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Expanding industrial design's contribution to manufacturing SME's in Hong Kong by introducing a Balanced Scorecard for industrial design management

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Abstract: Manufacturing small-to-medium enterprises (SME's) in Hong Kong utilise the Hong Kong industrial design profession as a source of competitiveness. However, the contribution of industrial design to these objectives falls short due to mis-aligned priorities and unmet manufacturer needs. This paper and associated literature review discusses the background and context for the creation of a Balanced Scorecard for industrial design management framework. The framework's intention is to provide a robust solution to Hong Kong manufacturing SME's to deal with business volatility and increased competition globally. The context of Hong Kong manufacturing is explored while the foundations and potential benefits of this new and novel framework are discussed.

Keywords: balanced scorecard; industrial design; hong kong sme; manufacturing sme

1. Introduction

Hong Kong manufacturing SME's want to become more strategic in their operation as part of elevating their business model from Original Equipment Manufacturer (O.E.M.) to Original Design Manufacturer (O.D.M.), Original Brand Manufacturer (O.B.M.) and Original Strategy Management (O.S.M.). However, they find the industrial design services available in Hong Kong are mismatched to these objectives. As highlighted by E. C. Yim (2018), industrial design in Hong Kong is under-utilized and doesn't contribute with its full potential. In fact, Yim identifies four aspects on which the two professions mismatch, thus creating a need for rectification.

This conceptual paper discusses the problems, contexts and reasons why a new and novel framework named the Balanced Scorecard for industrial design management may offer

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one effective solution. It focusses on how this framework can potentially help Hong Kong industrial design profession become more valuable and connected to manufacturing SME's in Hong Kong. It discusses the potential benefits and illustrates ways of making marked improvements to Hong Kong's industrial design profession.

This paper is contextualised for Hong Kong manufacturing and industrial design, however, the learnings from this could transfer to similar geographic and economic contexts globally where manufacturing SME's play a role in the economy. Also, modifications to this framework may potentially benefit other design professions which also aim to make significant contributions to business performance.

The following outline provides a brief introduction on the areas covered within this paper. The Balanced Scorecard for industrial design management framework is currently being developed as part of the requirements of doctoral research in industrial design. As such, the framework is yet to be fully created and will not be presented here. Empirical research is required to create and validate this framework which would be done in later stages of the doctoral research. Rather, this conceptual paper and review of literature will discuss the problems, context and influences surrounding its creation. This paper first discusses problems observed in Hong Kong related to a mismatch between manufacturing and industrial design, giving rise to the motivation for this research. It then explains the Balanced Scorecard (BSC) framework which is a business tool fundamental to this research. A brief history is offered and the main aspects of BSC are described, giving insights as to why it is chosen. The paper then discusses how industrial design increases its relevance in firms and how this new and novel framework enhances industrial design contribution. Discussion is made on how the benefits of BSC framework may carry across to Balanced Scorecard for industrial design management and why this new framework represents one solution to the problems in Hong Kong. What follows are deep dives into two scholarly works which also form foundations for this new framework and explains why these works are significant. Reasons why industrial design is key to SME success is then explained by further review of literature. The Balanced Scorecard for industrial design management is then briefly introduced before the paper is concluded by discussing how further research into the creation of this framework will proceed. The message this paper provides for other design researchers is a greater understanding of a Balanced Scorecard for industrial design management. The conceptual paper and subsequent literature can be used for other researchers to determine if a similar framework could/should be considered for organisations relevant to this field.

2. Hong Kong's mismatch problems

E. C. Yim (2018) discovered that Hong Kong industrial designers have weaknesses in manufacturing knowledge, technology knowledge, organisational behaviours and business knowledge. Hong Kong manufacturers require those skills and knowledge from their industrial designers. As highlighted, Yim notes the Hong Kong industrial design profession

fails to meet all the needs of Hong Kong Manufacturing SME's. Other scholars have noted that Hong Kong industrial design profession is not fully addressing manufacturability in the industrial design process (Li et al., 2018). Industrial design in Hong Kong focusses less on manufacturing aspects of product and more on aesthetics and the user's perceptions of products (Lam, Liu, & Yee-Nee Lam, 2016; E. C. Yim, 2018). In addition, the Hong Kong industrial design profession attempts to create value by advocating "for the significance and value of reapplying traditional design wisdom to solve contemporary design problems" (Zheng, 2014). These approaches do not align perfectly with Hong Kong Manufacturing SME's practical and commercially oriented design needs. On the most part, Hong Kong's current industrial design education has left Hong Kong manufacturers frustrated by offering a small array of industrial design strategies (E. C. Yim, 2018). This creates a need for change in the Hong Kong industrial design profession and asks how they can better meet Hong Kong manufacturers' needs.

