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Impact of the changing business environment on performance measurement and management practices

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Impact of Business Trends on Performance Measurement Systems and Performance Management Practices of Organisations

Abstract

While there is abundant literature in the field of performance measurement systems and performance management practices (PMM), there is little research into how the current highly volatile, uncertain and ambiguous operating environment are affecting the way organisations measure and manage performance. The literature suggests that business trends are indeed affecting the way organisations are managed in general, but their effect on PMM is rarely investigated. Thus, the purpose of this paper is to explore how current business trends are impacting PMM. A literature review reveals five business trends and develops an analytical framework based on organisational control theory. This framework is then used to explore the impact of these business trends through fine-grained case studies across four diverse organisations. Findings suggest that emerging technologies enable collaborative networks creating opportunities for co-creating value while, at the same time, fostering innovation. The findings are theorised using organisational control dimensions that lead to a number of propositions concerning: how the use and purpose of PMM is changing; how strategic objectives are expressed and deployed with particular differences in strategic and turbulent environments; changes in the focus and scope of how performance is measured and reviewed. The paper contributes to existing knowledge by explaining the changing nature of PMM from an organisational control perspective and also by presenting a framework to inform future studies investigating the impact of new business trends on PMM. The paper also reveals practical insights for improving performance measurement systems and performance management practices in organisations.

Keywords: Performance measurement; performance management, business trends, organisational control theory.

1. Introduction

It is widely recognised that effective **Performance Measurement Systems** and **Performance Management Practices (PMM)** bring improvements in the form of efficiency and effectiveness to organisations (Neely et al., 1995). Whilst, there has been a plethora of literature in the design of performance measurement systems (PMS) (Neely et al., 1995; Garengo et al., 2005), implementation and the use of PMS also started to receive attention (Bourne, 2001; Kennerley and Neely, 2002; Davenport et al., 2010). In this context, several researchers have also explored the dynamics between measurement, culture and change (Bititci et al., 2006; Garengo and Bititci, 2007; Franco-Santos et al., 2007; Nudurupati et al., 2011). It is apparent from the literature that the focus of the PMM literature has been evolving from *performance measurement systems, i.e., what to measure, towards performance management practices i.e., how to use measures to manage performance of organisations* (Bititci et al., 2012); some of these changes have also been in response to technological, economic and social trends (Melnyk et al., 2014; Nudurupati et al., 2011).

As we approach the third decade of the 21st century, the rate of change in the world is set to increase further, coming from unexpected directions (Bailey et al., 2019; Gunasekaran et al., 2019; Sheng et al., 2019). While this change is fuelled by technological developments, increasing globalisation and changes in trade barriers, political, social and environmental considerations are also becoming key concerns. Based on these trends, Bititci et al. (2012) conducted a review identifying ten grand challenges for PMM research. Similarly, Melnyk et al. (2014) investigated the evolving nature of PMM, highlighting the importance of maintaining “fit” between an organisation’s purpose and PMM to compete in an increasingly turbulent environment.

Whilst the impact of emerging business trends on organisations is widely recognised in general terms, their specific impact on PMM are rarely explored. Furthermore, the literature also recognises that businesses may operate in more or less turbulent operating environments where the rate of change and the impact of business trends could be considerably different (Prajogo, 2016; Cai and Yang 2014; Pérez-De-Lema et al. 2019). Once again, although this phenomenon is widely recognised in the literature, the specific implications on PMM are rarely explored. It is expected that these business trends and the stability or turbulence of the operating environment has significant impact on the way the performance of organisations is

managed. However, the literature does not provide sufficient insights to predict how business trends impact on PMM particularly in this new dynamic, volatile and highly turbulent environment. Hence, this paper aims to empirically investigate how these business trends are impacting PMM.

This aim is achieved as follows. In the next section, the literature review, develops theoretical foundation of PMM and identifies five business trends that are impacting on PMM (Emerging Technologies; Networking and Collaboration; Servitisation and Value Co-creation; Innovation & Knowledge Work; Environment & Sustainability) and concludes with an analytical framework based on organisational control theory (Smith and Bititci, 2017) and performance alignment matrix (Melnyk et al., 2014). The Methodology section that follows justifies and details the qualitative exploratory theory-building approach adopted to explore the impact of these trends on PMM using fine grained case studies in four diverse organisations. In the Context and Findings sections the case study companies are introduced, and the emerging findings are detailed. In the Discussion section, the findings are theorised in the form of propositions that contribute to existing knowledge by explicating the changing nature of PMM in response to business trends and environmental turbulence with distinct implications on future research and practice.

2. Background Literature

2.1 Theoretical Foundations of Performance Measurement and Management

Since being popularised by the Johnson and Kaplan (1987) PMM has been researched using a number of theoretical lenses, including agency theory, contingency theory, resource-based view, goal-setting theory, equity theory and so on (Franco-Santos et al., 2012). However, despite the diversity of the lenses used to investigate the subject, according to Bititci (2015), the theoretical foundations of PMM is rooted in cybernetic control systems in general and organisational/management control theory in particular. Neely et al.'s (1995, p.80) definition, "*a performance measure is a metric used to quantify the efficiency and/or effectiveness of action*" reflects this view where *effectiveness* of the action is "*the extent to which the result of an action meets the expectations/specification* and the *efficiency* is *the amount of resources the action consumes to deliver the result/output*" (Bititci, 2015). A key underpinning concept is

the *Performance Measurement System (PMS)*, which was originally conceptualised as a number of performance measures organised into a system to manage the performance of an organisation (Neely et al., 1995). This was later redefined as the process of setting goals, developing a set of performance measures, collecting, analysing, reporting, interpreting, reviewing and acting on performance data (Melnyk et al, 2013; Bititci et al., 2014). This definition incorporates a number of further performance measurement concepts that include *deployment* of organisational goals and objectives throughout the organisation to achieve *alignment*, ensuring that the whole organisation works towards common objectives. The PMS includes *feedback* and *feedforward controls* where *feedback control* is concerned with goal attainment and *feedforward control* is concerned with goal setting, based on external intelligence (Bititci, 2016; Fowler 1999; Pavlov and Bourne 2011). In this context PMS and strategy are intrinsically linked through a dyadic and dynamic two-way relationship, i.e., PMS evolves in response to strategy; and the feedforward signal from the PMS informs strategy (Magretta and Stone, 2002).

By definition, PMS, in bringing together several different performance measures, comprise of measures with different characteristics, such as: internal or external (Keegan et al., 1989); financial, customer, process, learning and growth (Kaplan and Norton, 1992); leading or lagging (Fitzgerald et al., 1991); stakeholder satisfaction and contribution (Neely et al, 2002). Between 1984 and 2003, these concepts have led to the development of various frameworks to conceptualise how performance measures should be deployed throughout the organisation to ensure alignment and effective organisational control (Bititci, 2015). As the main purpose behind all the PMS frameworks is organisational control, it is important to understand the PMS concepts discussed above in the context of organisational control theory.

The management and organisational controls literature consider *control* to comprise of two dimensions: technical and social (Cardinal et al, 2004; Tessier and Otley, 2012; Smith and Bititci, 2017). *Technical controls* refer to rational, planned, bureaucratic and structural elements of the organisation and include practices such as planning, measuring performance and setting targets, policies and procedures; review, reward and disciplinary procedures. *Social controls* focus on emergent, cultural and behavioural aspects of the organisation and include practices such as shared values, collaboration, participatory decision-making, open and honest information sharing and trust. According to Smith and Bititci (2017), performance

measurement and performance management represent the technical and social control dimensions of organisational control, respectively (Figure 1) that also include Simons' (1995) four levers of control, which are:

- Belief systems provide momentum and guidance through providing purpose, values and direction;
- Interactive systems focus attention on strategic uncertainties through participation and involvement in decision-making;
- Diagnostic systems ensure important organisational goals are achieved through performance measures, targets, feedback, monitoring and review;
- Boundary systems allow creativity within defined limits such as policies, procedures, codes of practice.

Bititci et al. (2018) suggest that PMM research, so far, has focused on technical aspects of PMM and that the theoretical concepts and PMS frameworks discussed earlier in this section largely represent the technical controls dimension of PMM. They suggest that, whilst the phenomenon relating to social dimension is recognised, the interaction between technical and social control dimensions of PMM remains under-researched. They identify the frameworks of Simons (1995), Tessier and Otley (2012), Smith and Bititci (2017) as potential means to help theorise the interaction between the technical and social dimensions of PMM.

Smith and Bititci (2017) conceptualise technical controls (i.e., the PMS) and social controls (i.e., performance management) as two distinct but related dimensions of PMM. Based on their definitions of technical and social controls, and Simons' definition for the four levers of control, it is argued that Belief (guidance, purpose, values) and Interactive (participation and involvement) systems represent social controls whilst Diagnostic (measures, targets, feedback) and Boundary (goals, policies, procedures) systems represent technical controls. The conceptual framework that emerges from this discussion is represented in Figure 1.

