THE CRUNCH IN MANUFACTURING: THE NEED FOR INNOVATION IN METHODS: THE CASE OF THE EXPORT PROCESSING ZONE OF MAURITIUS

by

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ABSTRACT

This paper draws on the first empirical study of manufacturing methods in the Mauritius Export Processing Zone (MEPZ). The objective of the research was to explore the necessity for and applicability of innovative production methods in MEPZ enterprises. Results from the study show that most firms operate an assembly-line method of production, with only a marginal few having an appreciation of the appropriateness of their current methods or of other methods. However, it emerged that most responding Chief Executives are willing to consider a transition from traditional methods to higher-productivity improvement systems, such as group-based manufacturing. This degree of “readiness” was not echoed in the extent of Structural and Cultural Capability of firms to implement alternative methods of production. Only an average score was noted on such factors as the Dependability, Self-motivation, and Leadership qualities of the Mauritian workforce, and relatively tepid responses were given regarding firms’ ability to manage labour turnover, corporate culture, worker involvement and continuous improvement programmes. In conclusion, a possible gap in management was identified, between the high level of readiness for change in top managers, and the poor degree of cultural capability for change in the Mauritian workforce.

Keywords: Mauritius; manufacturing methods; management; human resources.
INTRODUCTION

Mass-production systems: Fordist or Japanese?

Traditional mass production, in the form of Henry Ford’s moving assembly line, was the best thing that ever happened to the automotive industry, but not to the industry’s worker: high wages, but what boring, repetitive, isolated tasks, resulting in high absenteeism and alienation (Rehder, 1992). The early 1970’s in Europe saw an awakening to the dehumanising aspects of such mass production systems. Whereas in the typically Western, industrialised world, up until the 1980’s, increasing focus was placed on the quality and high productivity exemplified by the Japanese systems, emphasis in the newly-emerging industrial sectors of developing economies adapted the traditional, mass production methods. The fashionable Japanese “lean” manufacturing system was seen by advanced economies as possessing many virtues and offering apparently extraordinary competitiveness. Among its virtues were found, low absenteeism, low worker turnover, and less contentious employment relations. Some key elements of the “lean” system included Kaizen, or continuous improvement, teamwork, elimination of waste and efficient use of all resources. Here, production cycles are very short, as short as one-minute and often involving non-stop working stretches of 56-plus minutes an hour. Significant overtime is usually required to meet production and delivery targets. The team structure implies that each member of the team is expected to pass along to the team and group leader any time-saving improvement and/or innovation that could benefit the group and the organisation. However, although members clearly contribute to productivity improvements, the process also leads to higher job demands and work pressure. The reality is that both workers and managers work harder, smarter, longer, and that this often carries over to their personal and family life. All in all, the Japanese system has considerable human resource strengths that must be recognised: it offers high levels of training, combined with greater responsibilities and opportunities for workers for involvement. The flat hierarchies, the shared visions and goals, the Kaizen principles, and the culture of co-operation and collaboration, are all essential elements of success in high-performing organisations operating in such a system.

Innovation in methods: Flexible manufacturing and SMWTs

Innovative models of management, and especially of technology and people management, have shown great promise of achieving extraordinarily high levels of quality, flexibility and productivity, while also improving employee development, protecting individual and collective freedoms and dignity, and generally enhancing the Quality of Life.
The Volvo Corporation in Sweden is well known in the manufacturing and management world for its experimentation in methods at its Udevalla plant. The company attributes its enhanced global competitiveness to its high commitment to quality, safety, its high ethical standards, and its concern for employees, customers, and the environment. Volvo’s core belief is that work must be adapted to people, and not the other way round. As far back as 1974, Volvo’s organisational strategy (at its Kalmar plant) was a conscious effort to regain the pride and quality of work life, as it abandoned its traditional assembly-line system. The organisation of work was revolutionised, and the pattern of worker interactions was transformed. The company had long been aware that, technology, like bureaucracy, can stifle human creativity, freedom and growth. Its continuing efforts to develop more flexible and democratic production systems in Sweden was also in pragmatic response to workforce shortages and the need for more flexible production systems to meet fluctuating market and product demands.