At the same time, Hong Kong SME's can benefit from a more strategic approach (E. Yim, 2015). However, on an individual firm level, many SME's lack a clear strategy (Rompho, 2011), let alone one to lead them to a more competitive state. Their diversifications into realty, the volatile business environment, increasingly selective tastes of customers and advancements in manufacturing technologies (E. C. Yim, 2018), not only leave them in a weakening position, but the lack of proactiveness in being more strategic only amplifies the disabling nature of the problem. These gaps in alignment are widening and the need for a more strategic approach are of utmost importance. Manufacturers are not making the most of industrial design strategies to contribute to firm performance and create value (E. C. Yim, 2018).

This conceptual paper reviews relevant literature that contributes to creation of a new framework named Balanced Scorecard for industrial design management. The framework combines BSC with industrial design strategies to potentially become a robust solution substantiated by over 25-years of research. The new framework not only allows firms to create and plan a firm strategy, it also ensures every member of the firm is acting to deliver what is in the firm's best interests.

3. Balanced Scorecard (BSC) background

The BSC was developed by Kaplan and Norton in 1992. In their Harvard Business Review article, the researchers likened the BSC to "dials in an airplane cockpit: it gives managers complex information at a glance" (R. S. Kaplan & Norton, 1992). It is a business performance management and strategic planning tool that is highly effective at creating financial and non-financial firm improvements. In literature (BSI, 2008, 2018; Coe & Letza, 2014; R. Kaplan & Norton, 1996; R. S. Kaplan & Norton, 2001, 2005), BSC has been applied to a wide range of firms with great success. BSC measures a firm's performance through four important perspectives: financial, customers, internal processes, and learning and growth perspectives. These four perspectives exist as both financial and non-financial aspects. This is a strength of the BSC since it overcomes "limitations of managing only with financial measures"

(Davig & Brown, 2004) and managing with a “narrow and incomplete picture of business performance”(R. S. Kaplan & Norton, 1992) when relying purely on financial measures.

BSC combines important business areas which can be “disparate” into a single managerial report. The holistic view of the firms’ overall strategy prevents errors by showing managers “whether improvement in one area may have been achieved at the expense of another” (R. S. Kaplan & Norton, 1992).

Literature relating to both the BSC and SME's became more popular during the first decade of the 21st Century. Before this period, a literature review was not in existence (Sousa, Aspinwall, & Guimarães Rodrigues, 2006; Taticchi, Tonelli, & Cagnazzo, 2010). Early on, SME's were neglected somewhat with regards to BSC and importantly for this study, there has been very little literature on the link between a BSC approach and industrial design.

BSC “translates mission and vision statements into a comprehensive set of objectives and performance measures that can be quantified and appraised” (Bain, 2019). A key aspect of BSC is to “balance lagging indicators with leading indicators” (Mair, 2002). Lagging indicators describe what has happened, while leading indicators “attempt to quantify future results based on current actions” (Mair, 2002). Kaplan and Norton suggest the ideal BSC has “lead and lag indicators applied horizontally within the areas and vertically between areas” (R. S. a. Kaplan, 1996).

Mair (2002) was able to identify critical success and failure factors in implementing BSC for SME's. Success factors include mobilising change through executive leadership; making strategy a continual process; aligning organisation to the strategy; making strategy everyone's job; monitoring and reporting progress regularly; getting an objective (external) opinion on the developed BSC; and treating the BSC as a dynamic document, adjusting it to changing conditions. The pitfalls discovered include failing to communicate and train; having no accountability; measuring that does not focus on strategy; measures that are tied to compensation too soon; employees not being empowered; and having too many initiatives. Literature notes that training is clearly tied to effective BSC implementation (Sitkin, Sutcliffe, & Schroeder, 1994; Walton, 1986). This was evident from Sousa et al. (2006) who found UK SME's focus most on this area when implementing BSC.

Fernandes, Raja, and Whalley (2006) investigated a manufacturing SME with little familiarity with BSC and some level of scepticism as well as reluctance toward BSC's implementation. To meet this challenge, a robust 8-step implementation was devised to emphasised firm buy-in. Heavy input and involvement from the researchers replaced the traditionally top-down implementation approach (Papalexandris, Ioannou, & Prastacos, 2004). Part of the their insight was that Individual departments need to be held accountable if true buy-in can be achieved (Jude Fernandes, Raja, & Antony, 2001). Since M. B. Beverland, Micheli, and Farrelly (2016) highlight departmental conflicts as a barrier to increasing industrial design's contribution and status, the implementation model of Fernandes et al. (2006) will greatly help to smooth out such conflicts.

