by a sophisticated information and control system based on digitalised procedures. To capitalise development costs, Semicom has implemented an appropriate information technology and organisational procedure based on a digital platform. Notably, Semicom has been used as a case company in other research projects by at least one of the authors of the present paper. This has allowed the authors to be familiar with Semicom's strategy and culture, and with Semicom's NPD processes.

As shown in Fig. 1, the development process spans the product development lifecycle from the new product proposal (NPP, maturity 00) to product qualifica-

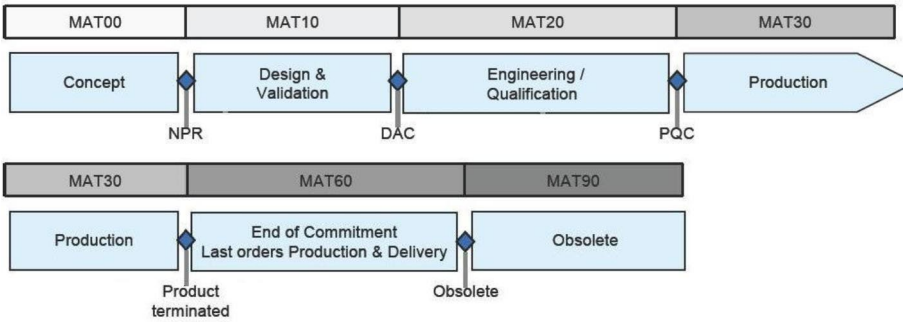


Fig. 1 New Product Development Process

tion (PQC, maturity 30), ending with the project closure (PCD) review. The maturity stages from 00 to 30 coincide with three main stages: concept, design and engineering. The tasks accomplished at each development stage are codified into specific documents: New Product Request (NPR) for the concept stage, Design Approval Certificate (DAC) for the design stage, and Product Qualification Certificate (PQC) for the engineering stage, when the development process is accomplished.

At maturity 30, the industrial phase (production) starts. Dealing with different maturity stages along the NPD process, the research aims to show how the digital platform promotes a global accounting language game that fosters the composition of local accounting language games. Addressing such issues, an interpretive study was accomplished. A three-person research team organised the data sourcing process, defining the data sources and the timing of data collection. The research focused on the two years preceding the writing of the present paper, since the digital platform was developed and implemented during that period. The main data were collected during the first year while the digital platform was developed; further data were collected during the second year while the digital platform was implemented.

The main data sources refer to documentary data and interviews. Documentary data are related to: (1) documents describing Semicom's profile and organisation, such as the documents accessed on Semicom's website; (2) documents containing instructions related to internal procedures, such as Semicom's Standard Operating Procedures (SOP), which are homogeneous across all Semicom's production sites around the world, and Semicom's Local Operating Procedures (LOP), specific to the local site accessed by the research team, which is located in the south of Italy; (3) documents prescribed by SOP referring to the NPD process, namely NPP, NPR, DAC, PQC; and (4) accounting documents related to the financial and accounting calculations aimed at estimating the financial consequences expected from the development of new devices. Such documents include cost and cash simulation worksheets, project time schedules, and non-financial performance estimations related to NPD project duration, NPD project cost adherence and reliability, such as the reports drawn from the new digital platform.

The process of interviewing was mainly informed by the documents described in the above points (1) to (4) and the results of previous studies. The managers interviewed were those involved in the development process, namely the project manager, the division planning manager, the product engineer, and the division marketing manager, and those in charge of controlling the development process, namely the corporate financial controller and the division financial controller. Each was interviewed using a semi-structured questionnaire, which helped the researchers to lead the discussion on: (1) defining Semicom's priorities with respect to NPD projects; (2) describing the procedure followed in the financial and accounting calculations practised across the different maturity stages of the development process; and (3) describing the main challenges and criticalities managers experienced using NPD performance reports before and after the introduction of the new digital platform. Each interview lasted an hour and a half, on average.