Concerning the turbulent and dynamic environment organisations operate within, Melnyk et al. (2014) imply that the organisational context has a significant impact on how organisations measure and manage performance. They identify four different approaches to organisational controls based on how generic or specific the outcome and solution may be (Figure 2). These four approaches are:

- Assessment-driven management - when what is to be achieved and how it is to be achieved can be stated in generic but not in specific terms.
- Solution-driven outcomes - when what is to be achieved can only be stated in generic terms, but specific solutions can be stated in some detail.
- Outcome-driven solutions - when what is to be achieved can only be stated in specific terms, but the solutions are not known in specific terms.
- Measurement-driven management - when what is to be achieved and how it is to be achieved can be stated in specific terms.

Their discussion implies that in environments where there are greater degrees of uncertainty in relation to outcomes and/or solutions, the emphasis of organisational control moves from technical controls (well-defined goals, targets and measures) towards social controls, where uncertain outcomes are achieved through a common belief system (purpose) and interactive work. However, this view is merely implied in their concluding discussion rather than being based on empirical evidence.

It is evident that PMM is a complex phenomenon and how business trends are impacting on the way organisations are measuring and managing performance is not yet understood. Thus, this paper aims to empirically explore how these business trends are impacting PMM. More specifically our research questions are:

- How are the business trends impacting on technical and social controls? and,
- How is organisational alignment being achieved and sustained in an increasingly more turbulent operating environment?

In the next section, the literature is reviewed to identify the current knowledge on the impact of business trends on PMM that leads us to develop our analytical framework and identify the gaps in knowledge.

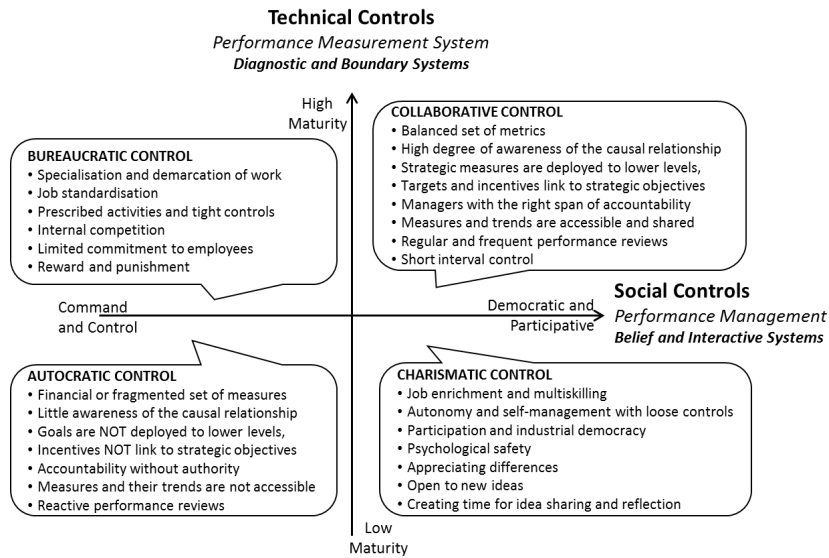


Figure 1. PMM in the context of organisational control theory - developed from Simons (1995), Tessier and Otley (2012) and Smith and Bititci (2017).

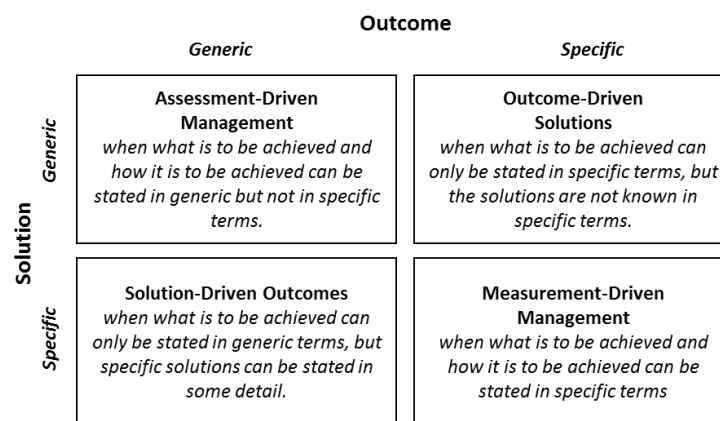


Figure 2. PMM Four different approaches to organisational controls (Melnyk et al., 2014).

2.2 Impact of Business Trends on PMM

In the current competitive environment, the global economy is volatile with fluctuating demands, reflecting changing customer requirements and global economic conditions. Bennett and Lemoine (2014) claim that businesses are operating in a “VUCA” (volatility, uncertainty, complexity and ambiguity) environment. In this “VUCA” environment it is argued that only agile firms survive by adapting and exploiting the opportunities offered by the underlying business trends (Ashmore and Wedlake, 2016). Several researchers have explored the emerging business trends to which organisations should respond in order to sustain and improve their performance (Bititci et al., 2012; Melnyk et al., 2014; Bennett and Lemoine, 2014). As the focus of this research is on business trends that have a significant impact on

PMM, in the following paragraphs we identify the most significant trends that may have an impact on PMM.

The advances in technologies and the developments of ICT, including the digital revolution and Industry 4.0 technologies (digitalisation, big data, artificial intelligence, internet of things and blockchain) are enabling organisations to collaborate faster and create supply chains and networks to quickly respond to customer needs, i.e., collaborative networks (Swafford et al., 2008; Chesbrough and Garman, 2009; Baldwin and von Hippel, 2011). Increasingly, the performance of network partners is being evaluated through opinions and perceptions of other network members/stakeholders (Bititci et al., 2012) and an increasing emphasis on knowledge work is changing the way performance is measured and managed. In this context, the literature implies that PMM should be moving from a technical control focus to social control focus (Ghoshal, 2005; Hamel, 2009; Bititci et al. 2012), but there is no clear evidence to support this argument.

With the emergence of service-dominant logic (Vargo and Lusch, 2008) and servitisation (Baines et al. 2017), the emphasis towards value-co-creation is increasing (Ng and Nudurupati, 2010; Ramaswamy and Ozcan, 2018) in line with collaboration, discussed above. In contrast, PMM theory has largely developed in the context of managing the performance of a single organisation. Even the works investigating PMM in supply chains tend to take an “arms’ length” approach to inter-organisational performance measurement (Gaiardelli et al., 2007; Estampe et al., 2013). Whilst, common logic suggests that in an environment where value is being co-created PMM could, enabled through emerging technologies (IoT, social media, big data), extend to include the partners co-creating value, the literature contains no coherent conclusions as to how value co-creation is changing the way performance is measured and managed (Silvestro, 2014).

Emerging technologies, particularly the use of collaborative technologies that integrate data-sharing, real-time communications, big-data analytics together with increasing sophistication of knowledge work are enabling organisations to bring breakthrough innovations in products, services, processes and business models (Chesbrough and Spohrer, 2006; Hilton, 2008). There is also a growing consensus that knowledge workers are motivated by a sense of purpose, autonomy and mastery, and that attempts at measuring and managing performance of

knowledge workers may yield counterproductive results (Bititci et al., 2006; Sardi et al., 2020). It is now being accepted that the traditional approaches to PMM may be unsuitable in the context of knowledge work where people are being used as problem solvers and innovators (Pink, 2011; Smith and Bititci, 2017). There is evidence that leadership and management styles in organisations are changing, or need to change, to accommodate this (Ghoshal, 2005; Hamel, 2009). However, it is not clear how this is influencing PMM.

Concerns over climate and the need for reducing the impact on the environment are putting organisations under pressure to develop more sustainable products services and business models (Hopkins, 2009; Lubin and Esty, 2010; Longoni et al., 2014). There is a general consensus that sustainability and circular economy are important and that relevant performance measures should be included within the PMS of organisations (Taticchi et al., 2014; Manninen et al. 2018). Furthermore, there are suggestions that emerging technologies such as big data, social media and market places can significantly enhance sustainability and circularity (Hazen et al., 2016). However, there is no evidence that these measures are changing the way organisations manage performance with some researchers arguing that these measures do not make a difference to organisational priorities and how performance is being managed (Walker and Jones, 2012).

From the above discussion it appears that five key trends are impacting the way performance measurement systems and performance management practices are evolving in organisations. These five trends are: Emerging Technologies; Networking and Collaboration; Servitisation and Value Co-creation; Innovation & Knowledge Work; Environment & Sustainability. However, although there are some suggestions as to how organisations should react to these changes, there is little empirical evidence on how organisations are responding to these trends and how their PMMs are changing. The key business trends discussed above, along with the dimensions identified from theoretical foundations of PMM, are used as a basis for our analytical framework illustrated in Table 1. The methods used in achieving the overall aim of this paper are presented in the next section.