**Societal factors and National Context**

Mauritius is a small island state in the Indian Ocean with a population of just over one million. Having emerged from the dominance of colonialists to the status of Republic, and today, of Newly Industrialising Nation, the island boasts not only its economic success, but also its peaceful multi-ethnic diversity. The discussion here includes such issues as: culturally and socially, can flat hierarchies apply in highly ethically-segmented contexts? Are organisational cultures in newly industrialising nations sophisticated enough to integrate the principles described in the previous section? The places we work in are mere extensions of the society we live in, with values, norms, attitudes, work ethic and all. For instance, the obsession with “Productivity”, typical of newly industrialising enterprise culture, really reflects a concept misunderstood: it is a common mistake to confuse labour productivity with labour intensiveness, or with maximum use of the labour resource, whereas the spirit of labour productivity is one of measuring how effectively and efficiently the human resource is utilised to produce the output required by societies in the long run. In order to avoid ambiguities surrounding the various related concepts of Productivity, it is suggested that, especially in the case of developing economies dependent on so-called labour-intensive industries, the concept of “Total Factor Productivity” be instead adopted as an objective to be attained in the search for economic growth, social progress, and higher standards of living. Because of the fact that the efficient use of capital (increasingly, technology) must necessarily go hand-in-hand with the use of labour, the following conditions must be observed in a quest for increasing Total Factor Productivity:

- Investment in education and training
- Technological progress and innovation
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- Improved management systems
- Better resource allocation through a shift towards higher value-added and technology-intensive products
- Economies of scale, and
- Harmonious labour-management relations.

A recent survey of 75 operatives at a branch of the New Island Clothing company in Mauritius, revealed that assembly line work was unanimously qualified as “very hard” and that rest periods were found to be largely inadequate (Cuneapen, 1996). The majority (90%) of workers voiced their discontent regarding “monotony” and “fatigue”, indicating the seriousness of this issue in the Mauritius EPZ. A follow-up to the study revealed that fifty percent of workers interviewed claimed not to like overtime work, but that they needed the money it brought to their take-home pay. 40% complained that they had to do overtime work for reasons of job security, because it was implicitly understood that they should not refuse to do overtime as requested by management. The poor Quality of Work Life was perceived to be a major issue, with 40% stating that meeting family obligations was more important than earning that extra overtime money, provided they were “free” to opt out of it. Those stating they “did not like” overtime work provided two main reasons, namely, fatigue (46%) and meeting family commitments (18%). Interestingly, 40% of workers stated that management was wrong to assume that local workers would be motivated to emulate the availability and “commitment” of foreign workers, because these workers “only came here to make money”.

Another issue for consideration is the import of foreign labour for work in the Export Processing Zone of Mauritius. The basic assumption leading to the import of these workers is that they are much more willing to work long hours, overtime, and not demanding of better working conditions, as opposed to local workers. However, this begs the question: no doubt, many a manufacturer would wish all local workers had such co-operative attitudes, but should the country not expect a degree of social responsibility from EPZ firms in not only limiting the proportion of foreign to local workers, but also in rethinking their human resource management paradigms? Indeed, the only sustainable approach to the labour issue is to adopt wholeheartedly and strategically, the Total Factor productivity approach, taking into consideration the Quality of Working Life (QWL) of workers. Worker commitment cannot be won overnight, and internalised controls must yield to management-imposed, external controls that result in mere compliance. Must it be emphasised that the closest ‘modernised version’ of traditional Fordist systems is the Japanese system, which may well be object of emulation by developing nations in their obsession with efficiency and “productivity”. This same system, although
characterised by high efficiency, is also associated with overstressing workers and reducing their individual and collective freedoms, with obvious consequences for morale and ultimately, productivity.

Also, the Japanese people are largely socialised to subordinate their individual goals, needs and opinions to that of the larger collective good. This ensures a relatively stable and congruent social environment, allowing the Japanese organisation to place at par all stakeholders’ interests with the interests of the company. The Mauritius societal culture, on the other hand, has, over decades, submitted itself to French and British colonialism, but also to contemporary Western, developed-nation influence, in the form of adoption of such values as individualism and democracy. Given the ethnic distribution of the people (Hindus, 50%, Muslims, 16%, Creoles (coloureds of mainly African descent), 31%, and the remainder of Chinese and White, 3% the resultant “Asian” attitude towards work and life in general is prevalent, combined with the values of individualism and democracy. As such, even though not to the satisfaction of all, several prevailing local conditions point to the difficulty of any organisation considering such methods as the Japanese system: the democracy-preserving institutions of the free press, Labour Relations legislation, the Welfare System reinforced by successive governments, influences from the great democracies of the world and donor agencies, the diverse ethnic tableau and a prevalent “free-and-easy”, generally insular, attitude.