All interviews were tape-recorded. A draft report was written and sent to the contact manager to be approved. Upon approval, some extracts from conversations were reported in the text of the present paper, while others were reported in the paper

indirectly, as narratives about interactions. Table 1 reports the main information on data collection.

5 The introduction of a digital platform at Semicom to promote a global accounting language game

A digital platform was introduced at Semicom with the aim of supporting the social coordination of activities and evaluating the performances of NPD projects for the efficient allocation of resources among divisions. Currently this platform is being checked at the divisions to share feedback and verify its capability to integrate the divisional and corporate perspectives in the R&D project management.

On this point, the corporate financial controller claimed: 'the idea of implementing the digital platform at Semicom arose just from the intent to both collect data coming from different tools already used and integrate them in order to develop performance measures in a homogeneous way between the various divisions and the various areas of responsibility. This also needs to respect the specificity of the different phases of the process and of the divisional levels.

In addition, the introduction of the digital platform aimed to redefine the meanings of profitability analysis for the NPD projects. These were traditionally evaluated considering the performance reached by maturity phase 30, when the development process finishes and the production phase begins. The redefinition of performance meanings in order to consider the production phase required the spread of a common

Table 1 Summary of data collection

Aims of the analysis	Documents	Interviewees	No. of interviews*
Outlining company's strategy and culture	Documents from company's website	Planning manager Project manager	2 2
Learning NPD process	Standard operating procedures Local operating procedures New Product Request New Product Proposal Product Qualification Certificate	Division, planning manager Project manager Product engineer Division, marketing manager Division, financial controller	3 2 2 2 2
Studying performance reports and their use along NPD process	Cost and cash simulation worksheets Project time schedule	Division, planning manager Project manager Division, financial controller Corporate, financial controller	4 2 2 2

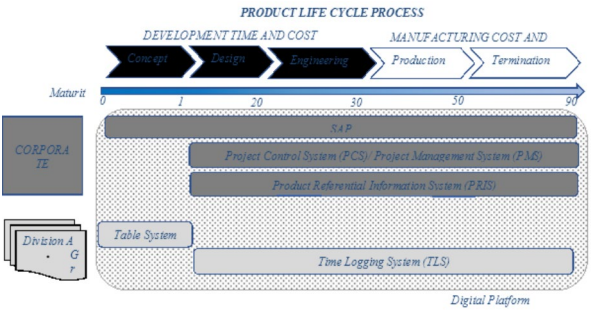
*The duration of each interview was 1.5 h on average.

accounting language game among all actors involved in the development and production processes. Accordingly, a digital platform was designed by a working group with heterogeneous expertise coming from management control, R&D and divisional areas. The digital platform was composed of four main sections. The first section was dedicated to the historical data profitability analysis of R&D projects. The second section referred to the ongoing analysis of the project portfolio (i.e. financial results, timing, resources, deviations, achievements, prioritisation, IFRS compliance). The third section concerned the sales analysis and market trend of each R&D project. The last section was devoted to services and provided further tables to check the data integrity.

The digital platform encompassed the interconnected tools previously used at Semicom that are briefly outlined in Fig. 2 and described in what follows.

The table system (TS) used at maturity stages 00–10 showed the lifecycle phase of a new project, making the project visible. This tool was used at the divisional level and interacted with the system accounting process (SAP), which was used at the corporate level as a project reference for any purchase related to the project. The combined function of these tools had the power to constrain managers' actions. For example, by sharing information about the project's status, the two tools were able to constrain purchases for closed, stopped or blocked projects. After approval of the project (maturity stage 10), the project control system (PCS) was engaged in the calculation of the expected product manufacturing margin by estimating future revenues and updating product costs. In doing so, it enabled the control of development projects, estimating the time to be allocated to the various steps of each project. The project management system (PMS) was an upgraded version of the PCS used at the corporate level. It allowed the corporate financial controller to extract profitability reports and to visualise the cost deviations in order to signal the various gaps to the divisions concerned. The time logging system (TLS) collected the hours spent on a project by every researcher at the divisional level. These hours were assessed considering the labour costs of the different jobs. Using TLS, it was possible to study the total hours worked by any division on research and development. Finally, the product referential information system (PRIS) worked at the corporate level, visualising all Semicom's projects and formalising the willingness of the company to continue the projects.

