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Companies' perceptions of inhibitors and enablers for process improvement activities

Inhibitors and enablers

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Abstract Outlines and describes the results of research at Cardiff Business School into the sustainability of process improvement involving shop floor personnel. The study identified a number of factors that influence the success or inhibit progress in terms of performance and sustainable improvement. The findings identify what companies perceive to be inhibitors and enablers for sustainability, within 21 companies who have conducted process improvement (PI) activities using a common intervention approach. The paper presents five classificatory profiles and concludes that managers can easily identify specific inhibitors in their own companies, but find it difficult to formulate specific enablers associated with successful and sustainable improvement. The general and cultural nature of the identified enablers indicates that managers perceive progressing PI activities are reliant on a change of culture within their organisations in parallel with "up-skilling" the technical knowledge of employees for change to be successfully enacted. The lack of specific processes to change culture, identified in the enablers, also indicates that managers do not know what to do to change their cultures or how best to deal with the inherently challenging and demanding nature of process improvement with shop floor operators.

Introduction

The impediment of a "sickly manufacturing function" to the overall performance of the manufacturing business is well understood (Slack, 1991), as too, is the leadership capability of operations managers in championing, with credibility, change at the shop floor level (Hill, 1991). However, in the turbulent and uncertain conditions of the modern market, the inability to sustain performance improvement has severe penalties and does little to promote operations management as an equal partner and the "primary tool" in the marketing arsenal of the firm (Peters, 1987). Despite these conditions, the techniques used by "high performance" Japanese and lean manufacturers are well documented and available to managers (Monden, 1993; Shingo, 1985; Ishikawa, 1985). These practices have also been positively correlated with competitive advantage and generated significant interest, especially in the British automotive component manufacturing sector, as a result of benchmarking studies of the 1990s (Womack *et al.*, 1990; Andersen, 1993, 1994). These studies served to identify and further promote the importance of the continuous, sustainable, and systematic management of improvement activities. Whilst Hall (1987) offers reservations concerning the ability to "graft"

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such techniques, Schonberger (1986) exuberantly argues that they are, in fact, "not that difficult to apply". Further authors have offered reservations and fears concerning "fashionable" operations management and express the concern that these techniques are not employed correctly in the West or result in failure (Hill, 1991). The issue at the heart of this long-standing operations management debate is therefore the ability to sustain the operational improvements needed to deliver the highest levels of customer service and offer the advantages needed in the marketplace (Slack, 1991).

To date, much of the operations management literature has focused upon the role of continuous improvement (CI) in developing the capability of manufacturing personnel (Imai, 1986). More recently, an improvement activity, termed process improvement (PI) has received new interest and has been associated with significant performance improvement and business results (Jowit, 1999; Sumner Smith, 2000). The difference in the two approaches concerns the length of time over which the improvement activity is focused, with continuous improvement taking place over a comparatively longer duration whilst process improvement interventions happen in the short term. It is this focus on the immediate intervention and immediate results that has earned the approach the term "blitz kaizen" (Bicheno, 2000). Despite the attractiveness of short duration interventions within an element of the factory process chain, the PI approach suffers from the problems associated with continuous improvement, notably "sustainability" and "autonomous improvement" (Friedl, 1999; Mackle, 2000). Griffiths (1998) contends it is often easy to make initial gains using process improvement techniques "but it is much more difficult to sustain" relative to continuous improvement approach.

Whichever approach is selected (CI or PI) there is widespread accord in the operations and organisational management literatures concerning the criteria for successful (and unsuccessful) improvement activities (Table I). According to Bessant *et al.* (1994), reporting results from their UK-based research concerning CI, the ability to generate "improvement momentum" "... is not a matter of doing one or two things well, but rather managing a complex integrated system". As such, "point changes" without a sufficient infrastructure to support improvements, at the business level, are unlikely to yield real and sustainable change. A point reinforced by Upton (1996), who later devised three alternative models of successful CI programmes. Further, Dale *et al.* (1997), adopting a case-based approach, identify "factors" that negatively impact on sustaining total quality management (TQM) using six organisations to generate six categories of issues associated with sustainability. These categories include the internal/external environment (context), management style (approach), policies (intent), organisation structure and the process of change management. Later testing of such "sustainability models" by Kaye and Anderson (1999), involving 18 cases, confirmed the earlier classifications as important. The study did, however, place a greater emphasis upon the role of management, a "stakeholder" focus to the activity, reflective learning from

