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Ensuring Survival through Business Process Re-Engineering (BPR) in the Manufacturing Industry: The Case of a UK SME

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Summary

Purpose

The British plastics processing industry is facing increasing pressures from competition, new technologies and increasing globalisation. This research investigates how a British family-owned plastics injection mouldings manufacturer uses Business Process Re-engineering (BPR) and Kaizen to ensure improvements in operational performance and their ability to compete with firms from overseas.

Design/Methodology/Approach

This case study investigates the processes of operational performance improvements in the case organisation. Primary data was collected from semi-structured interviews with key experts from the company and document analysis. This identified key themes that were related to strategic decisions to radically redesign their business processes in order to achieve improvements in critical performance indicators.

Findings

The firm's radical redesign of business processes achieved improvements in critical performance indicators such as cost, quality and service, as well as ensuring their financial and market position in the face of the competition from the Far East and Eastern Europe. Business Process Re-Engineering (BPR) brought transformational change in the key areas of people, process, planning, product, and price. They also took account of the human side of re-engineering by shifting from a top-down autocratic approach to a flat company structure.

Originality

Access to a family-owned Small and Medium Enterprise (SME) offered a rich contextualised knowledge and understanding of BPR implementation practices. These practices are seldom documented in the literature and manufacturing firms find it challenging to implement BPR. The conclusion emphasises the contradictions between general BPR theory and actual practical implementation. One reason for these inconsistencies may be the vast academic differences and lack of consensus as to what constitutes 'pure' BPR. This work addresses the paucity of empirical studies of BPR in family-owned SMEs. It also meets calls to investigate the processes of lean manufacturing and continuous improvement (CI) in specific contexts.

Abbreviations

BPR – Business Process Re-Engineering
CI – Continuous Improvement
SME – Small to Medium Enterprise
KPI – Key Performance Indicator
MRP – Material Requirements Planning
OEE – Overall Equipment Effectiveness

Keywords

Kaizen, Business Process Re-engineering, Operational performance, Continuous improvement, Lean manufacturing, Plastics processing, SME

Introduction

The plastic processing industry in the United Kingdom of Great Britain and Northern Ireland (UK) is subject to increasing pressures of competition, new technologies and increasing globalisation within the marketplace (Bettis & Hitt, 1995, British Plastics Federation, 2022). The industry has decreased dramatically due to original equipment manufacturers closing or reducing their operations, or moving to Eastern Europe or Asia (O'Regan, et al. 2011). Despite growing external threats, the plastics industry within the UK is described as “one of the major strengths in UK manufacturing (Hall, 2016), where in 2022, turnover within the UK plastics processing industry was estimated at £25 billion (British Plastics Federation, 2022). Within 5,800 firms, 155,000 people are employed within the plastics processing industry in the UK, which makes the plastics manufacturer the third largest employer.

This paper explores the implementation of Business Process Re-Engineering (BPR) and Continuous Improvement (CI) methods within a case study firm – a family-owned plastic injection moulding company which implemented BPR to change from manufacturing small injection mouldings and focus on their core competency of medium to large mouldings.

This decision reduced competition with Chinese companies on cost through economies of scale when shipping larger components from the Far East.

Qualitative methods of data collection, such as semi-structure interviews and document analysis were adopted to answer the primary research question:

How can a family-owned SME implement BPR and CI to achieve increased operational performance and competitiveness?

There is a paucity of literature on BPR, especially in SMEs, and responds to calls for further research related to lean manufacturing and six sigma in SME plastic manufacturers to achieve improved performance and competitive advantage (Desai & Prajapati, 2017). Throughout the paper, the authors evaluate how far these methods have been successful.

Theoretical Background

Western manufacturers are under increasing pressure to be more innovative against increasing competitiveness and rapid growth from low-cost emerging economies. Small to Medium Enterprises (SMEs) are extremely important in the UK economy, accounting for 99.9% of the business population and 61% of private sector employment (National Statistics, 2022). However, smaller firms are facing significant pressures of excessive costs associated with manufacturing and accessing a vast market of potential customers (Malhotra & Temponi, 2010).

Despite their crucial economic importance of SMEs, they are often controlled by resource-constrained managers with limited planning or foresight capabilities (Eisenhardt & Brown,

1998). With limited resources and capabilities, it is difficult for these firms to deal with a heightened level of uncertainty (Gupta, et al. 2004). In particular, SMEs lack strategic foresight, direction and commitment by top management in terms of improvement projects (Powell et al. 2013)

Production planning and control processes within firms are crucial for meeting increasingly high customer demand in a highly competitive manufacturing climate within the UK from domestic and overseas competitors (Stevenson, et al. 2005). Since the industrial revolution in the UK, several methods for planning and control of the flow of materials in production process have been developed (Jonsson & Mattsson, 2006). These include push and pull systems.

Push and Pull Systems in Manufacturing Management

Hopp & Spearman (1996) distinguish 'push' and pull' factors as the two primary techniques for managing workflow (Ballard, 1999).

Push-based systems release work into the production process based on pre-established delivery dates.

Pull-based systems allow work into the production process based on the state of the process.

A push factor common to manufacturing is a Material Requirements Planning (MRP) system which is usually put in place as a generally applicable method of planning (Jonsson & Mattsson, 2006). The strength of MRP is where the production involves complex standardised products and product options, long manufacturing lead times, and items with time variations and uneven demand (Plenert, 1999; Jonsson & Mattsson, 2003). However, a common criticism of MRP, and push-planning in general, is that it assumes infinite capacity of production (Ballard, 1999). This is especially a problem within SMEs, where production capacity is more limited than their larger counterparts (Persona, et al. 2012; Shah & Ward, 2003).