Fig. 2 Digital platform structure



During the development of the digital platform, a problem was the heterogeneity of data collected by the digital platform coming from the above-mentioned tools. For example, the data present in PCS and in PMS were not the same or had different names. The two sources therefore needed to be made homogeneous. Furthermore, PCS was based on a set of five databases, one per project group, managed independently by each group with methodologies that were not always identical between the different groups. This required the restatement of data in a homogeneous way during the digital platform configuration in order to avoid misunderstandings due to data inconsistency.

To represent the organisation as a whole, the digital platform required the spread of a new way of data classification or configuration among all users. With this aim, such procedures were defined at the corporate level in order to guarantee that the same data were retrieved and then processed in the same way. The intent was to move from a divisional perspective to a corporate one. This helped the company to have objective and comparable information for a correct evaluation. On this point, the corporate financial controller argued: 'Before introducing the platform, operational reviews were made by rendering personalised presentations of results. Each manager selected which results to show and the ways to aggregate data. Each report was structured in a personalised manner! Consequently, it was hard to compare results of different NPD projects.

To fulfil its function of evaluating the performances of NPD projects, the digital platform needed to put all the tools interconnected to obtain information concerning the whole universe of Semicom NPD projects. This would be aimed at recognising common and shared definitions of economic and financial data.

On this issue, the designers of the digital platform tried to identify some critical performance dimensions in order to define which Key Performance Indicators (KPIs) to use over the whole organisation. Some divisional managers were involved in this phase, with the aim of explaining what the purpose of the KPI was, identifying managers' needs, and then making a match to find the KPI that represented a suitable driver equally recognised by all managers.

Regarding this point, during an interview, the corporate financial controller argued: 'the main difficulties that we encountered in designing the platform were related firstly to making the data coming from the various tools already in use homogeneous and, secondly, to finding the correct way to connect all the previous tools now included in the platform. It meant identifying common measures and parameters that users were required to use, changing their way of thinking'.

In redefining the meanings of the performance of NPD projects, the digital platform extended the profitability analysis up to maturity phase 90, which involves both the development and the production phases. On this point, the corporate financial controller argued: 'Before the platform was introduced, the analysis of research and development costs of the projects was carried out ignoring the manufacturing revenues and costs produced by the prototypes after maturity 30 until maturity 90. The aim of the platform is to spread a global view among all managers, visualising the company's performance'. The redefinition of the meaning of performance to consider the production phase required the spread of a common accounting language game among all actors involved in the development and production processes.

In a bid to spread a global view among all managers, the corporate financial controller and the top management identified some common KPIs on time, cost and profitability. These KPIs were defined considering the specificities of the different products and fixing different targets in relation to devices that were developed in short cycles (6–12 months) and others in longer cycles (3–5 years). This was explained by the corporate financial controller as follows: 'To be honest, the users have local competences focused on specific NPD projects. The platform's goal was to identify common KPIs to all divisions, which could be used both at division and corporate levels.

The evidence coming from the design of the digital platform outlines how digitalisation was not just a matter of technology. Rather, it was devoted to developing shared procedures aimed at comparing the results of different project groups. In doing so, an alignment of meanings between the actors was sought, requiring the construction of a global organisational context for the use of the digital platform. This context could allow all actors to interact with one another, encouraging the combination of their accounting languages.

Even if digitalisation favoured the spread of a global accounting language, the use of such a language as a means of control required a process of meaning construction aimed at creating meaningful and functioning practices in divisional and corporate organisational contexts.