	Upton (1996)	Bessant <i>et al.</i> (1994)	Dale <i>et al.</i> (1997)	Kaye and Anderson (1999)
Process issues	Structure to stop backsliding	Lack of formal problem-solving process Failure to implement changes suggested	Failure to complete projects	
Strategy and objectives	Clear targets and common understanding of direction Consistent focus of improvement activities, growing from centre of previous activity Credible plan of campaign	Changes of organisational direction Lack of CI strategy		Long term objectives Aims and objectives links to CI activities Managers should be aware of long term strategy and have measurable objectives for achievement for themselves and their teams Business objectives and critical success factors that link vision, mission and business plans
Leadership and motivation	Failure, cause of lack of clear motivation as to why improvement is important Charismatic leader	Top management support	Inadequate leadership	Senior management involvement Leadership and active commitment demonstrated by all managers
Cultural issues		Culture clash between espoused and practical values	Resistance to change	Culture for continuous improvement (awareness of CI by employees, managers reinforce culture by checking awareness, effective communication, multidisciplinary teams)
Measurement and information		Lack of measurement	Inadequate information and its analysis	Measurement and feedback systems
Training, learning and skills		Lack of training	Lack of quality management and problem solving skills	The learning organisation
Miscellaneous	Selecting projects based on ability to improve a specific target and ability to provide improvement opportunities for the future	Emphasis on big bang innovation and undervaluing of incremental changes Inappropriate infrastructure Lack of suitable vehicles for CI	Break of improvement teams Lack of resources devoted to quality improvement	Stakeholder focus Focusing on employees (involving all employees) Focus on critical processes (VSM) Quality management systems

Table I.
Summary of factors affecting sustainability of PI and CI programmes

improvement results, quantified measurement of improvement and feedback to those involved in the change programme.

Table I re-classifies the factors identified by each of these authors and resultant models into six categories (plus a miscellaneous category). The common denominator and major category, identified by all four papers, is the management of leadership and motivation. All four papers emphasise the importance of senior business management support for improvement and demonstrated/active commitment to the improvement programme if process/continuous improvement is to sustain and result in further "self-initiated" activities by those employees involved. Three of the four papers also support strongly the need for clear objectives and an associated strategy to govern the focus and importance of the project to the firm. Kaye and Anderson (1999) combine these features to emphasise senior management commitment and leadership with the development of a formalised and written business strategy that recognises the causal link between CI activities and business needs. At the shop floor level, again using case material, Bateman and Industry Forum (2001) reinforce the need for formalisation and clear business justification and found having a cell level strategy was positively associated with success for teams engaged in PI activities and represented an enabler for sustainability. The latter strategy, at the subsystem level, was considered by the authors to assist in focusing and directing the change effort, especially under conditions whereby a formal strategy existed at the company ("system level"). These findings therefore reinforce the work of Bessant *et al.* (1994) and the need for "holism" and a "systems approach" to continuous and process improvement focusing.

The design of the "system" feed-forward and direction-setting aspects of sustainable improvement is paralleled by important design considerations concerning the measurement and information category (shown in Table I) which integrates with the feedback loop to update the area plans (short term feedback) and the business strategy concerning the aggregate results of improvement achievements (Bessant *et al.*, 1994). Such an "information" process design relays information concerning the current state performance of the team, the improvement activities and outcome measures for the teams and also to link the importance of improvement to key business "drivers". These latter mechanisms, uniting the feed-forward plans and feedback performance measures, create the conditions, with appropriate training, to develop the "learning organisation" necessary for sustainable rather than "point" improvement. The latter feature was identified as critical to the development of structures that prevent "back-sliding" (Upton, 1996). Finally, from the literature review, "cultural issues" were cited by many authors as an enabler for or an inhibitor for process improvement. However, there is less consensus concerning the cultural dimension of the firm and also in the definition of such enablers. Instead, authors tend to "bundle" cultural issues into descriptions. The major cultural issues, identified as enablers in the literature, include a "culture for continuous improvement" and those associated with unsuccessful

interventions commonly referred to as a “clash between espoused and practical values” or “resistance to change”.