A pull production, is considered as a method of workload control. The job entry level considers demand and capacity management when deciding whether to accept orders (Fredenall, et al. 2010). Slack (2016) notes that "pull control" is the exact matching of supply and demand wherever possible. Ballard (1999) champions the use of pull planning in the design and manufacture of goods, where jobs are pulled by successive workstations. No process upstream should produce goods or services until a customer has asked for it downstream (Womack & Jones, 1996). As a planning technique, pulling matches up various elements needed to perform tasks within production, whereas reliance on schedules made in advance impacts quality, adds costs and time (Ballard, 1999).

The use of lean pull production was first introduced at Toyota in Japan and was well documented by Sugimori, et al. (1977) during the post-war Japanese Miracle (Johnson, 1982). Just-in-time production, commonly referred to as the Toyota Production System, aims to reduce both production and response times from suppliers and to customers (Taiichi, 1988). Just-in-time production involves Kanban which is the Japanese word for "tag" as a simple form of communication that is always at the point where it is needed (Ohno, 1988). Advantageous to SMEs, lean pull production focuses on increasing value creation and reducing waste in all forms by shortening the time between customer order and shipment. It also aims to cut costs and improve quality by identifying and eliminating waste in the value stream (Bakås, et al. 2011).

Krajewski, et al. (2013) raises the argument that for a successful lean operation, the firm should ensure that the process consistently meets customer expectations. This can be achieved by adhering to the practice of quality at source. Quality at source and total quality assurance practices improves quality of output as well as effective use of available resources. A greater focus on design and up-front development yields greater results (Gunasekaran, et al. 1994).

The theory of constraints focuses on bottlenecks in production, and highlights potential issues around the lean process. It is important to recognise the significance of capacity constraints in the planning process (Slack, et al. 2016). By balancing flow, not capacity, around the processes that rely on heavily loaded resources (bottlenecks), firms can ensure that their lean production process never runs out of work (Slack, et al. 2016). Through network analysis, firms can identify bottleneck by plotting their critical path via a diagram (Slack, et al. 2016, p.665); the critical path of a project represents the shortest time that a project can be completed and identifies those tasks which will have detrimental effects downstream if they are delayed.

Push and pull systems are used as part of the production management. They are intended to preserve the status quo. Continuous improvement (CI) is an underlying principle in lean manufacturing (Brunet & New, 2003). This implies the ongoing improvement of products, services or processes.

Incremental Improvement in Manufacturing

The Japanese process of Gemba Kaizen (Kaizen), a cornerstone of the lean system, relates to incremental but ongoing improvements to all aspects of the operations, in particular quality (Barnes, 2018). This implies that continuous small incremental changes of the standard way of working, involving the whole organisation, (Chen, et al. 2000; Malik & Yezhuang, 2006). The Kaizen Umbrella is a metaphorical representation of the techniques covered by Kaizen including: kanban, total productive maintenance, six sigma, automation, just-in-time; suggestion system and productivity improvement (Imai, 1986). The overarching philosophy is to increase productivity whilst producing high-quality products with minimal effort (Deniels 1996; Reid, 2006) involving all employees. It is the key role of each supervisor to place the emphasis on teamwork, flexibility and quality, where teamwork comes from direct communication between the individual and their senior (Wickens, 1990).

Brunet & New (2003) argue the case that the concept of Kaizen has been lost in translation when misinterpreted by western firms, and is particularly critical of Imai (1986) for not providing a detailed explanation. Brunet & New (2003) argue that the concept of Kaizen is not merely the increase of communication of employees to their seniors, rather the mobilisation of the entire workforce. One principle of lean production is to tap into workers' knowledge of production processes in the pursuit of improvements (Barnes, 2018). By leading from the front, the Kaizen approach of involving employees plays a crucial role in employee motivation, where historically, Western methods of disaggregation and routinisation in firms left workers disenfranchised from the autocracy within management (Barnes, 2018).

Imai (1986) suggests that the concept of Kaizen is "so deeply ingrained in the minds of both managers and workers that they do not even realise that they are thinking Kaizen"; The practice suggests that Kaizen is a "*pervasive global programme which subsumes total quality management, just-in-time; and total production maintenance*" (Brunet & New, 2003). The wide variety of interpretations is that it has kept Kaizen free from controlling influences. Proponents have been able to cherry-pick the best elements of other systems and methodologies (Brunet & New, 2003).

It is important to note the difference between CI through Kaizen and innovation. Kaizen signifies small improvements made in the status quo because of ongoing efforts. Innovation involves radical improvements in the status quo because of large investments in new technology and equipment (Hammer & Champy, 1993). Barnes (2018) argues that Westerners generally believe that to improve performance, money must be spent. Western firms will completely disregard Kaizen in favour of more radical changes. However, within Japanese firms, radical change only comes when other opportunities for improvements have been exhausted (Barnes, 2018). Similarly, Singh & Singh (2009) suggest that only when

opportunities for Kaizen have been exhausted, then firms should seek opportunities for Business Process Reengineering (BPR).

BPR requires a radical change to business processes in an organisation while CI is the continuous effort to improve performance in critical success factors.

Radical Improvement in Manufacturing

Hammer & Champy (1993, p.32) define BPR as:

“the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as costs, quality, service and speed”.

Krajewski, et al. (2013) suggest BPR is the antithesis and natural progression from an exhausted Kaizen process, and that BPR usually brings larger payoffs (O’Neill & Sohal, 1999) However it is often met with workers’ disdain, where change management processes will also be required for a smooth transition.