Studying this process of meaning construction required, at first, analysing how the digital platform worked in the divisional organisational contexts in which specific accounting language games were in use (Sect. 5.1). Later on, we explain how the digital platform promoted a corporate accounting language game that favoured the combination of the divisional accounting language games, avoiding the risk of a decontextualised truth (Sect. 5.2).

5.1 The divisional accounting language games in the use of the digital platform

The introduction of the digital platform afforded divisional managers sight of the performance all along the product lifecycle, allowing them to better identify the NPD process boundaries and the linkages between NPD and the subsequent production process. In this sense, use of the digital platform supported the divisional managers in identifying future possibilities both in the development process and in the subsequent applications of the device under development. A new meaning of NPD process performance therefore emerged, referring to both NPD and manufacturing processes. This considerably modified how divisional managers worked, supporting monitoring of the time and cost of development. On this point, the division planning manager argued: 'using the digital platform, we are able to forecast the costs and times for manufacturing the device under development in order to consider them during the development phase'. On the same point, the project manager added: 'When the platform was introduced, other colleagues, such as the production managers of the different production sites, were involved in discussions about development costs and times, changing our way on how to discuss on them. Indeed, the platform makes visible forecasts on costs and times related to the different ways of manufacturing, such as subcontracting or internal manufacturing, and in the latter case, the manufacturing site where to produce the device. Therefore, the platform supports us in our interac-

tion while doing simulations'. Providing visibility of the whole value process, the digital platform became a communication tool that supported the divisional use of the accounting language in a meaningful way (Mantere, 2013).

The digital platform was used by division managers and financial controllers to perform reporting and analysis, giving an overview based on the needs of the user and their areas of expertise. In particular, the digital platform aggregated 600 projects carried out by all Semicom's divisions, classified in three groups, each of them articulated into technologically homogeneous subgroups. The analyses accomplished through the platform offered the possibility of analysing the profit of each project, highlighting actual values and deviations for the planned sales and costs, breaking down additional inquires. An example of how the platform worked is offered in the cost analysis related to the NPD process. In particular, Table 2 shows the average cost, comparing NPR average costs with actual (ACT) costs for the three groups of projects and their subgroups. This report helped the divisional managers in the process of meaning construction, providing them with a direction for comparing groups and subgroups and highlighting deviations between them. Discussing this report, the divisional financial controller pointed out: 'that report highlighted subgroups B1–B3 and C1–C2 with significant deviations from the forecast, given the critical threshold of deviations greater than 65%. This gave us directions on what deviation had to consider critical and led to search for additional inquiries.

Starting from the report shown in Table 2, the digital platform allowed additional inquiries for identifying the causes of deviations. The division planning manager showed us how they followed the directions given by the report shown in Table 2: 'Given the information provided by the report on cost analysis, our additional inquiries focused on the amount of cost which represented the relevant percentage of development costs for the subgroups with a critical threshold. Through the platform we learned that for the subgroups B1–B3 and C1–C2, the labour cost was the most

Table 2 Cost analysis

Groups	Subgroups	N. projects for subgroup	New Product Request (NPR) average cost	Actual (ACT) average cost	ACT vs. NPR (critical threshold >65%)
A	*A1*	21	754.2	999.9	33%
	A2	296	136.1	97.6	-28%
		312**	177.1*	157.4*	-11%*
B	*B1*	104	504.1	934.5	85%
	B2	22	4,250.5	6,133.8	44%
	B3	42	261.4	754.3	189%
		168**	934.0*	1570.3*	68%*
C	*C1*	80	2,545.5	4,458.5	75%
	C2	35	1,369.9	2,790.9	104%
		115**	2187.7*	3951.0*	81%*
		600**	**774.4***	**1280.1***	**65%***