		PMM Concepts					
		Technical Controls				Social Controls	
		Boundary Systems		Diagnostic Systems		Belief Systems	Interactive Systems
		Strategic objectives <i>Are strategic goals changing?</i>	Deployment <i>Is the way goals are deployed changing?</i>	Performance measures <i>Are the performance measures changing?</i>	Performance Reviews <i>Are the way measures are shared and reviewed changing?</i>	Purpose of PMM <i>Is the purpose of PMM changing?</i>	Use of PMS <i>Is the way the PMSs are being used changing?</i>
Factors postulated in the literature which are likely to impact PMM	Emerging Technologies	<i>Developments in ICT, Digitisation, Big-Data, Internet of Things and Social Networks (Industry 4.0) is changing the way organisations are interacting with their internal and external networks. This, in turn, is changing the way organisations collaborate, create value, innovate, engage with their workforce and deal with environmental challenges (Hazen et al., 2016)</i>					
	Networking & Collaboration	<i>PMM should be moving from technical controls to social controls but there is no clear evidence (Ghoshal, 2005; Hamel, 2009; Bititci et al. 2012)</i>					
	Servitisation & Value Co-creation	<i>The literature contains no coherent conclusions as to how servitisation and value co-creation is changing the way performance is measured and managed (Silvestro, 2014)</i>					
	Innovation & Knowledge Work	<i>There are suggestions that leadership and management styles in organisations are changing, or need to change, to motivate innovation and accommodate knowledge-workers (Ghoshal, 2005; Hamel, 2009) but it is not clear how this is impacting on how performance is measured and managed.</i>					
	Environment & Sustainability	<i>There are sustainability measures being introduced but there is no evidence that these measures are changing the way organisations manage performance (Walker and Jones, 2012)</i>					

Table 1. Analytical framework underpinning the empirical investigation

3. Methodology

A qualitative exploratory theory-building social constructionist approach (Easterby-Smith et al., 2002) was adopted, involving multiple case studies. The case study approach was chosen for two reasons (Eisenhardt, 1989; Meredith, 1998). First, although the phenomenon of the business trends is recognised, the current literature does not contain sufficient knowledge that would enable the construction of a hypothesis to explain the impact of these business trends on PMM (Barratt et al., 2011). Second, a case study approach generates richness and a depth of understanding which can be used as a basis to form an in-depth understanding of the PMM implications (Yin, 2014; Eisenhardt and Graebner, 2007) in the context of business trends.

3.1 Unit of Analysis and Interviewee Selection

In order to assess the impact of business trends and turbulence of the operating environment on PMM process or organisations, it was considered important that the case study companies had well-developed PMM processes representing a diversity of organisational contexts including size, industry and operating environments. It was thought that studying companies

that are similar in size and industry would negatively impact the reliability and theoretical generalisability of our findings. Thus, case study organisations were selected using a purposive sampling approach. The four case study companies selected (see Section 4) have well-developed PMM processes that have been in use for over 15 years. The case companies were selected according to: size¹ (medium and large); operating environment (stable/changing and turbulent); industry (manufacturing and service).

In relation to the operating environment, the literature defines three different types of operating environment. A stable environment is where there is no unexpected change and is highly predictable, a changing environment is one with incremental change but remains predictable. A turbulent environment is where change comes suddenly and from unexpected directions and is unpredictable (Pathak, 2010). However, in today's VUCA world, it is unrealistic to find a completely stable environment, thus we have classified the operating environments as Stable/Changing and Turbulent. Within this mix of criteria, four cases were selected based on researchers' established links (Yin, 2014), as illustrated in Table 2. The next section of the paper provides background for each company that justifies their classification.

		Operating Environment	
		Stable/Changing	Turbulent
Size	Medium	Furniture Co	Music Co
	Large	Distribution Co	Bank Co

Table 2. Profile of the four case study companies selected

Although it would have been ideal to conduct this as a longitudinal study, this was not practically possible due to the time over which observations would need to have been made (i.e., a minimum of five years) and the interplay between business trends and PMM, i.e., business trends needs to happen first and then we can study how these trends impacted on PMM. Thus, the study was undertaken as a cross-sectional study over a 17-month timeframe engaging with management teams of the selected companies. The managers were asked to reflect over the previous five-years or further. Thus, managers with minimum five-years' experience with the company were targeted. However, there were three exceptions where

¹ For the purposes of this research medium companies are defined as companies employing between 50 and 250 people and, in order to have a significant differentiation, large companies are defined as companies employing more than 1000 people.

recent appointments had a pertinent role in the PMM systems of the company (Appendix A). The participants include both owners and users of PMS. In three of the four companies, the PMS was owned by the management team except Furniture Co where the PMS had a specific owner. In each company, a broad spectrum of individuals was interviewed ensuring that different areas of business were covered; however, due to structural and nomenclature differences this coverage is not immediately obvious from the job titles.

3.2 Data Collection

On each case study, data were collected to ensure data saturation. There is no widely accepted approach to how saturation is determined, e.g., whilst Guest et al (2006) suggest that 12 interviews are sufficient, Creswell (2013) argues that 20 to 60 interviews will be necessary. In contrast, Yin (2014) reasons that the sampling strategy for qualitative research should be less concerned with its size, but more concerned with the appropriateness and richness of the data being collected, particularly in case study research, which is the approach taken in this study.

The researchers had been collaborating with the case study companies on various projects over the past five-plus years. The researchers used a multiple data collection approach for collecting rich data that enabled triangulation of the findings (Merriam, 1998; Yin, 2014), including: informal discussions with management and employees; 70 formal in-depth semi-structured interviews with 23 senior managers (e.g. Managing Director, Finance Director, Sales Manager, Accounting Manager, HR Manager); observing 32 meetings (strategy meetings, board meetings, weekly performance review meetings and daily operational meetings – Appendix A) and reviewing relevant documents (e.g., company reports, performance reports, meetings notes). For formal interviews, data were collected by three researchers against a standard interview protocol (Appendix B). Interviews were recorded and the recordings were used to create interview reports. The interview reports were discussed between the three researchers to reduce interviewee bias. Interview reports were sent to the interviewees for verification and feedback was used to amend interview reports.

3.3 Data Analysis

A common criticism of case study research is that it is often difficult to draw general conclusions about cause and effect, i.e., how do we know that observed changes in PMM were

directly in response to business trends identified (Eisenhardt, 1989; Meredith, 1998; Yin, 2014). In reality, the picture is often more complex as observed changes could be attributable to a variety of other factors which, in this case, could include changes in the market, organisational structure, leadership, ownership and so on. Whilst it is difficult to completely eliminate, this effect can be minimised through careful design of data analysis (Eisenhardt, 1989; Yin, 2004). This research employed within-case analysis to reveal how each company responded to these trends followed by cross-case analysis to identify emerging patterns (Yin, 2014). Each case was analysed, through the following iterative activities: data reduction, data display, identifying themes, drawing conclusions and final verification (Miles and Huberman, 1994). The report for each company, based on a standard structure, was discussed with a team of managers for validation to ensure the story and conclusions have not deviated from reality. Then, through several iterations, the four cases were used to build an overall general explanation about “how” or “why” certain things occurred that fits each individual case (Yin, 2014). The iterative process comprised of: proposing a finding, revisiting theory, testing it with each case study, verifying with participants. This iterative approach enabled patterns (exploratory emergent codes) to emerge from data that could be used to explain (Stemler, 2001) the impact of emerging technologies, changes to strategic objectives, performance measures, the way performance measures are deployed, the way performance measures are shared and the way performance measures are used and managed (Appendix D).

Finally, research findings were synthesised using data from multiple sources through iterative explanations based on triangulation of consistent patterns and comparable meanings to identify what has changed, why the change has occurred, where it occurred, what or who influenced that change and how it evolved. While emphasis was placed upon developing and triangulating integrated explanations to identify patterns, the popular approach of counting of occurrences was avoided for two reasons. Firstly, it limits the investigators’ ability to generate rich insights from unexpected findings (Hannah and Lautsch, 2011); secondly, the number of interviews conducted in our case study organisations were not homogeneous, which would have skewed the results.

4. Context – The case study companies

Music is a medium manufacturing company founded in the early 1970s with a passion for precision engineering of sound through modular and upgradable components and systems. It

strives to perfect sound reproduction and it is this goal that drives the company to new technology and product developments through its dedicated R&D team. It is located in a purpose-built facility with 160 employees. It also owns a record label with the mission for producing music at the highest possible quality which, together with its hi-fi products, maximises customer experience. Over a 40 year journey, their competency base has developed from mainly mechanical engineering (1970s and 80s) to include electrical and electronic engineering (1990s) to sophisticated software engineering (2000s) and ultimately web-engineering (2010s). Throughout their existence, the music industry has experienced significant change both in terms of how people access music (records, tapes, CDs, streaming) and the products used to experience music (record, tape and CD players, 8, 16 and 32-bit streaming products that include personal devices as well as sophisticated hi-fi systems), thus the turbulent environment.