Slack, et al. (2016, p. 546) argue that BPR is the amalgamation of various management ideas that have been present for a number of years, and consists of:

“lean concepts, process flow charting, critical examination in method study, operations network management and customer focused operations all contribute to the BPR concept”.

Barnes (2018, pp.436-437) argues that BPR involves four processes:

- Elimination of all non-value adding activities
- Simplification of all remaining tasks as much as possible
- Integration of tasks by combining two or more into one
- Automation of processes wherever possible using the latest Information Technology

BPR is not intended to preserve the status quo of an organisation, rather fundamentally change processes. Where there is a need for radical change, a change in the culture is also necessary (Davenport, 1994). The argument for culture change is where BPR is the ultimate successor for Kaizen. Unlike Kaizen, BPR has a top-down approach (Hammer & Champy, 1993) and is often criticised as being synonymous with staff lay-offs (Barnes, 2018). Whereas Kaizen, as previously argued, involves the mobilisation of the workforce as the driving force for CI.

Many see BPR as another cost-cutting exercise (Barnes, 2018). It is a high-cost process which brings radical change, but is not popular with workers. Organisations are faced with the strategic decision as to whether they need to improve their processes radically or incrementally to achieve an increased operational performance and competitiveness.

Whilst planning systems have all been designed to provide support to firms, most systems will vary in applicability, where the environment and industry will determine the extent, they can be used (Berry & Hill, 1992; Schroeder et al. 1995; Newman & Sridharan, 1995). The purpose of this research project is to investigate how a family-owned SME injection moulding firm implements CI and BPR to improve operational performance and competitiveness.

Methodology

The research project has adopted a single case study research design. This explores a research topic or phenomenon within its context (Warren & Bell, 2022). Yin (2009) highlights the importance of context within a research project. In a case study, the boundaries between the phenomenon being studied and the context within which it is being studied are not always

apparent. This study used an inductive qualitative approach as it is designed to explore the processes related to improving operation performance and competitiveness of an SME firm.

The case study firm is a family-owned plastic injection moulding company founded in 1967, producing medium to large injection mouldings between 500-12,000 grams in weight. One of the reasons for choosing this firm is its policy of lean manufacturing to form a culture synonymous with CI. It has ceased manufacture of injection mouldings under 500 grams to focus of their core competency of medium to large mouldings. This was due to growing pressures from competitors in China being able to produce the mouldings at a lower cost. Focusing on larger components enabled them to be more competitive by shipping larger components from the Far East.

Face-to face semi-structured interviews were adopted as it allows the researchers to further explore the research question and objectives given the nature of events and perspectives in the case study firm. This flexibility enables in-depth key themes and key questions, with additional questions so respondents can expand on their answers. A richer perspective of the concepts of BPR and Kaizen and further details were obtained through research in a live setting (Saunders, et al. 2012).

Primary qualitative data was collected from key experts involved in improvement projects in the firm. In total, four interviews were conducted with the managing director (CDM1), director of operations (CDO1), director of finance (CDF1) and a quality worker (CWQ1). Secondary qualitative data was collected to support the data gained from the interviews. The directors provided information logs pertaining to efficiency of machinery, along with evidence of improvements in the production line.

Shop floor observations were conducted and document analysis including flowcharts of processes and company's presentations and training manuals. The semi-structured interviews were audio-recorded and then transcribed as suggested by Saunders, et al. (2012). The secondary data was triangulated with the findings of the interviews which increased the validity of the data (Saunders, et al. 2012).

The inductive approach to the collection of primary qualitative data allowed for key themes to be identified, analysed, and synthesised throughout the data collection process (Yin, 2009). Saunders, et al. (2012) note that data should be analysed as it is collected to ensure that a conceptual framework is developed to guide subsequent work. Key themes have emerged from the study using thematic analysis (Braun & Clarke, 2013).

Results and Discussion

The Impact of the Strategic Decision to Implement BPR

During the interviews with each of the directors the importance of BPR became apparent very quickly. The finance director highlighted that radical change was required to ensure that the business was able to continue trading:

"In 2009, when there was the recession, we were actually losing money, there was no cash in the bank [...] There was not enough money coming in to reinvest." (CDF1)

The operations director elaborated on the initial need for BPR:

"Products from Eastern Europe and China landed in the UK for way below the price that we, and companies like ours, could offer. So, we could not compete in that market. Most of these types of businesses were moving from the UK to Eastern Europe and China. To this day, that is still the case." (CDO1)

There had been a radical redesign of business processes in order to improve critical performance indicators such as cost, quality and service and to ensure competitiveness. The

initial decision to use BPR in 2009 radically changed how the firm operated. A decision was made to change the firm's core product offering from smaller plastic parts to larger plastic parts. This required a significant investment into new, larger machines. The decision was viewed as a strategic one, as the firm needed to improve its financial and market position in the face of the competition from the Far East and Eastern Europe.

Implementing BPR required an overhaul of the firm's product offering, from smaller mouldings to larger mouldings. The managing director outlined that, where small moulding parts from Eastern Europe and China could fit inside a shipping container, allowing foreign firms to compete with British firms. Larger parts from foreign firms were less effective at absorbing shipping costs:

"The container costs from the Far East and Eastern Europe, from China now, it's £1500 to get a container. If you've only got 300 parts in there, those 300 parts have got to absorb that £1500, there's no getting away from it. The same from Eastern Europe, even a 40ft container or an arctic container from Eastern Europe, it's still £600-£700 before it's landed in the UK. And again, if you only get 500 parts coming over, it adds £1 per part straight away." (CDM1)

Moving over to larger mouldings, the firm was no longer competing against China's competitors and had fewer competitors in UK.