*Weighted average values

** Total number of projects

relevant cost with a percentage of 61.7% (B1), 53.8% (B3), 61.6% (C1), 71.4% (C2). Consequently, we directed our further analysis to the labour cost and its components'. On this issue, Table 3a compares NPR average labour costs with the actual costs, making clear how much of the previous critical deviation could be ascribed to criticalities in terms of the labour cost management. This was the case for subgroups B2, B3 and C2 that had a deviation greater than the critical threshold of 100%. Discussing this report, the project manager argued: 'The report on labour cost analyses gave us the possibility of further investigating what the criticalities were. Then, considering the peculiarities of subgroups, we chose the path of analysis to follow among the

Table 3 a: Total cost additional analyses

Groups	Subgroups	N. projects for subgroup	New Product Request (NPR) average labour cost	Actual (ACT) average labour cost	ACT vs. NPR (critical threshold >100%)
A	*A1*	21	405.34	604.13	49%
	A2	296	58.37	60.24	3%
		317**	81.36*	96.27*	18%*
B	*B1*	104	310.87	575.82	85%
	B2	22	1,819.59	4,343.35	139%
	B3	42	140.62	464.91	231%
		168**	465.88*	1041.46*	124%*
C	*C1*	80	1,567.34	3,009.60	92%
	C2	35	977,57	2,017.74	106%
		115**	1387.84*	2707.73*	95%*
	Total	**600****	**439.43***	**861.46***	**96%***

*Weighted average values

** Total number of projects

Table 3 b: Total cost additional analyses

Groups	Subgroups	N. projects for subgroup	average man/week New Product Request (NPR)	average man/week Actual (ACT)	ACT vs. NPR (critical threshold >100%)
A	*A1*	21	174.9	259.5	48%
	A2	296	21.8	24.5	12%
		317**	31.9*	40.1*	25%*
B	*B1*	104	149.7	288.9	93%
	B2	22	591.9	1,358.3	129%
	B3	42	53.3	185.3	248%
		168**	183.5*	403.0*	120%*
C	*C1*	80	535.5	991.8	85%
	C2	35	404.5	715.2	77%
		115**	495.6*	907.6*	83%*
	Total	**600****	**163.2***	**308.0***	**89%***

*Weighted average values

** Total number of projects

additional analyses allowed by the platform'. On the same point, the division planning manager added: 'to further investigate labour costs we searched for labour cost components, such as the New Product Request average man/week with the actual ones, to know the different efforts in terms of working man by project and the related deviation from cost value by subgroups. As shown in Table 3b, subgroups B2–B3 had a deviation greater than the critical threshold of 100% considering the human resource effort spent by project, measured by the ratio man/week per project. Using the reports shown in Tables 2, 3a and 3b enhanced divisional managers' awareness of the criteria adopted to compare the projects and the critical thresholds of deviations. That led them to conduct further customised analyses to investigate cost components, given the peculiarities of each subgroup of projects.

In general, the customised paths of analyses allowed by the digital platform favoured learning the profitability drivers that characterised the technology of the divisional practices. In this way, the digital platform helped the divisional manager to better understand the performance drivers by means of a benchmark analysis of the NPD projects carried out within the division. That analysis supported the divisional manager in defining the division's organisational context and reconfiguring the rules governing divisional practices and communications, coherent with the corporate guidelines (Mantere, 2013). On this point, the division financial controller highlighted: 'The use of the platform changed the way we carried out the benchmark. Now we are aware of comparison criteria and we have the possibility of comparing our performance with that of other homogeneous subgroups, we can quickly customise the path of analyses to follow in order to discover the causes of criticalities, searching for possible solutions'.

The introduction of the digital platform changed how the quarterly operational review meetings were carried out, where divisional managers discussed the advancements of their NPD projects. By means of the digital platform, these discussions were accomplished by using homogeneous parameters on costs and times. On this point, the division planning manager stated: 'at the beginning I was not convinced of the new way to accomplish the presentation at the operational review meeting. I was accustomed to the data configuration and measurement normally used at my division. I did not understand why my calculations were not suitable! After the first meeting, I realised that the new manner of doing the operational review allowed us to better compare results emerging from each NPD project, also avoiding any manipulations!'