Distribution is a large services company managing the supply chain of its customers in the food industry. The primary focus is on optimising the supply chain and reducing transport costs as well as improving customer service levels. Concerted competition from big players (such as UPS, DHL) is posing a serious threat with price advantage through economies of scale. Thus it is under constant pressure to improve services to deliver more value for money. This has compelled the business to innovate through available technologies (product identification, vehicle tracking) enabling more effective and efficient service delivery. It has also introduced innovation training and succession planning to improve engagement of the workforce where the employees are encouraged to innovate new ways of doing things. Even though the company has experienced significant change within its operating environment the nature of this change has been more predictable and incremental, driven largely by industry-standard technologies and competition, thus its classification as in a changing environment.

Furniture is a medium manufacturing company which offers a collection of innovative products by exploiting the space between business, art and sustainable development. Elements that make this company's products immediately recognisable are: simplicity in the forms; ample possibilities for customisation through colour and modularity; quality of materials and craftsmanship; accessible prices. Currently, their brand is synonymous with innovation. Their business model includes offering a mixture of innovative modular products embedded with the company's strong core values. It has systematic collaborations with

customers, suppliers and designers. As creativity is at the heart of their business, their internal processes are nourished by external connections which are maximised through a network studio (physical and virtual) that hosts design students and designers from around the world for promoting creativity. It also created the first Italian corporate creative space named "Design Conversation" for enabling stakeholders entering into discussion, involving customers to improve their lifestyle through the process of co-furnishing their home. It is clear that even though the company adopted an innovation strategy and made significant changes to pursue this strategy, the operating environment of the company has not changed significantly, i.e., it operates in a changing environment.

Bank is a large service company and is now one of the largest clearing banks. It offers a wide range of products and services that is typical of most high street banks. Their vision is to be a leading international financial services company trusted by all stakeholders and this is reflected in their core values. In the past, employees were more customer-facing in the branches. However, with investments into customer contact centres, automation of back-office processes, internet-banking, the nature of their business has radically changed and with emerging technologies such as artificial intelligence and robotic process automation this change is likely to continue in unpredictable ways. The scale of change has also been exacerbated as a result of mergers and acquisitions in the industry to drive productivity. This has resulted in an engagement problem with employees who feel that they are more like factory workers being measured on the number of transactions, leading to poor employee morale, which has affected customer satisfaction. Recognition of employee engagement problems and the consequent impact on productivity and customer service has resulted in the development of a pilot programme to increase employee engagement by introducing several self-managed work team projects to test how this would have an impact on productivity and customer service levels. It is clear that this company has been operating in a turbulent environment.

5. Findings

5.1 Organisational response to business trends

The impact of the business trends on each organisation is briefly described below and synthesised in Appendix C. Our data suggest that the rapidly developing technologies (particularly faster communication, connectivity, analytics and process automation) are the

underlying enablers for creation of collaborative networks with customers, suppliers and other key stakeholders. This creates the opportunity to co-create value while, at the same time, fostering innovation (all cases). Sustainability also emerges as a key issue (Furniture, Distribution and Bank) and particular attention is given to improving productivity and innovation whilst reducing environmental impact. However, whilst sustainability remains important, its deployment is sporadic with only one organisation making it explicit in their strategic intent and none deploying specific performance measures. Moreover, with the increasing use of social media, customers are becoming more informed with increasing expectations. As a consequence, whilst in all four cases there is pressure for innovation, this is explicitly fuelling the emphasis from manual-work to knowledge-work in three cases.

Music and Furniture have increased their levels of collaboration with a network of different stakeholders, thus co-creating value and fostering innovation. Music has invested in collaborative technologies to include several external organisations and individuals with particular attention to multimedia streaming products and artists. By developing a closer relationship with their record-label business and a network of artists, making music available in many formats, they developed the world's first studio-master quality multi-media streaming product.

"In order to remain at the leading edge we believe that technological competence is necessary in adopting open standards and collaborate with a range of organisations and individuals whilst maintaining control of the technologies that underpin our product offering" Managing Director, Music.

Furniture created a wide network firstly with customers and suppliers, after which they extended the network to designers and university graduates to drive innovation by co-creation. A research centre was created to support idea generation processes and development of new products, suppliers were involved in the innovation process and they contributed to co-create products and complementary services.

"We are continuously involved in the so-called 'lateral' projects with initiatives from universities and emerging designers running in parallel with our work in development, production and the launch of new products. An example of this collaboration is an initiative 'Art Reception', the first corporate reception room transformed into an art gallery" Managing Director, Furniture Co.

All the companies seem to be co-creating value by embracing innovation through technological developments (Music and Bank) and leveraging their collaborative networks (Music and Furniture). Distribution, Furniture and Music are constantly co-creating with their suppliers and customers to deliver improvements and innovation. Distribution has integrated additional services to its existing portfolio of service offerings to better suit customer requirements and to stay ahead of the competition whilst, at the same time, delivering better value-for-money.

“We don’t just focus on the product delivery, instead we focus on service excellence... Recently, we delivered a project to propose a new vision of public places and industrial areas with consideration to family, work-life balance and sustainability” Managing Director, Furniture.

“We are facing furious competition from big players (such as UPS, DHL) posing a serious threat to our business with price advantage. In response, we are designing storage and layout for some of our customers’ sites, thus adding value” Operations Director, Distribution.

Bank went through the reverse process of servitisation, i.e., productisation, by innovating self-service product platforms (e.g., online banking, banking-apps for smartphones). This, together with the increasing use of social media, means customers are better informed and more in control of their finances with a matching increase in their expectations.

“I have been with the bank for a long time where I started serving customers face to face. Now, most of our focus is developing and offering products that enable the customers to self-service” Team Leader, Bank.

While Music and Bank have embraced innovation, its impact on their knowledge-work seems to be different. Music has observed an increase in their knowledge-work in line with innovation, while Bank has observed a significant change with the reduction of customer-facing workforce to a significant increase in knowledge-work for development of back-office support systems. Based on the observations obtained in this study, it could be inferred that the process of servitisation/productisation is mediating this relationship. That is, adding

service to products actually increases the knowledge-work and, conversely, converting services into products (e.g., self-service products) reduced the knowledge-work.

“During our journey, we invested to expand our capabilities from mechanical and electrical engineering through software engineering towards web-engineering. By integrating these we have increased our IP that would previously have been resident in proprietary, brought-in subsystems” Managing Director, Music.

“The back-office technologies resulted in big reduction in the number of people we have serving the customers. But at the same time, we hired a lot of clever people to help us develop robotic process automation...” Business Unit Manager, Bank.

Distribution is addressing engagement and flexibility of their knowledge-based workforce to foster innovation. Similarly, Furniture encourages its employees to contribute to product development thus fostering innovation as part of their policy and core values.

In most of the companies, sustainability was considered indirectly through other productivity, service and innovation-related activities. For example, Distribution started providing the service of managing the reverse logistics for customers recycling waste products such as cardboard, bottles, used cooking oil, etc., generating savings for customers as well as becoming more environmentally friendly.

“One of our key innovations is the use the processed cooking oil from the [customers] restaurants, as bio-diesel for our vehicles” Operations Director, Distribution Co.

In Bank, the innovative developments in self-service technology have reduced their environmental impact by reducing paper statements, whilst improving service levels. They are continuing to work with various stakeholders in the supply chain looking to reduce their energy usage and waste. Furniture has created a sustainable approach for designing its products reducing the environmental impact of their products throughout their lifecycle.

“We have recently launched a new line of ‘sofas’ based on life cycle assessment methodology, it is now possible to quantify the impact of specific product on the environment throughout its life cycle” Managing Director, Furniture.

Despite the evidence and the focus on sustainability at these three companies, only Bank has included sustainability in its strategic objectives. Distribution and Furniture have not included sustainability in their strategic objectives. At Music, there is no evidence of any action related to sustainability, even though they recognise its importance.

5.2 Impact of business trends on PMM

The findings show that each of the organisations' PMM has been evolving in response to one or more of the business trends. In the following paragraph, we outline six distinct patterns identified through our analysis (Appendix D).

Impact of Emerging Technologies: Emerging technologies, particularly technologies such as social networks and analysis, IoT and mobile connectivity, process automation and collaborative technologies, big data and data analytics are shaping how companies are responding to these business trends. Technologies such as social platforms and data analytics are enabling companies to monitor customer opinion, industry trends (Music), competitors and employee morale (Furniture). Telematics and Internet of Things are enabling collection of timely information from the supply chain (Music and Distribution), Digitisation of information together with data analytics and process automation is enabling timely collection and sharing of information and knowledge within the companies as well as with their key business stakeholders (Bank, Music). These technologies are impacting on efficiency and effectiveness of the companies' operations as well as impacting the way they implement and use performance measures, discussed below.