The finance director explained that an SME could not make such a radical change instantly. It needed an investment of up to £450,000. It was a slow shift of business direction over several years:

"We got rid of a few smaller machines and bought one bigger machine. So, it wasn't all in one go. We bought one, we didn't have the work for it, over time we managed to fill that one up. That then gave us the confidence that we were going in the right direction." (CDF1)

The operations director commented that the decision to move to larger machinery was advantageous. Around £3,000,000 has been invested for this within the last eight years. This strategic decision allowed the firm to survive in the market:

"Products from Eastern Europe and China] landed in the UK for way below [the price that] we, and companies like ours, could offer. So, we could not compete in that market, it was a decision that we had to make. Chances are, we would not have survived in the market." (CDO1)

Other competitors failed as they did not see the necessity to go into large moulding at the right time. BPR not only secured survival but also allowed them to establish themselves as strong competitors in the marketplace servicing business-to-business customers. They were also able to expand their products in the automotive, housewares, building and brewery industries.

Effectiveness of the Business Process Re-Engineering

Prior to the research project, the layout of the shop floor had been reengineered to increase the effectiveness and efficiency of how tooling is loaded into the injection moulding machines. The operations director outlined the process involved to maximise efficacy and efficiency:

"We aligned eight machines in a row and bought in a low-level overhead crane to deal with putting the dies in and out. [...] What that means is, when we change the dies over, what used to take an hour-and-a-half is now taking forty-five minutes. We can do shorter production runs, which means less storage, improves your cash flow. Where we would have previously had storage space, we can put another machine there to increase production." (CDO1)

The change on the shop floor may be considered a radical change which led to improvements in the metrics of “Overall Equipment Effectiveness” (OEE).

OEE is a measure of:

Actual quantity of goods or products produced in the scheduled production time ----- compared with ----- Total quantity that could be produced

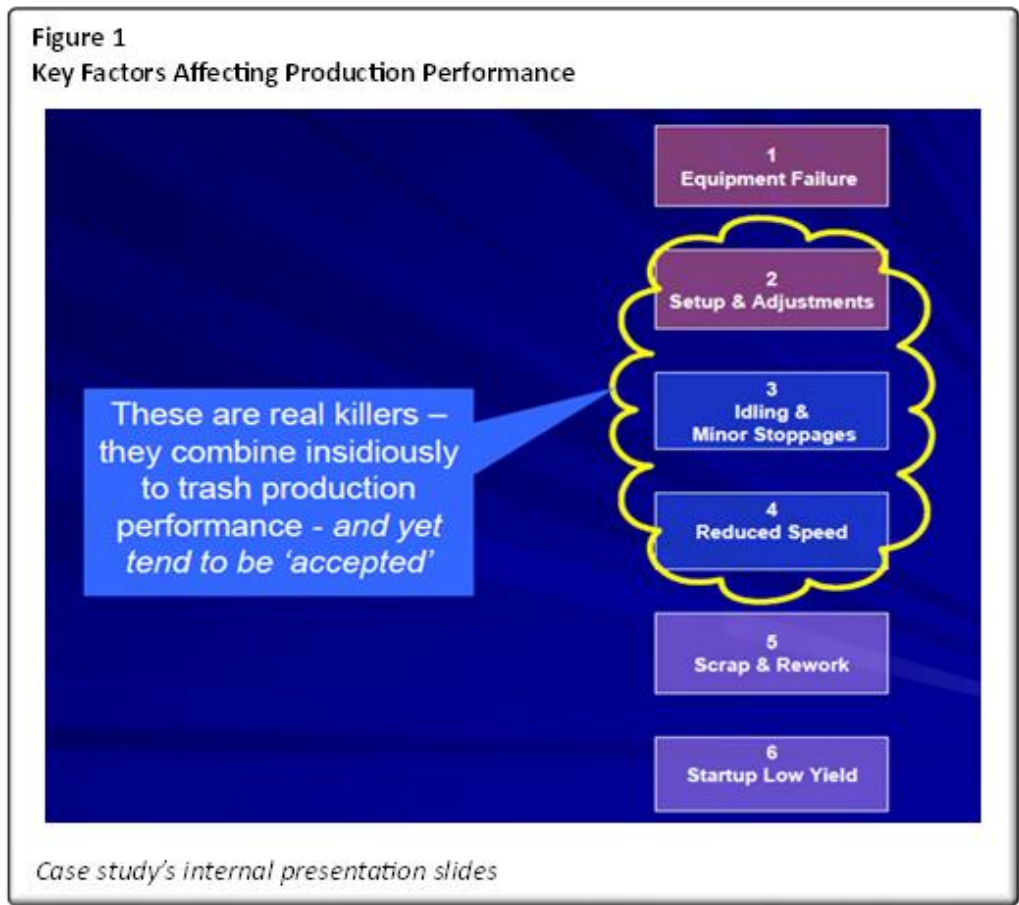
In the process of BPR, the case study firm identified six key factors affecting the production performance and what they call “Silent Killers” which affect their OEE metrics (see Figure 1).

Silent killers

1. Equipment failure
2. Setup and Adjustments
3. Idling and minor stoppages
4. Reduced speed
5. Scrap and rework
6. Startup low yield

To reengineer the shop floor, halving the time it takes for a die to be set up onto a machine, allowed the firm to better combat three of the identified six ‘Silent Killers’ namely: setup & adjustments, idling & minor stoppages and reduced speed.