Having outlined the dimensions of success/failure associated with operations management improvements, the objective of the research was to test and understand these features of sustainability within an appropriate context and to assess the results of process improvement using a common approach to the intervention itself.

Research design

The British automotive components manufacturing base was selected purposively as the subject of this research. This selection criterion was influenced by the association of the automotive sector with the innovations and techniques of process improvement (Womack *et al.*, 1990) and access was made available to a single organisation that conducted the intervention with such manufacturing firms. The latter organisation was the Society of Motor Manufacturers and Trades “Industry Forum” (IF). The research scoping therefore allowed the study of organisations that had each received the same approach and similar activities over a standard time-frame.

The SMMT Industry Forum is a non-profit making organisation that was established, in 1996, by the Society of Motor Manufacturers and Traders and the Department of Trade and Industry to improve the competitiveness of the automotive components sector in the UK. At the time of its establishment, the automotive industry was reportedly “under-performing” against other automotive manufacturing countries (Andersen, 1993, 1994). Another government initiative that influenced the development of the IF was the “Learning from Japan” programme operated by the Department of Trade and Industry (DTI, Anderson Consulting and SMMT Industry Forum, 1995). The programme involved a study visit to Japan by 12 leading UK second tier suppliers to Honda, Nissan and Toyota in the UK. As a result of the programme three recommendations were offered. The first recommendation involved the establishment of the IF by the British automotive industry (SMMT) and not by government. The second recommendation was that a long-term programme of improvement should be created to support the industry, and finally, the IF should undertake practical “hands-on” improvement rather than just informative exercises concerning “best practice”.

The establishment of the IF was as a direct result of this productivity challenge and IF represented an innovative approach to solving the industry’s problems by working with industry directly. To this end, the IF secured the services of two Japanese master engineers from each of the major Japanese vehicle manufacturers (Honda, Nissan and Toyota) and additional master engineers were supplied by General Motors and Volkswagen. These master engineers were seconded to teach process improvement techniques to British engineers and to direct factory improvement activities. The logic was that the British engineers would, after experience, teach new generations of engineers that joined the IF.

The chosen approach to accelerating improvements with British automotive firms was that of process rather than continuous improvement and to date the IF employs over 32 engineers working at the operations level of factories using the IF service. Among many products offered to participating automotive, and now other manufacturing sectors, are supply chain improvement and team leader development programmes, but the chosen intervention approach selected for this study was the Industry Forum MasterClass. For a full account of the MasterClass process see Bateman and Brander (2000). In summary, the MasterClass is a process improvement activity that occurs over three months and is used as a pilot and catalyst for sustainable continuous improvement to follow.

The MasterClass process

The MasterClass consists of five stages, commencing with a pre-diagnostic stage during which the model area within the host organisation is selected and data collected to identify the current performance standard ("current state"). These activities typically include a factory tour of the proposed area and discussions with the senior management team to establish their expectations. The second stage involves a "diagnostic" that is intended to identify potential areas for improvement within the model area, again using a systematic process of data collection and analysis. Using these data the improvement team prioritises its planned activities, applying many of the data analysis techniques that have been taught to them by the IF engineers (such as pie chart or Pareto analysis). The engagement of the team in data preparation is such that the team has confidence in the findings and this process assists in the team-selection concerning the improvement "focus" during the change intervention.