Accordingly, a different divisional manager specified: 'We were used to measuring the project timing and the related deviations. What was not obvious for all project managers was the starting point of the project. Do they have to consider the starting day or the first day on which they spent the first dollar? Identification of the project timing criteria was essential and was supported by the alignment of meanings between all project managers involved'. Also, the divisional manager added: 'Very importantly, the platform gave us the possibility of carrying out further inquiries that were customised according to the specificities of the project technology and cost components. That enriched our discussion of results during the operational review'.

This evidence highlights how use of the digital platform stimulated communication between the actors, favouring their agreement on a set of exemplary references that provided common understanding of measurement procedures. These were homo-

geneous in the cause-effect chain approach, while they were local-specific in the inquiry of performance drivers (Kure et al., 2017; Mitchell et al., 2017). Moreover, the evidence described highlights how the digital platform encouraged organisational actors, accustomed to using their linguistic toolboxes, to adjust their meanings of NPD processes' profitability (Nørreklit et al., 2016) without limiting the space for judgement (Knudsen, 2020). This avoided the risk that the digital platform, promoting a global accounting language game, could generate de-contextualised information, unable to reliably represent the specifics of the context in which it should be practised.

5.2 The composition of divisional accounting language games using the digital platform

The organisational complexity of Semicom is reflected in different local accounting language games arising from the use of the digital platform within divisional organisational contexts. Use of the platform promoted the creation of a global organisational context in which it was possible to assess and compare all NPD projects to allocate resources among divisions. In doing so, the digital platform favoured a global accounting language game as a rule-governed practice that fostered a comparative evaluation of NPD projects integrating communication and action (Mantere, 2013). On this point, the corporate financial controller argued: 'In the last year, after its first introduction, the platform started to be used during operational review meetings, where divisional managers discussed the progress of each NPD project quarterly employing homogeneous parameters coming from the platform: times, costs and revenues. This new way of doing the operational review allowed us to better compare different NPD projects. The company's focus is on time, cost and profitability; therefore, we consider these performance dimensions for comparing divisions' NPD projects relevant. So, the parameters are defined at the corporate level'.

Therefore, the digital platform was perceived by the corporate managers as a means to compare the divisional NPD projects' performances by spreading homogeneous parameters and promoting common reporting procedures. In so doing, the digital platform allowed the divisional and the corporate managers to become more conscious of the abstract meaning of performance, clarifying the conceptual content associated with the KPI they wanted to use. In particular, the platform helped the users to identify the performance boundaries captured by each KPI, recognising performance drivers. The profitability analysis described in Sect. 5.1 is an example of how this happened. Offering the possibility of comparing NPR average costs with actual costs for the three technologically homogeneous groups and their subgroups, the digital platform allowed corporate managers to easily recognise critical deviations, given the critical threshold of 65% that was centrally defined. Using the report outlined in Table 2, different accounting language games constituted and regulated social practices at Semicom. At the corporate level, managers were able to effectively compare the performance of NPD processes achieved by all divisions. In this case, the corporate accounting language game facilitated the practical action of evaluating divisions, supporting the corporate goal of efficiently allocating resources between divisions. At the divisional level, the same report made managers aware of the criteria

for comparison adopted at the corporate level. Through the spreading of the corporate accounting language game the digital platform supported all managers in the accomplishment of the corporate aim.

Allowing customised analyses, the platform maintained the specificities of accounting language games at the divisional level, at the same time favouring the composition of those languages at the corporate level.