“We’ve seen a significant increase in our OEE, from 70% to 78%”. (CDO1)



This change in percentage of OEE metrics gave a more competitive position, and also offered an opportunity for further improvements to achieve the status of a “World-class” manufacturer:

“We are looking to achieve an excess of 75% OEE. What it means is your cycle time is running to plan, so your performance is where you want to be. A world-class firm in our sector would run at about 80%, we have run at 76% this year, so there is a bit of improvement we can still do.” (CDO1)

Since the beginning of monitoring their OEE, in one year, the firm has dramatically increased their effectiveness by nearly 10% and gained IATF 16949 certification additionally to their ISO accreditation. IATF is an internationally recognised quality management system within the automotive sector (International Automotive Task Force, 2019). This achievement helped the firm to improve their standards in terms of quality, material recycling and their traceability throughout the whole supply chain.

The operations director believed that this strategic move allowed the firm to compete better and move their focus from BPR to CI to gain further competitive advantage:

“We’ve got the monitoring equipment, we’ve got the machines, we’ve got the know-how to do that. Now it’s just about continuous improvement to get there” (CDO1).

Business Process Re-engineering and Continuous Improvement Implementation

Since fundamentally changing their manufacturing process and product range, the firm has made further BPR endeavours alongside their primary objective of CI. Key themes that have emerged from the analysis are:

People

The firm had taken a proactive approach to Kaizen with their employees. An external company was brought in to educate and instil the need for Kaizen in the modern manufacturing environment. The operations director explained the reasons behind this:

“Transformational change, in my view takes time. Changing the people and getting them to see that you happy with allowing it. In companies like ours and manufacturers over a certain size, there’s a bit of trust that’s got to come there. [People] can add their voice to something, they can suggest things, they can participate, they can add value, then you get that benefit”. (CDO1)

It initially emerged that the case organisation viewed Kaizen as an employee-led initiative to ensure cooperation and teamwork. Later, company’s directors realised that to fully integrate company’s workforce with Kaizen mindset, they needed to establish a degree of loyalty to the firm ensure that the benefits of Kaizen were fully realised. It became clear from the interview with the managing director that for the company, it was important to listen to employees and their suggestions. It was believed that the most effective incremental changes have come from the employees.

The example below was offered as evidence illustrating what the company has done following employees’ suggestions for change:

“It’s the same with our orange t-shirts, that came back as a suggestion through the factory, where we were buying Hi-Viz jackets, in the summer it’s warm, and they’re saying; “it’s hot, we’ve got our own clothes on, then we’ve got a Hi-Viz jacket on, it’s quite warm, the company colours are starting to go orange, can we have orange t-shirts that we can have as corporate company colours, then we don’t have to wear Hi-Viz jackets?”. (CDO1)

This change resulted in establishing more loyalty and a feel of belongingness to the company:

“They’ve then got the benefit, they’ve got work gear they’ve been given, they feel more inclusive that they’re getting work gear that’s got their name on it, they belong within the company, yet we’re still saving money because they’re taking home the stuff and looking after it, washing it. Whereas with the Hi-Viz jackets, when they were dirty, they would go in the bin? (CDO1)”.

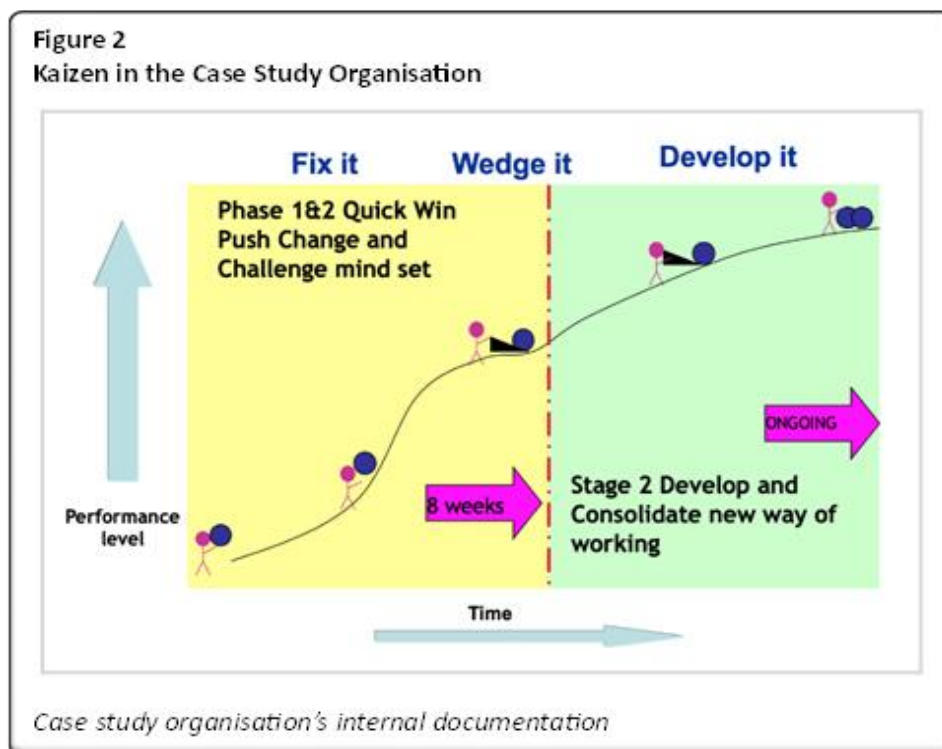
In company’s directors view the full benefits of Kaizen can be realised once the employees feel valued and integrated within the company.