Rompho (2011) is a scholar noting a fault with BSC in SME's. He cited “frequent strategy

changes that require revision of the BSC is another important factor that determines the success or failure of implementation.” Although this research was based on a single case study, it does point toward some problems in similar ways to Hudson, Smart, and Bourne (2001). Pekkola, Saunila, and Rantanen (2016) cites inflexibility and involved implementation as reasons making the BSC unsuitable for SME’s in turbulent environments.

R. S. Kaplan and Norton (1992) highlight how BSC allows a firm strategy to be formulated with the best interests of the firm at its heart. It also plots a course for individual departments and even individual colleagues to join hands and deliver on this strategy from the highest to the lowest levels of the firm. BSC is not only a strategic plan, it is also a performance measurement and management tool that ensures what a firm sets out to achieve is quantitatively measured and successfully implemented over time. The simple, holistic and practical nature of BSC are some of its great strengths.

However more recently, Heinicke (2018) conducted systematic literature review of performance management systems (PMS) in SME’s and family firms. The review featured examples and evidence of effective BSC deployment in an SME context, lending support for BSC’s use in SME’s. Malagueno, Lopez-Valeiras, and Gomez-Conde (2018) offers quantitative data that shows BSC leads to improved financial performance for SME’s. In particular SME’s which are more established as opposed to start-up SME’s. The researchers found that BSC enhances organisational efficiencies without apparent reductions in firm flexibility. This discovery is important since it refutes earlier researchers suggesting BSC implementation required a higher level of firm structure in order to be successful (Pekkola et al., 2016; Rompho, 2011; Taticchi et al., 2010). As such, the affirmations for BSC usage in SME’s support the creation of a Balanced Scorecard for industrial design management framework which targets Hong Kong SME’s.

4. Industrial design strategies for SME’s and how these can be complemented by this framework

There is extensive literature exploring how industrial design can create and capture customer value. These industrial design strategies cover a wide array of opportunities for Balanced Scorecard for industrial design management to enhance through measurement of performance and management by firmwide strategy. For example, contributing to scientific experiment design to ascertain a better research direction (Thong & Kuys, 2012), using “inclusive design principles to develop appealing assistive products” (Kuys & Renda, 2013), improving design outcomes through special focus on design brief formulation (Yang & Renda, 2019) or use of “frugal innovation” (Rao, 2018; Weyrauch & Herstatt, 2017) to create new product concepts cheaply and rapidly. The framework in this research can support these strategies by integrating them into one which involves the entire firm and appends appropriate measures that quantify staff contribution. Regardless of whether the strategy (or strategies) occur at the front-end of the product development process, or represents a firmwide paradigm change, industrial design strategies can be integrated into this framework

to create a firm wide strategy.

Industrial design strategies involving higher degrees of firm participation may include work on a firm's "value creation design" where its business model and value networks are designed for increasing profit (Schneider, Mittag, & Gausemeier, 2017). Or, industrial design could capture value through the use of design thinking to enhance innovation of products, systems and services (Kleinsmann, Valkenburg, & Sluijs, 2017; Tabeau, Gemser, Hultink, & Wijnberg, 2017). These types of high involvement strategies can be very well supported by a Balanced Scorecard for industrial design management because of its ability to clearly delegate responsibilities and involvement to each member of staff. It clearly allocates measures to these staff so that they are aware of how they can achieve the required results. For example, one measure within a learning and growth perspective may be to evaluate the adoption of design thinking in the firm after six, 12 and 24-months. Another measure may be to evaluate the number of new product ideas generated since the introduction of design thinking to the firm.

A knowledgeable framework implementer may pair this framework with any type of industrial design strategy. For example, a firm engaging in design-led innovation to improve a business model, repositioning the business and its offerings in the market to become more innovative (Townson, Matthews, & Wrigley, 2016) would require an implementer who is well versed with such a transformation. He/she would be tasked with determining the right set of measures for the process together with management and staff. Another example may involve designing for manufacture and assembly (DFMA) to reduce part-costs (Bin Ahmad et al., 2018) or the "servitization" of products by offering "services in combination with their products" (Kuijken, Gemser, & Wijnberg, 2017).

There are many examples of how industrial design strategies can contribute to firm performance. What is discussed here is a small selection with due respect to the limitations of this paper. When implementing this framework with various industrial design strategies, a list of benefits exists for firms.