A critical aspect emerged when the digital platform was used in the interaction between the divisional managers, the division financial controller and the corporate financial controller aiming to measure the NPD projects' performances. The KPIs used referred to the whole product lifecycle process and were not limited to the NPD phase. Regarding this point, the division financial controller underlined: 'When we use information, we must consider who uses it and what he/she wants to observe. For example, if a product manager is responsible for the development phases of the new product until it reaches maturity 30, he is interested in measuring the performance up to this stage because he is responsible for the results achieved up to this stage. Otherwise, if a product manager is responsible for the whole process, he observes the entire value process [e.g. including costs for services supporting the customer] and not just the development phases. On the same point, the project manager highlighted: 'The platform allowed us to visualise times, costs and revenues related to the different phases of development and manufacturing, leading us to discuss and plan those values and making us responsible for them'. The increased visibility provided by the platform made the divisional managers more conscious of the performance drivers along the various phases of the whole process. A new meaning of performance emerged, extending the field of evaluation to the whole product lifecycle process. This led the corporate managers to redefine the divisional managers' responsibilities in both corporate and divisional contexts, reconfiguring their rules, and governing practices and communications.

It was the digital platform, disclosing KPIs and reports, that favoured the emergence of Semicom's global accounting language game that combined the divisional accounting language games in which meanings were constructed, negotiated and learned in relation to the specific organisational context (Kure et al., 2017).

Furthermore, the evidence highlighted that managers agreed on a set of exemplary references that represented the common understanding of the new meaning of NPD process performance (Kure et al., 2017; Mitchell et al., 2017). On this point, the corporate financial controller observed: 'Currently the digital platform is recognised at Semicom as a tool of analysis used by 90% of the divisional managers. The divisional managers who used the platform gave good feedback related to the tool, trusting it. Today we can say that there was a progressive alignment of the local meanings that required the following steps: understanding the performance measures used and their characteristics, constructing their meaning at local level, sharing the meanings associated by each project manager, finding a common meaning!'

To sum up, the process of meaning construction for Semicom's corporate accounting language game was performed by establishing a system of concepts that enabled social coordination and linked local meanings with the global one promoted by the digital platform. It was in establishing common KPIs, common possibilities for additional analyses and a common way of accomplishing operational reviews that the

corporate accounting language game emerged, defining common rules to follow in the performance measurement of NPD processes. Criteria such as those required to compare divisions or to identify critical thresholds helped the new abstract meaning to become practice, also leading interpretations of the specific contexts in which information or reports were used. Evidence also outlined that KPIs and reports were meaningful and recognised by corporate and divisional managers as a set of valid exemplary references to monitor the fundamental aspects of the development process.

The case evidence underlines how use of the digital platform promoted the corporate accounting language game that combined the divisional ones, without offering the illusionary view of a centralised truth.

6 Discussion and conclusions

The paper focuses on how digitalisation, promoting a global accounting language game, favours the composition of accounting language games arising from local organisational contexts. The effect of digitalisation in creating a centralised truth might disregard the specificities of local organisational contexts, leading to non-functioning practices. To deal with this risk, digitalisation, promoting the visibility of the whole organisation, should favour the sharing of rules and principles, leading to the construction of common meanings.

To address this issue, we discussed the case of NPD projects' performance measurement in a multidivisional company operating in the semiconductor industry. The case refers to a digital platform introduced to support the comparison of NPD projects performances among all divisions, also defining a new meaning of NPD process performance. This new meaning of performance overcame the local view of NPD process performance, extending it to a global view that encompassed both the NPD and the industrial manufacturing as a unitary process. The abstract meaning of NPD process performance modified the practices at the divisional and corporate levels, generating new criteria for evaluation, and transforming subjective judgements into numbers that should improve the correspondence between the meaning of the concept and its pragmatic use.