The third stage is the conduct of the improvement workshop and in a pragmatic "learning by doing" approach the process improvement techniques such as 5C (also known as 5s or CANDO) and seven waste analysis are applied (Bicheno, 2000). The structure of the workshop is based upon the Deming cycle of plan, do, check, act. At the end of the workshop, all outstanding tasks and further improvement concepts that have developed during the workshop are captured and recorded as items to be "followed up" and "closed out" by the team. To close the intervention session, the team presents its findings and activities to the senior factory management and other interested parties, after a suitable period during which the team is left to work on the remaining issues in the factory area and report progress at "follow-up" sessions with the IF engineers over a three-month period after the intervention. The purpose of these "follow ups" is to check that the improvements made during the workshop have been sustained and the team continues to achieve the targets set of them. At each review the improvement team assesses the compliance of the model area to the plan. Any problems encountered will be discussed and the Industry Forum engineer may, if required, provide support as a countermeasure. During this stage the leadership of the change management process transfers from the IF engineer to the local factory improvement team.

Finally, to close the intervention and "follow up" process, a "post follow up" review is conducted at which any outstanding and on-going issues are reviewed to create a certain amount of pressure to support and nurture the culture of continuous improvement as a result of the process improvement activity. The MasterClass process was considered to offer the greatest insight into the issue of "sustainability".

The research design was based upon a realist perspective and involved a multiple case replication strategy and with multiple levels of informant (Leonard-Barton, 1990). The research process was designed in two stages, the first involved the quantitative identification of enablers associated with the effective interventions and higher degrees of sustainability (reported in Bateman and Industry Forum (2001)). The determination of the "sustainability enablers" was based upon the views of IF engineers, Japanese master Engineers, the views of Bateman based upon overt participant observation and insights provided by academic authorities in the field. The data were collected using a structured interview approach that was triangulated with secondary data collected from the case.

The second stage, the focus of this paper, involved the collection of qualitative perceptions of enablers/inhibitors based upon the views of informants undergoing the process improvement intervention. The latter stage was designed to capture any inhibitors/enablers not tested during the first stage. This exercise informed the selection of a semi-structured interview approach used to assess factory level and production area "enablers" and "inhibitors". The selected informants included the "change champion" or senior manager with responsibility for the process improvement programme, "change agents", or the person(s) responsible for the facilitation of the improvement activity, and the manager of the production area concerned. Finally, the team leaders and operators in the production area were also interviewed to triangulate the research findings. Each change agent and change champion was asked what they considered to be the inhibitors and enablers for sustaining their process improvement programmes. These inhibitors and enablers were then grouped in broad themes to try to identify the generic issues pertinent to the concept of "sustainability" using a data display and pattern matching approach (Miles and Huberman, 1994).

In total, 21 cases were selected for the study, involving some 40 PI activities. These cases operated different technologies, different ownership patterns, different sizes (employment) and included both profitable and unprofitable firms (Figure 1). Due to the combination of change agent and change champion roles at certain firms, a total of 40 change agents were interviewed.

Results

The perceived inhibitors

The results of the pattern-matched data displays (presented in Figure 2) revealed the "lack of resources" as the greatest citation by the informants. Such resource constraints were not associated with "financial resources" but more