“So everybody in the company excluding the senior management was given eight weeks of training, working in little teams on kaizen, which is about improvement techniques and change management. We made this compulsory, so it was all to do with how they can change, and how then can affect change. We made this compulsory because, if we made it voluntary, you’d have less than 50% sign up for it. We wanted to get involved in it, and we wanted them to see the change, get involved with the change and be a part of the change. It was quite strange because the outside consultants that were doing it for us asked me what I would like the outcome to be, I said “If they are working on a project and design some processes better to make improvements, that’s good. But I want to change people’s mindsets”. So that was the main criteria for the change management, to get their mindset into a way where they can help facilitate change”. (CDO1)

Process

The case study firm purchased a warehouse adjacent to their factory for storage. This gave them access to their stock when required, instead of during the normal operating hours of a local logistics company. This decision was part of their CI strategy which resulted in offering the production a stable, flexible and quick response.

Further projects, such as installing an overhead crane into the shop floor to load dies into the injection moulding machines, instead of being loaded by a human, halved the time of the specific process and meant less downtime on each machine.



There was an analysis of the firm's documentation with regard to BPR, CI and Kaizen. Figure 2 is an example of how they approached making incremental changes towards CI in order to instil processes to enable "wedge" and monitor progress made under Kaizen.

The operations director further explained that:

"Wedge is documented processes, following standard procedures, and everybody singing off the same hymn sheet. Only when that was all done would you put the wedge in. Then with time we would decide the push a little further up the hill, another incremental change". (CDO1)

It seems that the case study firm has established processes to develop and manage Key Performance Indicators (KPIs). Before BPR, the firm monitored a few KPIs. After implementing the new manufacturing process, they started to monitor everything and with a greater detail:

"Now we actually delve down into everything. From scrap rates, and we're reporting on this every month. So, the quality guys are coming in reporting on customer returns, they're doing the lean audits and storing that, and then we're going onto the operations guys, they're looking at down times. What's the cause of the down times. What's our internal scrap rate. We're looking to see whether we can improve on these all the time (CMD1)".

For instance, reducing the scrap materials levels within the warehouse was one of the key focuses of the quality department within the case organisation:

"First, we will analyse the process, what is wrong in the process? Then we will redesign the process. If the process was handled manually, then we will look at ways that human error is reduced. Then we acquire resources, we then start implementing this and then communicate with the team to make sure the training has been carried out. We then review the processes to prevent reoccurrence". (CWQ1)

Kaizen particularly contributed to reducing the scrap:

"I can't remember what the original figure was now, but it was sort of £250,000-£300,000 worth of scrap per year, and then we halved that to £150,000, and then they've done it another time so it's now around about £100,000 of scrap at the moment, a £200,000 saving" (CMD1).

Other smaller improvements were made through suggestions from the shop floor employees with regards to segregating the waste. "We've got little bins on the shop floor, and we were finding that people weren't using them. They were still mixing the waste in the bins. So, we put hoops up with little bags in, so they can't put heavy waste into the wrong bins, because otherwise the bag falls onto the floor. It's just little things like that, doesn't sound a lot, but it adds up" (CMD1).

Planning

Regular management meetings to discuss the KPIs were introduced following the BPR. These led to more effective handling of issues. BPR has changed the way the company was managed and became more strategic:

"We had a strategy meeting eight years ago and planned for the next five years, which we do every single year now about investment, where we are, and where we need to be. So, we look at the business in more of a strategic way now rather than on a month-to-month basis or yearly basis (CDO1)".

The company has shifted its approach from reactive to proactive. BPR, Kaizen and lean manufacturing has allowed them to tackle root causes rather than symptoms of a problem.

Their five-year planning identifies their weaknesses and looks at ways to address these. The plan is now viewed as the driving force of change. The directors have a strategic meeting each year to discuss new investments and strategic directions. These new initiatives appear to have influenced the directors' mindset and the way they think about their business:

"With lean manufacturing, you've either got to be in it, and change your concepts and your mindset, or you're going to be one of the dinosaurs. You know what happened with the dinosaurs, they went extinct. That's the thing, if the business hadn't changed, we wouldn't be here now" (CMD1).

This was reflected in company's practice of looking at ways how their products can be continuously improved. Further BPR efforts resulted in the purchase of a warehouse adjacent to their factory for storage of stock. This gives them access to their stock whenever required, instead of only local logistics company is open. This strategic purchasing decision gave more flexibility and a quicker response to customers demand.

Product

The initial decision to use BPR radically changed how the firm operated. The first was to change their core product, offering from smaller plastic parts. This decision necessitated significant investment into new, larger machines. Moving away from smaller mouldings was a calculated risk, where competition from the Far East and Eastern Europe would be less effective at absorbing shipping costs per part from larger mouldings, effectively eliminating competition from these areas.

During interviews it emerged that Kaizen contributed to actively seeking product improvements:

"So, from version one, we are now on version four, which is five or six years down the line. The customer is extremely happy with our input to his design, and it saved him money and it saved us money. [...] But we, as a company, are continually looking at our products and suggesting to our customer where we can make improvements, without compromising the product". (CDO1)

Since fundamentally changing their product range there have been further BPR endeavours alongside their primary objective of CI. For example, they installed an overhead crane in the shop floor. This has halved the time it took for a human to load dies into the injection moulding machines.

Price

Due to the nature of the market that the company operates in, customers will not accept price increases, and will instead use a competitor. CDF1 outlined that, the firm needs to absorb increases to minimum wage and electricity rates, further reducing their margin if the case organisation does not improve.