5. Benefits of BSC that are potentially shared by Balanced Scorecard for industrial design management

Balanced Scorecard for industrial design management can be matched with any industrial design strategy listed above. This unrestrained flexibility of the framework is one of its great strengths. It achieves this by measuring any industrial design strategy from four financial and non-financial perspectives found in BSC. Thus, manufacturers can implement this framework no matter what their goals, objectives or intended choice of industrial design strategy is.

The framework allows a firm to adjust its strategy over time, too. During implementation, the firm's chosen strategy can be adjusted, combined with other strategies or altered to address the changing business environment. Since the resultant Balanced Scorecard for industrial design management document is designed for ongoing adjustments, firms can use it flexibly to free itself from limitations rising from changing business environments.

The heart of Balanced Scorecard for industrial design management is its ability to bring clarity and transparency to the contributions of industrial design. It holds actors in the firm accountable to their allocated measures and allows management to see exactly what is achieved in each component of an industrial design strategy. The benefit of this framework is that industrial design can now be measured across the entire firm down to the individual employee. Benefits include quantification of performance for decision makers and the elevation of industrial design to the forefront of management's attention.

Firms in Hong Kong managing industrial design can benefit from using this framework by quantifying how industrial design adds to firm performance. Since the framework makes explicit the contribution of each perspective, mapping industrial design to these perspectives clarifies its contribution, where measurable performance can be managed (Ridgway, 1956).

By integrating disparate business areas into a single report, industrial design is integrated into a firmwide strategy, thus potentially raising its level of importance in the firm. By identifying lag/lead indicators in the context of industrial design, time versus value creation/capture reveals an added dimension to understanding the contribution industrial design has on a firm.

For Hong Kong SME's, it represents an attractive option that may support its navigation through a volatile/uncertain/complex/ambiguous (VUCA) business environment (Cousins, 2018) which they find themselves in.

To summarise, all benefits experienced in a typical BSC implementation can potentially carry across to this new framework. The work will need to be done in the doctoral research to determine the degree to which this is true.

In literature on increasing the contribution of design, different models and frameworks can be found. For example, various models have similarly considered design as capability or as resource (Acklin, 2013; DDC, 2003; Kootstra, 2009; Westcott et al., 2013), as a contributor to branding and firm strategy (M. Beverland & Farrelly, 2007), as requiring cross-firm acceptance and cross-functional collaboration (Bilson & Aitchison, 2016; Micheli, Perks, & Beverland, 2018), and as process guided by design maturity models with various measurement metrics (Acklin, 2013; DDC, 2003; Kootstra, 2009; Westcott et al., 2013).

Micheli et al. (2018) found critical success factors for increasing industrial design contribution to a strategic level to include: top management support, leadership of the design function, generating awareness of design's role and contribution, inter-functional coordination, evaluation of design, and formalisation of product and service development processes are all necessary ingredients.

For Balanced Scorecard for industrial design management framework, achieving these types of success factors is integrated into its conceptualisation. For example, when a firm's management commits to this framework it will inherently accept that industrial design will play a major part in the firm's competitiveness. It will involve commitment and buy-in from management down to individual staff and will require different departments in the

firm to work toward the same goal. The great advantage of this framework is that design is consequently formalized and permeated throughout the firm. Once performance measures are in place for each department, the firm can focus on delivering the strategy that will bring them success.

Potential applications for this framework may include helping inexperienced firms to introduce industrial design to their business in a transparent and measurable way, supporting a firm's elevation in design maturity to become more competitive, increasing the performance of an existing industrial design department or measuring the effectiveness of increased investment into industrial design over the short/medium/long term. Beyond strictly industrial design related applications, the framework can be adapted to facilitate similar results for other professions. For example, the framework can measure fashion design contribution to firm performance for a fast-fashion brand, manage architectural design client expectations (Wong, Lam, & Chan, 2009) or to improve civil engineering sub-contractor selection (Ng & Skitmore, 2014). Further to this, synergy can be created through this framework by integrating inter-disciplinary design efforts into a single cohesive strategy map. The map would clarify how each design discipline would contribute to positive performance in such synergistic projects. For example, by including a sustainability measure (Wang, Chang, Williams, Koo, & Qu, 2015) to BSC in projects geared toward environmental benefit to society, synergy between multiple design disciplines can be integrated into a single cohesive strategy map and performance measurement plan.