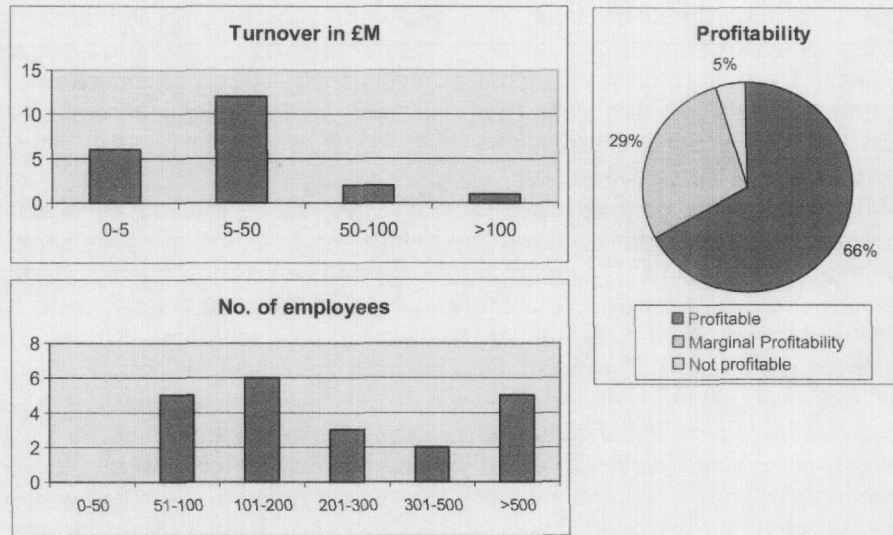


Figure 1. Company profiles

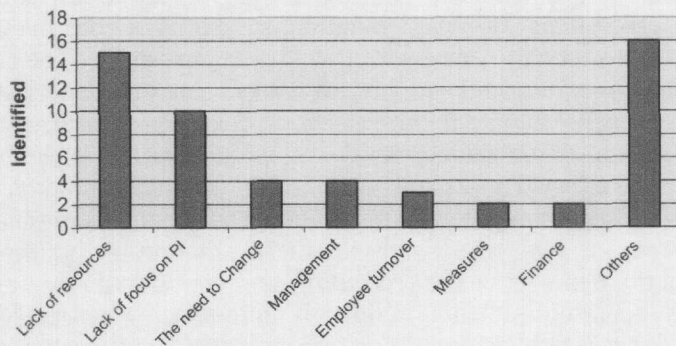


Figure 2. Inhibitors for sustainability of process improvement programmes

practical considerations such as the access to the production equipment, human resources. In only two cases was the financial justification of the “down time” needed to conduct improvement activities considered to be an inhibitor. The concern to access the appropriate resources was not affected by the size of the firm. The larger companies in the case sample also identified the complexity and “interconnectedness” of their operations as presenting an added constraint upon resource availability. Given the impact of process improvement upon “bottleneck” machines (and the relationship of any improvement to the performance of the firm), it is unsurprising that process improvement of this nature, given capacity and loading conditions, is often taken with certain reluctance. Business managers who must ensure customers continue to receive a flow of product are naturally reluctant to ransom this flow by releasing the machines that determine factory output and the sequence of production outputs. Similarly, certain employees represent “asset bottlenecks” in terms of process knowledge and, whilst invaluable supporting employees to the

improvement team, are resources in high demand. Again, a limited number of highly skilled personnel, for whom the operations and improvement teams compete for attention, causes conflict and inhibits process improvement effectiveness. Even when such individuals are made available, a sustained heavy involvement with the team is unlikely.

The second significant inhibitor mirrors that identified in the literature and concerns a "lack of focus" and the unfortunate consequence that business pressures distract team efforts as improvement is replaced with traditional operations management "fire-fighting" (Slack, 1991). In addition, external "shocks", such as changes in ownership of the firm leading to a "freeze" on improvement programmes, inhibited progress, given that changes in ownership patterns within the automotive industry occur frequently and may be an issue specific to the automotive industry (that low level of generalisability beyond this sector).

Even cases that did not suffer so extensively from a lack of focus did still suffer disruptive events. However, these firms either managed to continue to allocate resources to process improvement or returned to the intervention after correcting the source of the disruption. Some of the companies with an established and systematic improvement programme continue to engage in its promotion and strategic importance for business success such that, even during times of crisis, a common "mental focus" was maintained. The latter promotion serves to prevent the failure of the process improvement activity and serves to limit "anti-improvement" but convenient decision making during times of crisis.

An associated aspect of the "promotion" of the validity of process improvement is that of communicating the drivers for change that come from the marketplace. This inhibitor was identified by four informants (employed by three cases) and verbalised as a "failing to communicate the need to change". One of the four interviewees also related this to a more personal level, identifying the difficulty in convincing employees that corporate change results from change at the cell and individual levels.

Four interviewees (from three companies) identified a more serious inhibitor and proposed that not all of the business management team supported the process improvement initiative. The poor level of internal support was attributed by the informants to result from a lack of understanding, low levels of functional benefits perceived by fellow managers and the competition for resources needed to support PI. However, no informant identified "a managerial resistance to change" but rather more practical issues and the perception that process improvement was a "functional initiative" concerning production processes rather than support functions.