**Why Mauritius should rethink its methods**

In the face of ruthless global economic conditions over the last decade, the mot d’ordre has been “We must be more productive”. Training for acquisition and upgrading of skills has taken increasingly large proportions of budgets, both at national and organisational levels. Technology transfers have been numerous, although only sometimes successfully integrated. Common exhortations to work “harder” and to “change our work ethic”, by, for instance, emulating the Singaporean example, are rife. One may question the effectiveness of such appeals. Can one make workers work harder, even smarter, more creatively, more innovatively, and more responsibly, or should industrialists be attempting to make workers want to be more productive? As previous sections have stated, as long as workers in mass-production manufacturing and assembly systems are treated as single-purpose machine tools, to be utilised to breakdown point, then motivation and commitment to ‘work harder’ will simply not come. Whatever else, dehumanised humans will not co-operate. Berggren (1985) states, from one study, that:
The further one got from traditional line assembly, the better the results in the area of variation, skill development, taking of responsibility and room for the use of knowledge at work. And the further from line assembly [itself], the less common were psychosomatic symptoms caused by work, such as stomach pains, headaches, and sleeping difficulties.

The Self-Managed Work Team (SMWT) is derived to a large extent from the autonomous work group, a prominent form of worker organisation developed as an outcome of the sociotechnical system theory in the 1960s and 1970s (Sexton, 1994). A Self-Managed Work Team is an independent and democratic form of work organisation that gives a group of workers responsibility for the regulation, organisation, and control of their jobs and the conditions immediately affecting them. Six general conditions are necessary for the successful implementation of a SMWT:

- Proper training
- Shared vision
- A set of shared values
- Shared benefits
- Managerial faith in employees, and
- An organisational culture that supports risk taking.

The SMWT has been heralded as the productivity breakthrough of the 1990s, and increasingly, Quality has been cited as the primary reason given by managers for turning to self-managed work teams. However, unlike Quality Circles, SMWTs do not simply recommend, they DO. In other words, when responsibility for quality is moved down to the production level, it is expected that defects will be reduced at those points where they are most likely to occur, to provide prompt response to customer requests, and to decrease the need for layers of middle management. Naturally, the primary goal is increasing organisational effectiveness. This approach focuses on the joint optimisation of the technical and social systems of an organisation. From a sociotechnical point of view, work in groups is more likely to provide meaningful work, to develop responsibility, and to satisfy human needs than work which is done by individuals who are supervised separately. From this systems perspective, human needs have precedence over technology, and thus the emphasis is on quality of life without sacrificing organisational effectiveness. Currently, the notion of self-managed work teams should be able to receive extra impetus and support from the sister notions of empowerment, democracy, ethics and social responsibility.
The SMWT is characterised by team autonomy, and self-regulation/management. Of course, autonomy is a dimensional concept: at one end are co-acting groups in which workers are independent actors whose jobs are externally well-defined in advance and supervised by management. At the other end are fully realised self-managed teams, characterised by self-regulation of work content, that is, scheduling, choice of work methods, job rotation, self-evaluation of quality and productivity, and self-adjustment to contingencies such as customer requests. Such a team is responsible for production cycle activities, output rate, quality, and quantity. A team’s position on this continuum is determined by how much management is willing to give up in terms of control.

**Research Organisation and Methodology**

*Research objective*

The study attempted to determine the readiness and/or capability of the Mauritius Export Processing Zone with regard to the introduction of alternative methods of production to current methods in force. Lines of investigation included systemic factors present in the EPZ manufacturing sector, including type of production method(s) used, level of training offered, management systems, labour-management relations, proportion of overtime to total production time, labour turnover and absenteeism, and organisational culture. Hypotheses developed are as follows:

**H1**: Chief Executives and/or Plant Managers of Mauritius EPZ are willing to try new, alternative production methods to traditional mass-production methods;  
**H2**: The Culture of the Mauritian workforce is conducive to the introduction of new, alternative production methods in the EPZ.