Changes to the strategic objectives: Significant changes in the strategic objectives of all four companies are apparent (see Appendix D). At Music, the strategic emphasis has shifted to a new product proposition (streaming) as well as collaboration and co-creation with customers and artists. At Furniture, the emphasis has changed to product and process innovation through co-creation with a wider network of stakeholders. At Distribution, the emphasis has changed to collaboration with its major customers to co-creating innovative solutions. Finally, at Bank, the emphasis has changed in automating customer-facing processes to create self-service capabilities. While Bank included sustainability in strategic objectives, the driver for doing so was to motivate innovation and improve productivity in offering its services. Also

apparent in the data is the different approaches to strategic planning taken by different organisations. Those organisations, operating in turbulent environments (Music and Bank), appear to have taken a short-term or generic approach to strategic objectives, in contrast to organisations operating in stable/changing environments (Furniture and Distribution), which have taken traditional view.

“... it is not possible to plan for the long term, we know our mission, all we can realistically do is set six-month objectives for everyone to work towards. We have an idea what we might do the next six months but we do not formalise this until we come to the end of the [first] six months” Chairman, Music.

“We know what we want in terms of numbers and we also know how we want to achieve it by making our workforce more engaged and adaptive” Managing Director, Distribution.

Changes to the performance measures: Changes to the performance measures are also apparent. Music and Distribution use external evaluation measures, in addition to their existing measures. There is also increasing emphasis on innovation. In Music, they are asking their distributors to compare and evaluate their performance against their competitors.

“... we did not have many measures in the past... now we have a lot of measures to help us manage the flow of work through the business... for us, the most important measure is what our customers, distributors and artists say about us” Managing Director, Music.

Distribution is encouraging their employees to subjectively evaluate their current performance (not necessarily restricted with the set objective measures) to fuel innovation.

“Our customers’ think that we are innovative but our employees don’t... it is difficult to measure innovation using numbers so we developed 100 ways of thanking the employees for being innovative but this is all based on our opinions” Operations Director, Distribution.

Similarly, Furniture, having had no formal performance measures other than financial, adopted a new integrated PMS with particular emphasis on innovation indicators. Bank

developed feedback mechanisms with particular attention on customers' voice and public perception indicators that are collected and synthesised through various online sources.

Concerning sustainability measures, despite extensive debate and recognition in the literature purposeful integration of sustainability measures into PMS was not observed. At best, sustainability-related measures remained in companies' annual reports and the strategic sustainability-related objectives were served at operational levels by the existing productivity and innovation measures (Bank).

In summary, we observe four main changes to the performance measures that are being used in organisations. *First*, we are seeing an increased maturity of measures (Music and Furniture). *Second*, whilst existing internally focused measures are being maintained, the PMS is extending to include wider value creation networks. *Third*, the nature of measures is changing from traditional customer-facing measures (e.g., on-time delivery, quality, speed, etc.) towards measures that provide valuable feedforward signals that: evaluate innovation; capture customers' voice; and gauge stakeholders' perception of organisations' performance. *Fourth*, we have not observed a significant change towards the inclusion of sustainability measures within the performance measures of the companies.

Changes to the way performance measures are deployed: All the companies have changed the way they deploy performance measures to engage employees in a conversation about performance. We observed that the resolution of control changed from activities and individuals to processes and teams, to motivate collaboration, responsibility and engagement. A shift in the purpose of performance measurement from monitoring and surveillance towards engagement and improvement is also apparent. This is evident in the visual management approaches adopted by all case study companies where performance information is openly presented and discussed with people at all levels.

It seems that performance measures are being deployed as a tool to help people manage performance by focusing their attention on aspects that matter, e.g., the flow of work through the organisation (Music) and innovation (Furniture).

“...we have organised the measures to help people to manage this flow of work... to do this we make sure that all performance information is simple, accessible in public places and visual” Operations Director, Music.

In organisations operating in turbulent environments, technical control also seems to be loosening with some generic high-level goals (outcomes) being deployed to teams and the teams being encouraged to develop the more specific measures associated with the solution (i.e., how the goals are going to be achieved).

“...we used to have KPIs to help managers to manage, now the main purpose of KPIs is to help our people to manage what they do....” Team Leader, Bank Co.

In summary, we observe three interrelated changes in the way performance measures are being deployed. *First*, in general, the balance of PMM seems to be shifting from tight controls towards looser controls by engaging people in a conversation about what matters and what needs to be done to improve performance. *Second*, it appears that for organisations in turbulent environments an assessment-driven management approach (Melnyk et al., 2014) is becoming more prevalent where high level generic organisational goals are being pursued through teams of highly engaged people who develop the specific solutions through engagement, participation and teamwork. *Third*, for organisations in stable/changing environments, an outcome-driven solution approach, with specific outcomes appear more prevalent.

Changes to the way performance measures are shared, significant changes are noted in the way performance measures are being reported and shared. Music and Furniture have extended performance measures into their value creation network, i.e., distributors, artists, designers and university graduates where stakeholders evaluate products as well as competitors, providing valuable intelligence.

“While we continue to measure financial, sales and operational indicators, we now consider our distributors, artists and customers to be part of our business and encourage them to evaluate the performance of our products and services against our competitors” Managing Director, Music Co.

Similarly, Distribution shared its performance measures with its suppliers and customers and undertook collaborative initiatives resulting in redesigning the freezer layout within their suppliers' distribution centre and more effective organisation of space on the customer site for mutual benefit. In Bank, the performance reports were originally generated by a purpose-built PM software for the exclusive use of managers with only the individual productivity information being reported in a manner to create internal competition. In response to these trends and to improve employee engagement, customer perception, innovation and productivity, they eliminated the reporting practices that created internal competition, they adopted visual management approaches enabling open dissemination of performance information together with the adoption of self-managed work team practices.

"... in short we moved from command to self-management... we give them high-level goals and we let our teams decide what is more or less important to measure" Team Leader, Bank Co.

In summary, we observed three interrelated changes in the way performance information is being reported and shared. *First*, performance measures are being shared with individuals and organisations outside the organisational boundaries to include business partners, suppliers and customers; *second*, more open and accessible sharing of performance measures, typically through visual management systems; *third*, the use of contemporary information technology platforms such as social media tools for sharing performance information and engaging employees and external stakeholders in a conversation about performance.

Changes to the way performance measures are being used and managed: There appears to be a move towards a participative management style where the performance measurement system is used to communicate to wider numbers of people including key stakeholders outside the organisation. At Bank, it is evident that there is a transition from directive towards a more participative management style in managing performance. The implementation of self-managed work teams has resulted in empowering people and spending more time supporting each other rather than competing with each other, defending themselves and pointing fingers. Loosening organisational controls and giving the work-teams greater levels of autonomy have resulted in improved employee engagement and retention as well as improved productivity, customer service and quality.

“... we used to measure the productivity of each employee... after implementing self-managed work teams, we started measuring the productivity of each team... the effect has been profound, people stopped pointing fingers and started working as teams” Divisional Director, Bank.

In a similar vein, Furniture has re-organised their business processes with particular attention to R&D and changed the emphasis of their PMM to promote empowerment, a continuous improvement culture and the company’s core values through visual displays of performance measures in a participative atmosphere to motivate employees to resolve issues autonomously.

“...[now] we predominantly use a performance measurement system as a communication and empowerment tool rather than an uncompromising tool to control employees” Managing Director, Furniture.

Music adopted a visual strategy and performance management system. Through daily performance review meetings, the company *engages its employees in a conversation in priority issues and objectives*. A six-monthly milestone approach to the strategic development of the company ensures that the whole company moves as a whole towards a single high-priority objective and uses PMS as a learning tool. Similarly, Distribution has started using PMS to encourage people to be more creative and contribute toward improvement and innovation.

“We do not offer monetary rewards to our employees but instead offer training and support to develop further, which always directly or indirectly results in monetary benefits” HR Manager, Distribution Co.

Table 3 summarises the impact of these changes in the companies’ positions on the organisational control and deployment models (Figure 1). In the following section, we discuss the theoretical implications of these findings.