"Staff turnover" and employee mobility were identified as a critical issue for three cases, of which two regarded themselves as particularly vulnerable due to the availability of alternative employment with local businesses. This inhibitor concerns the retention of human resources and the "pay back" of skills and training in terms of process improvement results. The fact of participation in a

PI activity exacerbated this problem because involvement in a PI activity was seen as a benefit to the skills profile of participating individuals and increased their desirability by local and competitor companies.

In two cases the operations management measurement system was identified as an inhibitor to process improvement activities. Of these companies, one case informant stated that the measurement system imposed on it by an outside agency (corporate level) tended to inhibit the type of behaviour needed to support a PI programme. The current measures, based upon the traditional product costing associated with mass-production manufacturing, allocated operator time to each product made, thereby causing a conflict in terms of the reconciliation of the time spent conducting improvement activities. Although the case company intended to modify the method of measurement, and had taken active steps to do so, there was a high degree of resistance to such a fundamental change in cost allocation. The second company had a similar measurement system that was a historical legacy that had not been reviewed and had grown to be incompatible with the behaviour needed by managers. Changes to the measurement system were regarded as an outcome and key aspect of their PI programme.

The "others" category dealt with a range of issues that tended to relate to the particular and contingent circumstances of the case. These issues included skills shortages in specific employment categories (such as technician skills), the poor perceived status of conducting shop floor based improvements relative to other managerial activities, and so on. These issues were not repeated, in the data display and pattern matching process, beyond the individual case.

Enablers

The enablers identified (shown in Figure 3) tended to be expressed in less specific terms than the inhibitors identified. These "enablers" also represented a wider variety of issues and the informants had much less consensus regarding what were perceived to be the important enablers in comparison to the "readily-identified" inhibitors. In total, 52 enablers were identified compared with 56 inhibitors. Of the inhibitors, 45 percent of informant citations concerned the two most significant inhibitors, whereas in contrast, the four most significant

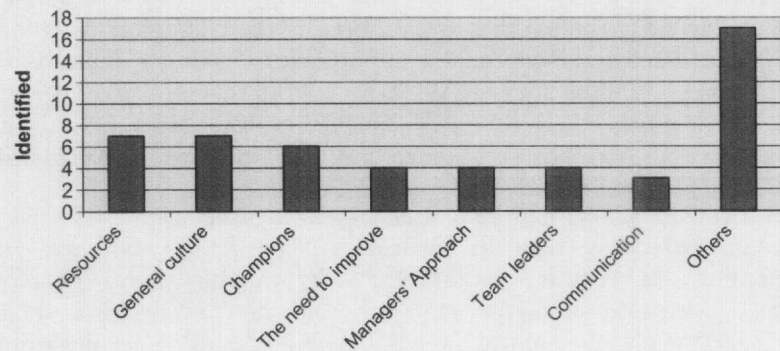


Figure 3.
Enablers for
sustainability of process
improvement activities

enablers covered 46 per cent of the citations. In addition, the enabler categories also reflected issues of a "more general nature" than the more precise descriptions of what slows progress. An illustration of this issue, within the category of "general culture", a feature identified as important in the literature review, informants described enablers such as "open minded culture" and "enthusiasm" but found it difficult to quantify or describe the actions demonstrated by these "enablers".

Another significant enabler was, reflecting the inhibitor cited earlier, the availability of resources, and many managerial informants, having acknowledged that resource availability was a problematic issue, had taken explicit action to counter the inhibitor. These countermeasures had involved the authorisation of overtime to ensure process improvement actions were "closed out", engaging additional "floating" staff who could fill in to allow improvement activities to take place, and other means of increasing the pool of available human resources deployed to improvement activities. The companies that engaged these countermeasures were also more successful in sustaining their process improvement activities (based upon quantified data collected during the study) and the attention to eliminating predictable inhibitors, by managers, suggests that these managers were better at planning for success. The seven companies who identified "resources" as an enabler had conducted a total of 15 improvement activities and all cases had sustained the improvements from their initial process improvement activities. These businesses were defined as Class "A" or "B", the highest levels of sustainable performance grading (Table II). The Class A profile is characterised as a firm that successfully completes the MasterClass and then develops a continuous improvement capability to further increase performance and the number of activities.