6. Balanced Score Card and Design Value

Mozota (2006) created a conceptual framework which combines design and management. Seeing misalignments between the two professions yet both having to operate in firms together, Mozota offers a single holistic framework to combine the work of both parties. "A value model in design management" aligns the "four powers of design" with the four aspects of Kaplan and Norton's Balanced Scorecard. Besides this, Zizlavsky (2016) created an original conceptualisation called the Innovation Scorecard which is based on the stage-gate process and the Balanced Scorecard. These two frameworks serve well to measure and manage design/innovation performance. The referencing to these two frameworks represents two separate but equally valid versions of the BSC for industrial design management. Although they are conceptually similar, the purpose of this research is to create a suitable and effective framework to help Hong Kong manufacturing SME's. As such, these two versions hold much validity and contribute to the creation of this framework.

7. Reasons why industrial design is key to SME success

To benefit SME's on a long-term basis industrial design can become more strategic in its approach, "influencing decisions and setting direction on issues related to long-term sustainability and competitiveness" (Luchs, Swan, & Creusen, 2016). Raising industrial design's level of influence brings benefits. It is instrumental to the creation of new markets

(IDSA, 2019) and adds value to SME's (Mak, 2018). Strategic industrial design "drives innovation, builds business success, and leads to a better quality of life through innovative products, systems, services, and experiences" (WDO, 2015). Through engaging with industrial design, firms can achieve greater competitive advantage as well as support innovation (Hernandez, Cooper, Tether, & Murphy, 2018).

8. The beginnings of an integrated solution

The Balanced Scorecard for industrial design management aims to deliver a robust framework for performance measurement and performance management to Hong Kong Manufacturing SME's. The framework is based on a commonly understood strategy statement which is permeated throughout the entire firm. The robustness of this framework improves businesses no matter the sector or size. It gives firms a clear and explicit way to achieve improved firm performance in a step-by-step manner. Once the system is set in place through a tailormade implementation plan, the firm carries out the required tasks and iterative progress until improvements become evident over time. The main differentiation between the traditional BSC and Balanced Scorecard for industrial design management include the following:

1. BSC looks at measuring the entire firm's performance based on general performance improvements whereas this framework starts with the premise that industrial design will take a strategic lead by dictating the direction of the firm. Thus, all other departments within the firm contribute to increasing competitiveness through high deployment of industrial design.
2. BSC is a performance management tool which measures a firm's performance down to the individual level whereas this framework also does this but has the capability to raise industrial design to a strategic level, increasing the firms design maturity.
3. BSC uses a generic firm strategy which is based on the firm's competitive competencies, whereas this framework creates a business and design strategy allowing performance measurement using best practice design metrics and measures.

By proposing the Balanced Scorecard for industrial design management as a solution to the mismatch between the Hong Kong industrial design profession and Hong Kong SME's expectations, Hong Kong gains a reliable framework for leading SME's to a better future and greater competitiveness. Hong Kong's leading position in the Greater Bay Area of China has been seriously challenged by the rapid rise of neighbouring Shenzhen (Heaver, 2016). What is being proposed leading out of this conceptual paper and literature review, is a new and novel framework that enables industrial design to enhance Hong Kong SME competitiveness.

9. Conclusion

The Balanced Scorecard for industrial design management — a new conceptual framework — refers to the knowledge areas reviewed in this research. A robust framework that takes advantage of what Hong Kong industrial design profession has to offer through a diverse range of value adding methods and techniques. Industrial designers can implement any one or combination of these strategies to generate value for Hong Kong Manufacturing SME's. By moving up the value chain, the Hong Kong industrial design profession can help Hong Kong Manufacturing SME's step up in strategic focus from O.E.M. to O.D.M., O.B.M. and O.S.M.. The Balanced Scorecard for industrial design management framework provides a clear and 'easy to use' performance measurement and management framework for Hong Kong SME's to achieve increased strategic focus and become more competitive.

Through implementing this new framework, design maturity and contribution of industrial design for Hong Kong Manufacturing SME's is raised as a consequence; with benefits such as "cost savings, revenue gains, productivity gains, speed to market, and brand and market position improvements through their design efforts" (InVision, 2018).

Importantly, when a firm commits to increasing the contribution of industrial design and attracting more value from the market, they will have a robust and proven method for doing so. The framework will help limit risk with industrial design engagement, as well as an increased understanding of the impact industrial design can have on a firm. In the same instance, since many SME's are not endowed with a thorough strategic plan (Rompho, 2011), and strategic directions change often, a clear mission and vision that is translated into a workable and executable strategic and performance plan is all the more necessary. This would help SME's navigate the VUCA business environment.

Moving forward, the doctoral research will use empirical research methods to create, implement and review this new and novel framework with suitable research subjects. This research will propose questions related to this framework's effectiveness and suitability to addressing problems found in Hong Kong manufacturing SME's. It will seek to create a thorough and well considered framework that would be robust and adaptable to the many firms which require such a solution.

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