These hypotheses test the assumption that the adoption of alternative (to mass production methods, both traditional, Fordist, and Japanese, “lean”) manufacturing practices, such as group-based methods and Self-Managed Work Teams (SMWT), rests on the presence of certain internal and external environmental conditions. The research design was based on the assumption that the economic sector most amenable to changes in methods was the EPZ manufacturing sector, on account of its dependence on global market movements and the resultant necessity to continuously seek out methods and approaches that could help enhance global competitiveness.
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**Research instrument and sample**

A survey instrument supplemented by telephone interview was developed using items from previous research, in particular in SMWT and Japanese Manufacturing. Several items were included to seek responses that reflected the realities of Mauritius. Thanks to a readily-available directory of EPZ enterprises (some 100 members, from micro-entrepreneurs to large conglomerates), members of the Mauritius Export Processing Zone Association (MEPZA), 25 Chief Executives, representing in most part the larger manufacturing firms, were contacted and asked to respond to a series of questions relating to their current production methods, to their perceptions regarding alternative methods, and to their perceptions regarding their organisations’ internal capabilities and external labour market environment. Institutional profiles of responding organisations are as follows: 72% were textile and garment manufacturers, 16% were Food Processing Plants, and the remaining, namely Jewellery, and other manufacturing, represented 12% of the sample. Size of responding organisations ranged from 28 to 1830 employees, with the distribution highly right-skewed (most organisations being medium to large). Data analysis was done using the SPSS package, and is correlational and descriptive in approach. Table I describes the size profiles of participating organisations, which is highly satisfactory result, given that the few larger, influential EPZ operators are all represented in the data collected, which emerges as highly skewed (to the right) toward larger organisations.

<table>
<thead>
<tr>
<th>Number of Employees</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std.</th>
<th>Skewnes</th>
<th>S.E</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>23</td>
<td>28</td>
<td>1830</td>
<td>643.17</td>
<td>548.48</td>
<td>.603</td>
<td>.481</td>
</tr>
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**Table 1. Statistics on organisation size**

**Results and Discussion**

This section presents the relevant research findings for each issue under scrutiny: the applicability of Japanese “lean” manufacturing methods and the more innovative and flexible group-based manufacturing methods.

**Current manufacturing conditions**

No responding organisation utilised Self-Managed Work Teams or Cellular Manufacturing as their only production method. Five firms (20%) used some form of group-based production system, such as Cellular Manufacturing or Quick-Response systems. All the rest (52%) were mass-production, assembly-line plants.
Understanding of organisation and processes

Whether flexible-manufacturing methods such as self-managed work teams or mass-production systems such as the Japanese system are called for in Mauritian industry rests on in-depth organisational diagnosis and analysis. 68% of respondents stated they would like to try out new methods, with 28% of these having a vague idea of some productivity-improving method. The majority had no idea of what type of method was ‘available’ for consideration. An impressive 72% had previously heard about Self Managed Work Teams, and two did not respond to the question. When asked how they believed the average Mauritian worker would respond to group-based methods, participating managers provided the following responses, indicated in Table 2 below.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>%</th>
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<tbody>
<tr>
<td>They would prefer assembly-line methods</td>
<td>7</td>
</tr>
<tr>
<td>They would be indifferent</td>
<td>7</td>
</tr>
<tr>
<td>They would prefer group-based methods</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>

An index was created to measure the degree of readiness of Mauritian senior executives to the introduction of alternative manufacturing methods. Several variables entered the computation, and the results confirm the hypothesis H1: senior managers of the Mauritian EPZ are ready to consider implementing alternative production methods in their plants. This hypothesis was confirmed through a t-test of the mean of the “Manager Readiness Index”: the tested value was 80, representing the hypothesised degree of ‘readiness’ of managers. The actual mean emerged as 77.64 and the t-test showed a mean difference of –2.36. Two organisations scored the maximum (100) and the lowest score was 52. Thus it would appear that Mauritian EPZ firms hold much promise for the introduction of innovations in methods, because they (top managers) reported to having favourable notions of such internal factors as: investing in human resources, technological innovation, improved management systems, better resource allocation to more value-added products, economies of scale, and harmonious labour relations. These were indeed included in the computation of the Readiness Index. In order of importance (according to respondents), are the internal factors to be managed in order to achieve total factor productivity for enhanced productivity growth: Investment in People and Improved Management Systems (76% of managers rating these as “Extremely Important”), followed by Harmonious Employee Relations (68%), Better Resource Allocation
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(40%), and Economies of Scale (24%).