The category concerning "general culture" represents enablers associated with a management approach and customary practices that are positive to change and acceptance of role changes needed to improve performance. The most commonly cited terms included "positive people", "open minded culture" and "enthusiasm" although the managers interviewed were unable to elaborate upon these general statements and were equally unable to identify how these features generate and enhance a culture that is predisposed to performance improvement.

The enablers associated with the calibre of "the champion" were all very similarly expressed and identified the importance of having a "figurehead" who

Classification	Improvement in workshop?	Maintain new procedure?	Close out problem follow-up?	Continuous improvement?
Class A	✓	✓	✓	✓
Class B	✓	✓	✓	×
Class C	✓	✓	×	×
Class D	✓	×	✓	×
Class E	✓	×	×	×

Table II.
Summary of sustainability model



had a good personal understanding of the process improvement approach, and a personal drive and commitment to this form of change intervention. These combined personal characteristics were generally summarised in terms of a "strong process improvement champion" as a critical enabler to improvement and effective change. This enabler was also associated with organisational size and was cited repeatedly by interviewees at smaller companies. All informants who identified this as an enabler were engaged at firms with employment levels below the mean size in the sample. At smaller companies, the personal style of leadership exhibited by the managing director has greater impact and is more prominent to the line workers than the managing director role in larger and divisionalised organisations.

"Effective communication" was identified by three companies in the research and in each case had implemented mechanisms to improve their factory-wide communication relating to general business issues (drivers for change) and the results of process improvement initiatives (promotion of results and focus). The causal link between promotion/communication and effective change was recognised by the informants and terms used during the interviews included communication to "clarify the business position" and "to make the reasons for the actions taken as clear as possible". Two of the companies who raised communication as an enabler also identified the appropriateness of a portfolio of performance measures as an integral and important part of the communication process. The latter was designed to reinforce the learning cycle, to guide behaviour that reinforced the need for quantified performance improvement and to make explicit the logic between business needs and change.

Within the enablers, the "others" category was again reflective of individual case circumstances. These issues generally related to the perceived support and relationship of the trade union and process improvement (an aspect that is absent from existing models) and a developed partnership with the trade union and its representatives in the workplace. Other enablers concerned the relationship between process improvements and remuneration (at the company and individual level) and finally the determination of a 5C (also known as 5S) master plan with the discipline to maintain high standards of workplace control.

Comparison of results with literature

The research results compare well with the inhibitors and enablers identified in the literature (Table I). In particular the concepts of "leadership" and "culture" equate to the enablers of "culture" and "champions" categories identified from the pattern-matching process. The concepts of "measurement and information" was raised by only two companies in this survey and both cases identified their own measurement systems as an inhibitor to effective process improvement initiatives. Upon reflection, many of the companies investigated tended towards traditional "piece part" measures of performance efficiency rather than a broad portfolio of indicators that relate to the quality, delivery and cost of the product concerned. In addition, cases with under-developed systems are unlikely to identify "measurement" as an enabler or an inhibitor. The two cases

that identified "measurement" as an enabler did so only when the measurement system was integrated within an effective communication system that itself instructed employees of the importance of measures and their logical relationship with business-level improvement.

The informants, except in relation to team leader practices, did not raise the concepts of "training, learning and skills" as an issue. Four of the companies in the research identified the role of the team leader as an enabler for sustainability similar in nature to the personal qualities identified with the effective "champion". These interviewees generally perceived the role of the team leader, the front line of management, as the initiator and means of "focusing" future process improvement initiatives, supported by the company, yet in a team-specific and autonomous manner. However, only one of these companies linked this with the need for team leader training in this area.