During the interviews it emerged that the firm had agreements with some of its customers, whereby any money saved through different product iterations is evenly shared between firm and its customer. The money saving initiatives provided an incentive for the firm to work with their customers and to continue to seek improvements of their products. This strengthened firm-customer relationships and improved competitiveness.

"So we continually look at products and say, we can improve this. We have an agreement with the majority of our customers that if we can give them a genuine saving on the design of their product through materials or alternative materials, then they get fifty percent of the savings, and we get fifty percent of the savings. Which gives us an incentive to make improvements, and an incentive to them to

use us. It's a win-win situation. In certain instances, we've done that, and it's helped our customers for them to stay competitive as well. Rather than fearing the price pressure, we will design something slightly different and make a little improvement which saves a bit of material, and that gives us all a little incentive to make a little bit of money (CDO1)".

Culture and Structure

Alongside the shift towards an improved product and a new way of thinking and planning, the firm recognised that lean manufacturing brought a whole culture change for everyone. A key moment of change of perspective started when directors could see cost savings and the benefits of BPR and lean manufacturing.

Alongside the shift towards offering novel products, the firm noted the importance of culture change within the firm, to ensure that the changes made were fully used and the benefits of the BPR endeavours were fully enjoyed. The initial phase of this was, when inheriting the organisation from their father, CDM1 and CDF1 shifted from a top-down autocratic approach to a flat company structure. CDO1 and CWQ1 both agreed that one of firm's greatest assets is the firm's structure, and by extension, its employees. The flat structure is consistent with Imai (1986), Wickens (1990) and Barnes (2018) argument that Kaizen is led by the employees and management autocracy leaves employees disenfranchised. It was clear from observations and interviews the employees are the firm's greatest asset.

"Yes, the problem is, my father was very autocratic. "No, forget that it doesn't work, this is how we've always done it, it will be done this way" (CDM1).

Not all the employees were content with the changes. Both CDF1 and CDO1 noticed small, but significant opposition to change in favour of a 'tried and tested' method of working. Dent & Goldberg (1999) noted that *"employees resist the unknown, or management ideas that do not seem feasible from the employees' standpoint"*. It is better if the employees understand the new vision and want to make it happen, but there are obstacles to that (Dent & Goldberg, 1999). This argument is consistent with an interview with CDF1, where some employees that some factors, such as scrap, that are a natural part of the production process, and cannot be changed or reduced.

All the interviewees recognised the benefits of a flatter structure that brought culture change:

"Back in t 2009, we had a totally different culture, my dad started the business, and he ran it as a sort of an autocrat, a dictator. [...] There was no thinking through, nobody thought for themselves, it was just what he told them to do, and when he wasn't there, they sort of just plodded along, waiting for him to come back and tell them what to do next. But now, there is a totally different culture, we're an organisation of people, everyone knows what they're supposed to be doing, different departments, heads, people are doing their own thing" (CDF1).

The flatter structure resulted in closer relationships between the firm and their customers as the new owners were hands on to help. Decision making was quicker, and any problems were resolved promptly, which increased customer satisfaction.

CDO1 and CWQ1 recognised that the employees are a great asset to the firm. Kaizen is considered an employee-led initiative (Wickens, 1990 and Barnes, 2018) therefore it may be assumed that in an organisation where employees are considered a valuable resource such initiative have a greater success.

BPR initiatives require a change of culture, and these are not always welcomed by all the employees. While most employees were content with the shift to a new organisational structure and a new way of working, there were some employees who did not embrace the

changes and were in favour of a 'tried and tested' method of working (CDF1 and CDO1). Dent & Goldberg (1999) explain that employees rather than resisting the changes made they "resist the unknown". In some cases, there are obstacles that prevent execution (Dent & Goldberg, 1999). Similarly, the findings of the interviews confirmed that employees understood the new vision and wanted to make it happen, however there was a belief amongst some employees that there are some factors that are a natural part of the production process, such as scrap, that cannot be changed or reduced. There was a consistent view among all the interviewed directors that as part of the BPR and Kaizen, there was a need for a change in "culture" within the company to occur before any significant and tangible improvements could be made.

Since the initial BPR within the case study firm, ways to allow the firm to change its culture was to adopt a flatter company structure, to the benefit of the company. When asked what is one of firm's core strengths, CWQ1 outlined that:

"It's easier as a small-scale industry to directly speak to the managers. If there is a problem, we can go to CDO1 or CDM1 "please help me with this", and they will sort it out within minutes or an hour" (CWQ1).

The sentiment of one of firm's core strengths of having a small gap between the workers and directors was also echoed by CDO1:

"I think, being a medium sized family company, we do not have a big gap between the shop floor and the top management. So, we can make decisions very, very quickly" (CDO).

it is noted by CDO1 that the most important change within 'The Company' is changing the mind-set of the workforce:

"The biggest thing which I believe you can do in a continuous improvement project is to change the mind-set of the people. [...] If you can change the mind-set of the people to think differently, then your achievement will last forever" (CDO1).