Company	Operating Environment	Organisational Control Matrix		Deployment of Control Matrix	
		Previous	New	Previous	New
Music <i>Medium/Manuf.</i>	Turbulent	Charismatic control	Collaborative control	Solution driven outcome	Assessment driven management
Bank <i>Large/Service</i>	Turbulent	Bureaucratic control	Collaborative control	Measurement driven management	Assessment driven management
Distribution <i>Large/Service</i>	Changing	Bureaucratic control	Collaborative control	Measurement driven management	Outcome driven solution
Furniture <i>Medium/Manuf.</i>	Changing	Autocratic control	Collaborative control	Solution driven outcome	Outcome driven solution

Table 3. Changes in the companies' positions on the organisational control and deployment models

6. Discussion

We started this by asking: *How are the business trends impacting on technical and social controls; and, how is organisational alignment being achieved and sustained in an increasingly more turbulent operating environment?* Earlier, we grounded PMM within control theory and described various concepts that underpin its theoretical basis. **This section discusses the theoretical and practical implications of our findings and derives several propositions relating to how performance measurement and performance management are changing (Table 4).**

6.1 Implications for Theory

The findings highlight that all four cases are impacted by the business trends; however, not all companies filter these effects on PMM practices. Underpinned by emerging technologies the trends that have the greatest impact on PMM include networking and collaboration, servitisation and value co-creation, innovation and knowledge work. Whilst the operating environment of the organisation also appears to have a significant impact on the way the PMM is configured, the size of the organisation (large v SME) does not appear to have an influence. Concerning sustainability, whilst companies recognise the importance of sustainability, they do not reflect this effect in their PMM. Literature recognises the need for organisations to respond to the sustainability agenda (Büyüközkan and Karabulut, 2018) including embedding sustainability into PMM (Taticchi et al., 2015). In contrast, our findings show that although three of the four cases are impacted by sustainability, the companies have not reflected this in their PMM. This may be because all three dimensions of sustainability (economic, environmental and social) are already served by existing productivity, resource consumption, customer service and innovation-related performance measures.

At the outset, we presented our analytical framework (Table 1) in terms of organisational control theory comprising the two dimensions of organisational control, technical and social (Figure 1); and approaches to the deployment of control (Figure 2). Concerning organisational controls, our first research question, we observe distinct changes to both technical and social controls.

Regarding social controls, our findings indicate companies are purposefully moving towards a more interactive, open and participative use of performance measures to engage a wide set of stakeholders, internal and external, in a conversation about the performance of the organisation (Table 4: P1). Clearly, the purpose of performance measurement is changing from monitoring and surveillance towards engagement and improvement (Table 4: P2). These findings also signal increasing dominance of Interactive Systems and a significant shift in the Belief System (Simons, 1995) that underpin PMM, i.e., from a directive management control tool towards a performance enabling framework (Table 4: P3). This suggests that, increasingly, organisations are recognising the social aspects of PMM (Bititci et al., 2012) where organisational behaviour is shaped by the perceptions of the individuals and the communities within which the business operates. In this context, it appears that in response to business trends the emphasis of PMM is purposefully evolving towards interactive and belief systems (Simons, 1995) to support attention-focusing and decision-making (Henri, 2006) rather than being used purely as a diagnostic and boundary system (Simons, 1995) to support monitoring and legitimising (Henri, 2006). This signals that a more balanced approach between technical and social controls, i.e. Collaborative Control (Table 4: P4). Our findings also reveal that different stakeholders (internal, external, customers, suppliers, etc.) have different interests for engaging in the use of performance measures and the performance conversation. It appears that customers are particularly interested in effectiveness related outcomes whereas internal users and suppliers are interested in both effectiveness and efficiency related outcomes. However, our data relating to this phenomenon is anecdotal, but the phenomenon represents an opportunity for further research into classifying interests of different stakeholders on PMM processes of organisations.

Regarding technical controls, we have observed changes in Boundary Systems in the way strategic objectives are expressed and how they are deployed, our second research question.

It is clear that with the trend towards more interactive and participative social controls, companies are deploying their organisational goals, irrespective of how generic or specific, through dialogue and conversation with the teams who are responsible for operations, rather than through prescriptive PMSs (Table 4: P7). In all cases, empowered by the organisation, the operational performance measures and targets, where they exist, are developed by the operational teams through interactive dialogue. However, we observe a clear difference in the way strategic objectives are expressed. In turbulent environments organisations are responding to the uncertainties through generic long-term outcomes and rely on their teams to shape the shorter-term goals and solutions, i.e., Assessment-driven management (Table 4: P5 and P8). In contrast, in more stable environments organisations can articulate more specific outcomes whilst still relying on their operational teams to innovate and deliver the solutions towards these outcomes, i.e., Outcome-driven solution (Table 4: P6 and P9) (Melnik et al., 2014).

Continuing on technical controls, we also observe changes to Diagnostic Systems. In this respect existing performance measures (i.e., financial, customer, process, learning and growth) remain valid; however, companies are placing increasing emphasis towards extending these measures to include the wider value creation ecosystem. In doing this, a pattern is emerging concerning purposeful use of more subjective, perception-based evaluation measures where internal and external stakeholders are asked to evaluate the organisation (Table 4: P10), often using social media and other contemporary information technology-enabled platforms. In this context, companies are also placing increasing emphasis on the use of performance evaluation information for goal setting purposes, i.e., feedforward as well as feedback (Table 4: P11) (Fowler 1999; Pavlov and Bourne 2011). This finding contrasts with the view that, in the 21st century, attempts at measuring and managing performance of knowledge workers may yield counterproductive results (Bititci et al., 2006; Sardi et al., 2019). The findings in this study suggest that companies are extending the scope of their PMSs (technical controls). Thus, it can also be argued that they are growing in maturity by engaging the “voices of the stakeholders” from their value creation ecosystem in the PMM process (Table 4: P12). Further, this trend is being fuelled by emerging technologies, such as social media, IoT and data analytics, that make possible data collection, analysis and reporting effective and efficient in providing additional performance information (Table 4: P13). Finally

as previously discussed, sustainability, although seen as an important strategic outcome, does not have a significant impact performance measures used within organisations (Table 4: P14).

Concerning Diagnostic Controls, the way performance measures are reported, shared and reviewed are also changing. The companies are making performance information more open and accessible through modern IT systems, visual management approaches and social media platforms (Table 4: P15). This change in Diagnostic Systems is enabled through collaborative and social media technologies and motivated by the desire to engage the key stakeholders in the value creation process by making the performance information more accessible internally and externally (Table 4: P16).

What is also significant is that the changes in technical and social controls are not mutually exclusive but interrelated. Together, they act to position performance measurement systems of organisations into the top-right quadrant of the organisational control matrix (Figure 1). It is clear that whilst technical controls, with the support of technologies and by extending into the wider value creation network, are becoming more sophisticated, this is being balanced and made possible by a significant shift towards open and participative management approaches that serve to engage the knowledge-based workforce internally as well as the wider ecosystem externally in a conversation about the performance of the organisation.

6.2 Implications for Practice

All companies are being impacted by the contemporary business trends and their PMM is evolving in response to these trends. Companies are responding to these trends by repurposing how they use their performance measures from a directive approach towards a more participative approach where the main purpose of PMM becomes communication, engagement, reflection and learning. This change implies a change in the leadership approaches of the companies from a directive and autocratic approach towards more shared and distributed approach (Anderson and Sun, 2017).

Our findings identify two distinct types of response depending on the level of turbulence in the environment. Organisations operating in a stable/changing environment need to be thinking about ways they can deploy their high-level goals and objectives by adopting an *outcome-driven solution* configuration, i.e., providing specific goals but letting operational

teams decide how these goals are to be achieved and what measures to employ. In contrast, organisations operating in more turbulent environments need to be employing an *assessment-driven-solution* approach where the medium-long term outcome could only be communicated in generic terms and the solution needs to be continuously adapted to the evolving outcome expectations.

To enable both of the above responses, it is going to be important to widen the scope of performance measurements inside the organisation through the use of more accessible visual management approaches to engage with the wider employee. Also, increasing the use of contemporary technologies and greater use of perception-based evaluation measures will enable organisations to extend their performance measurement systems into the value creation network. This will enable organisations to use the power of the crowd to influence markets as well as gathering useful intelligence for formulating strategies, developing/improving products and services as well as setting objectives. This becomes particularly important for organisations operating in turbulent environments where the medium-long term outcome could only be communicated in generic terms and the solution needs to emerge through innovation, experimentation and learning. In this context, creating PMM processes that extend beyond organisational boundaries and engages internal and external stakeholders in conversation about performance enabled by the appropriate leadership approaches will facilitate new solutions to emerge. In this regard, PMM presents an opportunity for organisations as mechanism for engagement, learning and innovation.