"Strategy and objectives" was not specifically mentioned by any manager interviewed despite the importance of this feature that was identified during the quantitative phase of this research programme (see Bateman and Industry Forum, 2001). The latter research programme explicitly related a coherent strategy that directed improvement in cells as a critical enabler for effective change and sustainability of improvement. Aspects of strategy was reflected in this qualitative research but these tended to be indirect citations by informants which, during questioning, did not necessarily result in the identification of a relationship with a coherent strategy. However, a coherent process improvement strategy would have eliminated some of the procedural and communication issues identified by the informants as inhibitors. Importantly, issues such as "struggling to get collective decisions" during the focusing stage of the MasterClass would have benefited from a coherent approach or "theme" to assist team decision making. Such a strategy would also have reduced comments concerning "people do not understand why we are doing things" and there is a lack of "consensus" concerning the "plan".

Only one informant mentioned "process issues" as an enabler and the systematic approach to data collection, group analysis and structured implementation/"follow up". No other informant identified the "process" of process improvement as an enabler or an inhibitor. This result is surprising given the logic of process improvement is to systematically engage improvement activities within a relatively short time period and, based upon Deming principles, to standardise subsequent improvements in terms of standard operations and tasks (Bicheno, 2000). This finding is "at odds" with the existing literature that has sought to devise models of intervention that result in sustainability. The use of the standard MasterClass approach upon which this research is founded provides a common denominator for all informants and case companies and therefore the discipline and novelty of this intervention would appear to highlight deficiencies in the design of the organisation and deployment of resources. The implication is that the case companies were designed for efficiency and task-orientation rather than thinking more broadly about the role of the production area and its impact upon the overall performance of the business. The results therefore suggest

that the “sustainability jigsaw” is, as Bessant *et al.* (1994) highlight, the design and management of a “complex system”. This design process reinforces the position of Slack (1991) that:

Any manufacturing organisation is made up of a collection of smaller operations, where each department, unit or cell is an operation in its own right ... they all contribute to the performance of the whole. In other words, the internal performance of each contributes to the external performance of the total operation – the performance which the customer sees.

From these qualitative research findings, it would appear that the corner pieces of this design jigsaw concern the interplay between strategy, promotion, communication measures, culture and feedback as supporting enablers, whilst the effectiveness of the intervention itself is determined by support, leadership, legitimacy (the access to resources provided as a result of the strategy) and feedback.

Conclusions

The research shows that change agents and champions can easily identify specific inhibitors in their own companies, but find it difficult to formulate specific enablers, and so resort to more general descriptions such as “enthusiasm” and having an “open minded culture”. The general and cultural nature of the enablers indicates that companies perceive that progressing process improvement initiatives is reliant on a change of culture within their organisations. The lack of specific processes to “change culture” in the enablers also indicates that companies do not know what to do to change their cultures and where to start.

The more successful companies have identified enablers that specifically counter their inhibitors, especially in the area of resources. There is also a large range of inhibitors and enablers that relate to each company’s unique situation, reflected by the high number of “others” shown in Figures 2 and 3. Therefore it is difficult to provide generic advice that companies can use to cover all of their sustainability issues. The key factor for companies appears to be the ability to identify the enablers that are an issue for a particular activity and to develop enablers to counter these inhibitors.

Thus it can be concluded that managers perceive inhibitors more sharply than enablers and that change agents and champions perceive the issue of sustaining their process improvement programmes as having a high degree of complexity. This reflects the inherently challenging and contingent nature of improvement identified by Bessant *et al.* (1994). However, as the competitive environment continues to demand more from existing manufacturing organisations, the ability to determine the enablers and inhibitors of local and company-wide improvement activities will become increasingly more critical. The operations management literature has, since 1969, sought strategic integration yet poorly performing and “sickly manufacturing functions” have been an “irritant” to this elevation. The importance of process improvement and sustainability are now at a premium and failure in this aspect of organisational management, but more importantly operations management, may therefore differentiate the organisations that adapt and survive in this context and those that, whilst recognising the inhibitors, do not.

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