The digital platform supported divisional managers in their profitability analysis, providing them with a map of cause-effect chains which was quite general and flexible in order to avoid predefining the directions to be followed. These directions had to be chosen at the divisional level, according to the specifics of the project and the division technology. Cost and profit drivers and the path to follow in their navigation belonged to a divisional accounting language game. Therefore, the digital platform encouraged paths of additional analyses that enabled divisional managers to be able to develop and adjust the meaning of the concepts in relation to their organisational context. This reconceptualisation required an alignment of the structural dimensions of meaning. Initially, the new meaning of performance, extended until maturity 90, changed the way actors were accustomed to measure performance. Thus, the definition of criteria for performance measurement and analysis helped transform subjective judgements into numbers that promoted correspondence between the meaning of a concept and their pragmatic use. Finally, divisional managers had to agree on a

set of exemplary references that provided common understandings of a concept. This was the case for the operational review meeting accomplished after the introduction of the digital platform, which sustained the divisional managers in the construction of a common understanding of the performance concept to adopt in their practices.

The case evidence shows how the digital platform supported the corporate managers in the allocation of resources amongst the divisional NPD projects and the divisional managers in the management of the NPD process performance. To do so, the platform, by spreading the new meaning of NPD process performance, promoted the use of common practices and enabled corporate and divisional managers to use a corporate accounting language game. This required them to follow common rules in performance measurement and to recognise a set of exemplary references used to monitor NPD processes. In addition, the digital platform did not fail to consider the peculiarities of multiple divisional practices, favouring the composition of divisional accounting language games. This was made possible by providing divisional managers with general and flexible paths of analyses that they could customise according to the specificities of their local contexts.

The paper contributes to the extant management accounting and information system literature on digitalisation by addressing the issue of the possible de-contextualisation that the introduction of digital technologies may entail with the risk of neglecting the specificities of local organisational contexts (Knudsen, 2020; Quattrone, 2016). Such a critical issue was dealt with by mobilising the concept of the accounting language game, which was useful in highlighting what differs between global and local practices, explaining how the two can be interrelated. Moreover, this paper is helpful in understanding how the global accounting language game, promoted by the digital platform, interacts with local accounting language games shaping global and local practices without neglecting the peculiarities of local organisational contexts. The paper examines the risk of a centralised truth coming from the de-contextualisation that may be produced by digitalisation. On this point, the paper highlights how digitalisation can promote the spread of a global accounting language game, still allowing users to construct different courses of action from which they can choose (Quattrone, 2016). In doing so, the production of meanings occurring in multiple local practices needs to be made functionally coherent at the corporate level (Nørreklit, 2017). Hence, we have proposed and examined the function of digitalisation in composing local language games. On this issue, the paper highlights how digitalisation allows the translation of a given amount of data into knowledge that differs according to the specificities of the organisational context. Consequently, the use of digitalised data in different organisational practices shapes the boundaries between local and global accounting language games affecting the production of knowledge for decision-making (Knudsen, 2020). The concept of the language game applied to accounting makes the paper different from other studies that focus on the use of accounting and control systems in global and local organisational contexts. This is the case of the paper by Goretzki et al., (2018), who mobilised the concept of the vernacular accounting system to refer to an informal accounting and control system, self-generated by organisational actors in local contexts, that is counterposed to a formally sanctioned system introduced at the global level. Drawing on the concept of the accounting language game, the current paper refers to the use of language

in accounting practice in the local and global organisational contexts. The focus is on one performance measurement system within the whole company, the practice of which can differ between local contexts and between local and global contexts, leading to local and global accounting language games.

Furthermore, the paper has examined how the process of meaning construction develops in divisional and corporate organisational contexts, shaping their own accounting practices and the related language games. In particular, the paper contributes by showing an interdependence between local and global accounting language games, underlining how the meaning construction in the global context favours the combination of the local meanings. This evidence is consistent with literature that maintains that information technology is beneficial only when it does not compromise the dialectic and judgements characterising the organisational context (Knudsen, 2020; Nørreklit et al., 2019; Quattrone, 2016).

Future areas of research may address issues related to a possible divergence between local organisational contexts in constructing performance meanings. The possible reasons for that divergence remain unexplored and could be the topic of future studies. Further inquiries can address how the enhanced visibility of local practices offered by digitalisation amplifies the effects that changes to local practices may have on global practices. This may highlight how digitalisation can increase the opportunities for interaction between local and global language games.

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