PMM Concepts		Emerging propositions theorising the impact of business trends on PMM	
Social Controls	Interactive Systems	Use of PMS	<ul style="list-style-type: none"> Interactive Systems are gaining significance with a clear trend towards a more interactive, open and participative use of performance measures in order to engage a wide set of stakeholders, internal and external, in a conversation about the performance of the organisation (P1).
	Belief Systems	Purpose of PMM	<ul style="list-style-type: none"> Purpose of performance measurement is changing from monitoring and surveillance towards engagement, learning and improvement (P2). The Belief System that underpins PMM is changing from a directive management control tool towards an interactive performance enabling framework (P3). The balance of PMM is shifting from technical controls towards a more balanced approach between technical and social controls, i.e. Collaborative Control (P4).
Technical Controls	Boundary Systems	Strategic objectives	<ul style="list-style-type: none"> In turbulent environments, objectives are expressed as general mission and purpose statements with more specific shorter-term outcomes (P5). In stable/changing environments, objectives are expressed in more specific longer-term outcomes (P6). “stakeholders voice” captured from the extended PMS is used as a source for feedforward signal to shape the direction of the organisation (P11).
		Deployment	<ul style="list-style-type: none"> Operational performance measures and targets are developed by the operational teams through interactive dialogue (P7). An assessment driven management approach is prevalent in turbulent environments (P8). An outcome-driven solution approach is prevalent in more stable/changing environments (P9).
	Diagnostic Systems	Performance Measures	<ul style="list-style-type: none"> In addition to traditionally internally focused measures there is an increasing use of externally focused perception-based evaluation measures (P10). The PMS is extending to the value creation network to capture “stakeholders voice” (P12). Social media, IoT and data analytics technologies are enabling collection and analysis of data from the field, providing additional performance information (P13). Sustainability, although an important strategic outcome, does not have a significant impact performance measures used within organisations (P14).
		Performance Reviews	<ul style="list-style-type: none"> Performance information is being more openly reported, shared and reviewed (P15). Collaborative and social media technologies are enabling accessibility of performance information to the organisations’ internal and external value creation network (P16).

Table 4. Propositions emerging from empirical investigation.

7 Conclusion

This study explored the impact of business trends on the PMM of organisations. In doing so it makes a number of contributions. The primary contribution is to PMM theory which, in turn, is rooted upon organisational control theory. In line with our stated research approach, i.e., inductive theory building, we have built upon the previous PMM theory as set out in Section 2. Our findings and ensuing discussion explain the changing nature of PMM in response to current and emerging business trends, which are summarised through the testable propositions presented in Table 4.

PMM has traditionally been criticised for not being theoretically grounded (Bititci et al, 2018). In this paper, by grounding PMM in organisational control theory and developing our framework presented in Figure 1, we provide a theoretical basis for future work on PMM. As such, it also provides a useful platform for investigating the impact of new business trends on PMM. Finally, the paper reveals several practical implications that should provide practitioners with some guidelines towards designing and/or improving their PMM.

However, as with all research, this study has some limitations. *First*, it would have been ideal to conduct the study longitudinally over five or even ten years. However, practically this was not possible due to the timescales involved and the ever-emerging nature of the business trends. That is, business trends need to be observed first and only then the researchers can study the implications of these trends. However, the fact that we collected data over a 17-month timeframe and asked the managers to reflect over 5+ years of their experience at least partially mitigates towards this limitation. *Second*, in case study research such as this, it is often difficult to ascertain direct causal linkages and that what is observed is often based on the perception of the managers interviewed. Although our research design attempted to minimise this effect through triangulation and validation of conclusions at various points, it would be inaccurate to claim that the observed changes to PMM are solely based on the business trends investigated; it is likely that there are other external and internal factors that are also driving these changes. *Third*, the findings are constructed from the phenomena observed in the four cases in general and two cases when comparing the impact of environmental turbulence. However, we would argue that the fine-grained detailed case study approach across four very different organisations, combined with our transparent and repeatable methods, led us to consistent results. *Fourth*, although the four cases represent different industry and market characteristics the fact that we have only one case representing each industry/market combination (e.g. manufacturing, SME, consumer electronics, B2C) it is not possible to be specific about how these business trends impact on PMM in specific industries and markets. However, this limitation is also a strength, in that the patterns observed from the four case with diverse industry and market characteristic add to theoretical generalisability of our work. This gives confidence that the findings will be prevalent in other similar organisations. However, realistically we would also expect similar works conducted with different organisations to yield additional insights as well as serving to confirm the pervasiveness of our findings.

Regarding further research, until recently PMM has been treated as a technical system with little attention being paid to social dimensions of organisational control (Ghoshal, 2005; Bititci, 2015). Future research needs to recognise the socio-technical nature of PMM and configure theoretically grounded research programmes to enquire into both dimensions of performance measurement. In this context, it appears that PMM is increasingly being used for interactive as well as diagnostic purposes (Henri, 2006), both internally as well as externally across the network of extended operations. Further research is required to better understand the appropriate balance between diagnostic and interactive use for different contexts, internally and externally. The nature of performance measures also appears to be changing. Increasing use of performance evaluation (Bititci et al., 2012; Micheli and Mari, 2014) by internal and external stakeholders that complement traditional measures is apparent. Further research is required to understand the implications of this trend and how best to integrate such measures into the overall PMM of the organisation.

Nonetheless, it is clear that performance measurement is being impacted by modern times, which needs to be recognised by the researchers and practitioner communities. It is hoped that this paper provides new insights to enable new enquiries and practices to emerge.

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Appendix A - Summary of profiles of selected participants for the interviews

Case	Job Title	Experience with the company	No. and length of interviews	Meetings attended	Core responsibilities
<i>Music</i>	Managing Director	12 years	4 x 1.5 hrs	1x board; 3x strategy; 2x weekly performance review; 3x daily ops	Son of the founder with overall responsibility for performance of the business
	Chairman (Founder)	44 years	3 x 2 hrs		Responsible for long terms growth and performance. Also looks after al HR matters
	Operations Director	9 years	2 x 1.5 hrs		Responsible for manufacturing and supply chain
	Finance Director	22 years	3 x 1 hrs		Responsible for financial management and compliance
	Sales and Marketing Manager	4 years	2 x 1.5 hrs		Responsible for marketing, promotion and global sales. Have recently developed the customer facing scorecards
	R&D Manager	13 years	3 x 1.5 hrs		Responsible for technology and new product development
<i>Furniture</i>	Managing Director	20 years	4 x 1.5 hrs	1 x board; 2x strategy; 2x monthly management; 2x weekly review 1x daily ops	Responsible for overall performance of the business and is the key person responsible for innovation
	Production Director	5 years	5 x 1.5 hrs		Responsible for production management. Also key person driving empowerment in production department.
	HR Manager	25 years	9 x 1.5 hrs		Responsible for HR management and recruitment process.
	Accounting Manager	25 years	3 x 1.5 hrs		Responsible for PMM process.
	Marketing and Social Media Manager	1 years	4 x 1.5 hrs		Responsible for marketing with particular attention to social media tools inc. Facebook, Linked-in, Instagram, etc.
	External Consultant	10 years	3 x 1.5 hrs		He was responsible for BSC implementation
<i>Distribution</i>	Managing Director	12 years	2 x 1 hrs	1x strategy; 4x general management meetings	Responsible for overall business performance
	Operations Director	6 years	4 x 1 hrs		Responsible for the overall operations on the site
	Warehouse Manager	8 years	3 x 1 hrs		Responsible for warehouse effectiveness and efficiency
	Marketing Manager	5 years	1 x 1.5 hrs		Responsible for marketing and sales performance
	HR Manager	3 years	1x 1.5 hrs		Responsible for managing HR processes and performance
<i>Bank</i>	Divisional Director for Account Management	6 years	2 x 1 hrs	2x quarterly management; 4x weekly management; 4x daily performance review	Effectively divisional Managing Directors responsible for the overall performance of respective divisions. Also acting as Finance Director of the respective divisions
	Divisional Director for Mortgage Services	14 years	2 x 1 hrs		Effectively Operations Manager responsible for day to day management of their respective divisions. Also acting as HR managers of their respective divisions
	Account Management Team Leader	12 years	3 x 1.5 hrs		Responsible for account management
	Mortgage Services Team Leader	5 years	3 x 1.5 hrs		Responsible for processing mortgage applications
	Account Management Agent	17 years	2 x 1 hrs		
	Mortgage Services Agent	13 years	2 x 1 hrs		

Appendix B – Interview Protocol

PART I: ORGANISATION'S BACKGROUND

- Organisation's history: the company profile, historical background, organisation chart and information on the existing information system and the performance management system.
- Governance structure: family firm; managerial structure, ownership and decision power
- Organisation's business strategy: mission statement, business strategy and key assets and resources.
- Business operation configuration: identification of key processes and products/services; customers/markets, channels, etc.

PART II: MAIN CHANGES IN RELATION TO GLOBAL TRENDS

- Looking into the future, can you tell us what the main challenges your company is facing in the future?
- Has the profile of the employees changed over the years?
- Is there a greater need NOW for coming up with new products, services or ways of working?
- Are your current technologies, products and/or services threatened by developments outside your organisation? What is the nature of these developments? (Trying to explore if the company is being threatened by innovation)
- Are your future/emerging technologies, products and/or services developing/influenced as a result of interaction with customers, suppliers and other organisations and/or people outside your organisation?
- Are you doing or feel you need to do something to become more environmentally friendly?
- Are you doing or feel you need to do something to become more socially responsible?
- Are you finding yourself having to deal more with international and multicultural situations?
- Are you finding the increasing need to work with and relying on the network of other organisations or people in conducting your daily business?
- What is the percentage break down of your revenues between services and products? Is there a trend from pure products to product-service offering?