The findings revealed that the use of BPR within the case organisation contradicts Krajewski, *et al.*'s (2013) argument that BPR is the ultimate result of *Kaizen*. It became apparent that BPR was a precursor to the CI endeavours. The use of BPR and *Kaizen* is consistent with the view of Slack, *et al.* (2016) that "*BPR is the amalgamation of various operations management ideas that had been present for a number of years*". Another interesting observation was about the top-down approach of BPR outlined by Hammer & Champy (1993). Whilst the decision to reengineer the firm was clearly made from the top, the resulting amalgamation of BPR and *Kaizen* led to the flatter company structure. This change in structure is further consistent with Slack, *et al.* (2016) sentiment, that BPR is an amalgamation of different management ideas. The sentiment found synonymous with BPR used to be largely associated with staff layoffs. This was found to be untrue in this case. Barnes (2018) argued that BPR is often met with workers' disdain for the process, as it would have been likely that they would lose their jobs. During the interview stages at the case study firm however, despite some resistance to change, those employees who left did so of their own accord.

However, with a change in the firm's culture, also came a personnel change. Both CDO1 and CDF1 noted that, those employees who were resistant to the change in culture left the firm. Those resistant to change, as outlined by CDF1, were those that did not see the benefits of working under *Kaizen*, and were happy with the way that firm was previously run:

"Some people were just so against it, for example, if you're going to have a system which you use to start recording scrap every day, some people are like "Well, what's the point in doing this? What's the point? You're never going to change it,

scrap comes out of the machine". Some people would just totally rebel against it" [...] The majority of employees stayed with us and some employees decided that's not the way they wanted to be. They left, we didn't force anybody to go, we made it very clear that this was the route, this was the plan. We highlighted to the workforce our more strategic direction, they were willing to ask questions, put their opinion. But as the directors of the business, we've got to look after the future of the business. (CDO1)".

Conclusions

The findings revealed that the implementation of BPR within the case organisation contradicts the general BPR theory (Krajewski, *et al.* 2013), that argues that BPR is the ultimate end-result of Kaizen. However, in the case study BPR was a precursor to CI. Another interesting finding emerged that the case organisation used a 'top-down' approach to BPR as suggested by Hammer & Champy (1993). Whilst the strategic decision to reengineer firm's processes was clearly one made from the 'top' of the organisation, the resulting amalgamation of BPR and Kaizen led to a flatter company structure confirming Slack, *et al.*'s (2016) argument that BPR is an amalgamation of different operations management ideas.

In the literature, BPR is largely associated with staff layoffs, while this was not the case in the case organisation. Where there was a resistance to the unknown within the firm, the employees that did leave left on their own accord, rather than being laid off.

The issue of inconsistencies between theories of BPR can be attributed to the vast academic differences and no real consensus as to what constitutes to 'pure' BPR. O'Neill & Sohal (1999) raise the argument that some authors refer to generic business process improvement on a large scale, whereas Watkins, *et al.* (1993) and Earl & Khan (1994) highlight that the process of reengineering can be performed at a variety of different levels within an organisation. There is a vast array of differing academic opinions of BPR. O'Neill & Sohal (1999) outline two methods of BPR that are most appropriate to the case study. These are related to:

- Change management (Mumford & Beekma, 1994; Bruss & Roos, 1993) – this was appropriate to BPR in relation to where the firm needs to take account of the human side of reengineering as suggested by O'Neill & Sohal (1999), Mumford & Beekma (1994) and Bruss & Roos (1993).
- Process and customer focus (Chang, 1994; Vantrappen, 1992) – this was appropriate with regard to process redesigns focusing on improving performance from the customer's perspective. (O'Neill & Sohal, 1999; Chang, 1994; Vantrappen, 1992).

Regardless of the differing methods of *how* a company can implement and fully use BPR, what seemed apparent is that the end goal of BPR is radical improvement (O'Neill & Sohal, 1999).

CDM1 gave a specific example of where the lines between BPR and Kaizen were unclear. The firm, responding to a suggestion from the employees, provided high visibility orange polo shirts, embroidered with the company logo and the employee's name, as a type of uniform, instead of high-visibility jackets over their own clothes. This example shows elements of both Kaizen & BPR. As an employee led suggestion, CDM1 raised the argument that this gave a more inclusive atmosphere, and employees tended to take care of their new clothing. The employees' names and company logo were embroidered on the clothing. This was cheaper than high visibility clothing which would be discarded when dirty. There are also elements of BPR in the practice, it had been a reasonable investment within the firm, allowing for a radical change in a perspective of the treatment of employees as they could wear the uniform rather than their own clothes.

This theme of BPR and Kaizen being closely linked was present throughout each interview with the directors, where significant investment into property, automation and an overhead crane, as well as the uniform, led to incremental improvements rather than radical improvements. This is consistent with Slack, *et al.* (2016) and O'Neill & Sohal (1999), who argued that BPR is an amalgamation of various operations management improvement techniques, and there is no single definition of how BPR can be implemented by a company.

Limitations Recommendations for future research

- The primary limitation is that the study was within a single company. A multiple case study could have allowed triangulation of findings. It is inconclusive whether the research is transferrable between firms.
- The single case study approach limits the sampling of interviewees, who were all directors and workers. The research could have benefitted from a customer or outsiders' perspective.
- There is a lack of financial secondary data to back up assertions made in the interview process. Whilst interviewees all spoke confidently of the company's financial performance and their figures were consistent with one another, secondary data could have been helpful and could have provided a stronger argument.

Recommendations for Future Research

It is recommended for similar research studies to be conducted within the manufacturing sector using a multiple case study approach. Results can then be triangulated between companies to explore whether the results are consistent across multiple companies, industries, or geographies. This also gives the opportunity to discuss prevalent BPR themes and whether the practices are transferrable. Outsiders add new perspectives as to the true success of the BPR and *Kaizen* endeavours from a customers' perspective. By gaining secondary financial data from future research projects, tangible benefits of BPR and *Kaizen* can be fully realised.

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