PART III: QUESTIONS ABOUT COMPANY RESPONSE AND IMPACT ON PMS

- So what are you doing about this?
- How does this impact the way you measure and manage performance?

More specific questions are asked based on the responses in Part II

Appendix C - Impact of business trends on case study companies

	Music	Furniture	Distribution	Bank
Emerging Technologies	High speed internet transformed the product portfolio. It now pioneers technologies that enables customers to enjoy studio master quality music... Products are connected (IoT) and the co. is able to collect data on product performance and its customers' use of the product... Data analytics is enabling the company to refine its products and customer service.	Social media are essential to drive customer relationships, monitor and systematically identify the changes in customers' needs. Data is collected from the production process and the external environment. These data is analysed daily to monitor change in the market, company efficiency and employees morale. They also monitor the impact of weather, customer morale and sales using big-data analytics tools.	Telematics based on Geographical Positioning System (GPS) / Geographical Information System (GIS) for real-time vehicle tracking enable the company to continually monitor the movement of vehicles and its goods. The systems also enable the company to control the temperature and condition of the products they are transporting in order to minimise waste, maximise service levels and efficiencies.	Internet, mobile technologies and Robotic Process Automation (RAP) transformed the way the company delivers its services to its customers through 24/7 on line banking. It is now able to provide better security services through data analytics and AI This has resulted in increased back office work with reduced branches and front office staff. Automation of the processes is also encoring a consolidation through mergers and acquisitions in the sector.
Networking & Collaboration	Collaborated with distributors, network of artists and other stakeholder groups to strengthen the right technical competencies to develop and deliver products and services.	Collaborated with customers, suppliers, designers and university graduates to create a network to complement and prosper their creativity in delivering their state of the art products and services.	Integrated with suppliers and customers to gain the supply chain benefits, but did not feel the importance of disrupting the market by creating a network of stakeholders.	Being a part of a big bank, the business unit did not explore the options of collaboration and creating networks of stakeholders to deliver their mass services.
Servitisation & Value Co-creation	There is a transition of servitising their products into packaged solutions, particularly by co-creating value together through collaborative networks	Although predominantly offering products, they are adding modularity and customisation by co-creating value with collaborators. Created on-line community to support their product and to collect information using social media.	Although they predominantly offer products, they started bundling additional services and co-creating value with customers by delivering solutions to them.	Have seen the reverse of servitisation, i.e., productisation, where they used products such as online and smartphone-based services to replace their existing services. They are co-creating value with their customer networks by providing online self-service
Innovation & Knowledge Work	Constant innovation in line with breakthrough changes in the sector. They realised the need for a more knowledge-based workforce and thus invested to expand their capabilities further through the development of core expertise.	Innovation is constant and much higher than competitors. They have implemented policies in encouraging their employees to contribute towards innovation. They noticed high changing trends in their knowledge-based workforce which mainly affects the younger entrepreneur and younger people.	Innovation is intermittent, and they attempted to embrace recent technological developments for keeping up with the competition. To promote innovation they launched succession planning and introduced workforce mobility raising a knowledge-based work.	Constant innovation in line with breakthrough changes in the sector. However, due to the advent of ICT in their operations, much of the knowledge content was removed from the employees making them disengaged.
Sustainability	Recognised the growing emphasis of sustainability aspects by public, policy-makers and government. However, this is not reflected in their strategy.	Adopting a green approach to designing products they quantify their environmental impact throughout the product life cycle to position their brand in the target market and create competitive advantage. Sustainability is strategically important.	Managing the reverse logistics of their customers to improve competitiveness, profitability and reduce environmental impact. They also run awareness programmes with local communities. Sustainability is strategically important to them.	Reducing energy usage and waste production. They also work with the community and their supply chain to promote this line of thinking such as converting the paper to online statements. Sustainability is strategically important to them.

Appendix D - Impact of business trends on PMM systems and practices

Emerging Patterns	Music	Furniture	Distribution	Bank
Impact of Emerging Technologies	<ul style="list-style-type: none"> IoT and data analytics is enabling product performance and customer usage trends analysis Social network analysis is enabling the company to monitor customer opinion and industry trends. 	<ul style="list-style-type: none"> The use of social media and data analytics are enabling the company to monitor competitors, customer need and customer satisfaction. Social platforms are used to monitor and improve employee morale 	<ul style="list-style-type: none"> The use of telematics has improved availability of timely information resulting in improved efficiencies, utilisation and on-time deliveries, protecting margins and customer satisfaction 	<ul style="list-style-type: none"> Digitisation, analytics, process automation and collaborative technologies is enabling timely communication of rich performance information gathered from internal processes and customers in the form of performance dashboards. Collaborative technologies are enabling faster knowledge sharing enabling timely response to performance issues, improving efficiencies.
Strategic Objectives Changes to strategic objectives	<ul style="list-style-type: none"> Its mission "Music Co makes everything you listen at home better" remains unchanged. The strategies they use to achieve this mission now include collaboration and co-creation with its customers and artists. Strategy comprises of mission and six-monthly milestones 	<ul style="list-style-type: none"> Its mission "to create a new way of life" remains unchanged Product and processes innovation become the main strategic objective, based on empowerment, participation, shared values and social media Information from data is interpreted by the management team to drive decision on new product development and operational changes 	<ul style="list-style-type: none"> Company mission remains unchanged The strategic objectives were changed to include collaboration with its major customers and delivering better co-created solutions. Strategy is managed in a traditional way through annual reviews and deployed through the PMS 	<ul style="list-style-type: none"> The mission remains unchanged and its strategy expressed generically now incorporates automation and customer self-service capabilities. However, how this is achieved for max. effect is left to the operational teams Sustainability became an objective included in corporate reports but not included in operational measures
Performance Measures Changes to the performance measures used	<ul style="list-style-type: none"> Started using evaluating measures to assess their product/service performance when compared to their competitors. 	<ul style="list-style-type: none"> A significant shift from ad-hoc performance measures to a more purposeful and integrated PMS that reflects their strategy. Attention is given to the measurement of the external business environment by means of digital tools. 	<ul style="list-style-type: none"> Started using evaluation measures to improve inputs that go into the innovation process and linked it with their knowledge-based workforce development. 	<ul style="list-style-type: none"> Started using customer and employee satisfaction surveys to evaluate customer and employee perception. Using public perception indicators synthesised from various online/social media sources.
Deployment Changes to the way performance measures are deployed	<ul style="list-style-type: none"> Originally had very generic outcomes and solutions. Measures are deployed to teams of people, inc. external people/ organisations, rather than individuals. Measures are organised to reflect the flow of work through the business (marketing-sales-purchasing-production-customer service-financial). Specific high-level goals are supported with specific KPIs that are developed by operational teams. 	<ul style="list-style-type: none"> Originally had very generic outcomes and solutions. Now specific business goals are deployed to operations but not fully formalised into solutions. The measures used to monitor improvement activities are defined by the operational teams. Visual information systems are used to deploy measures and targets associated with day to day business, with emphasis on projects. 	<ul style="list-style-type: none"> Originally outcomes and solutions prescribed. With the increased focus on creativity and innovation, more measures were deployed for engaging employees on a day to day basis for improving the business performance. Specific outcomes are defined by encouraging employees to drive through improvement they feel appropriate. 	<ul style="list-style-type: none"> Originally outcomes and solutions prescribed. Changed the resolution of control from individuals to work teams; the interval of control from daily measures to weekly measures; eliminated league tables that ranked individuals. Now, emphasis on high-level specific goals but more specific KPIs are now the teams' responsibility.
Changes to the way performance measures are shared	<ul style="list-style-type: none"> Extended to distributors and artists to evaluate product/service performance compared to competitors. Internally, visual management systems are used to engage everyone in a conversation about the performance of the organisation. 	<ul style="list-style-type: none"> Extended to designers and university graduates in order to drive innovation. Use of social media along with paper billboard to share information about company performance. 	<ul style="list-style-type: none"> Extended to its supply chain, i.e., started collaborating with customers and suppliers co-creating improvements. 	<ul style="list-style-type: none"> Evolved from computer generated reports for exclusive use of managers to visual performance reports shared and accessible by everyone working in the bank.
Social Controls Changes to the way the PMS are being used	<ul style="list-style-type: none"> To communicate strategy and engage people in addressing priority issues. Including distributors from downstream supply chain to evaluate performance. The PMS is used as a learning tool, both internally and externally. 	<ul style="list-style-type: none"> Changed the emphasis of PMS and used it as a communication tool with visual displays to empower and engage people as well as solve problems autonomously to promote a continuous improvement culture. Open information sharing. 	<ul style="list-style-type: none"> To promote innovation by developing 100 ways of thanking the employee for changing, developing or improving a service or an element of it. Increasing people engagement and development resulting in an improvement culture. 	<ul style="list-style-type: none"> Changed emphasis from command and control management style to an open and participative management style. Promoted self-managed work teams that empowered people and increased their engagement.