**Internal capabilities**

Can a mass-production, linear method of operation, heavily reliant on overtime production, be amenable to changes in manufacturing methods? Factors taken into the computation were: current production methods, and such internal structures as: absenteeism and labour turnover levels, employment relations, training offered, employee involvement, adoption of Kaizen principles, organisational culture, leadership, and sharing of benefits. It emerged that the mean score on Structural Capability was 31.4, with a standard deviation of 5.42 while the maximum possible score (54) was not obtained by any organisation.

**Cultural capabilities**

Conditions at individual, group, organisational and societal levels, can either enhance or inhibit the successful implementation of such innovative manufacturing forms as SMWTs. The six conditions for the implementation of a self-managed work team are: proper training, a set of shared values and vision, shared benefits, managerial faith in employees, and a culture that supports risk-taking. In addition, employees must be dependable, self-motivated, possess a high level of interpersonal skills, leadership qualities, assertiveness, willingness and ability to participate, and coping skills to deal with stress and ambiguity. Taking these factors into the computation of a “Cultural Capability Index”, as well as respondents’ opinion of the preferred working method of the average Mauritius worker, a mean score of 27.44 of cultural capability for the entire EPZ emerged, with a standard deviation of 4.50. A t-test disconfirmed the hypothesis H2, indicating that the level of Cultural Capability of the Mauritian workforce is inadequate at present for the introduction of alternative production methods such as the Self Managed Work Team. Cultural and Structural Capability correlated positively (p < 0.01, confirming the well-tested relationship between organisational culture and structure.) A breakdown of the items entering the Cultural Capability Index showed that responses were split equally for the “collectivist” vs “individualist” nature of the Mauritian worker. 40% saw the Mauritian workforce as “somewhat collectivist” and 36% as “somewhat individualistic”, with the other extremes being marginally checked. This would indicate that the Mauritius workforce is comparable neither to the Japanese worker, nor to a purely US-style model. Whether this can be indicative of a degree of flexibility of the workforce, should a considerably innovative or different method be introduced, deserves to be investigated. However, most Top Managers only rated their plants averagely over the internal dimensions mentioned above, except for Absenteeism control (64% rated their organisations as “Good” at this), Managerial
faith in employees (68% that they were “Good” at this), and Employee Relations (76% claiming to have “good” management-employee relations). Surprisingly, only 44% rated themselves as “good” with regard to the Training they offered.

CONCLUSIONS AND RECOMMENDATIONS

This study, which is a milestone study, albeit on a small but representative scale, shows that, even though the managerial culture with regard to innovation in methods and the conditions necessary for the implementation of the same, is conducive to the introduction of alternative production systems, it remains a fact that the Mauritian workforce culture is not. It is quite evident that intervening variables must abound in such a societal and organisational context, which may or may not explain the low Cultural Capability scores across the sample, and the study of this has not been within the scope of this research. The disparity in scores between Manager Readiness and Cultural (and even Structural) Capability may, in the first place, point to lacuna at the organisational level, whereby the level of enlightenment and innovation at the strategic apex is not seen as cascading down to worker level. For example, it is clear that traditional personnel practices, the majority, if not all, of which have been developed by and imported from the developed West, to employ large quantities of unskilled workers at the lowest possible cost, require immediate review. It is clear that more attention needs to be paid to the possible links between innovations in production management systems and the management of human resources. Based on the foregoing analysis in this paper, there are several recommendations that can be made to manufacturing firms in the Mauritius Export Processing Zone when considering the possibility of innovation in methods of production.

First, Mauritian top management should realise the importance of strategic management, and this, with the total involvement of both Production/operations Directors, and Human Resource Directors (provided of course that these two functions’ inputs to the strategy-planning process are considered as crucial). Thinking time at the strategic apex, free from day-to-day, internal and operational problems, must find top priority on senior management’s agenda, especially the Chief Executive’s. For example, developments in the product market, the labour market and the supply market, in the face of globalisation, must force managers to Think Global and Act Local. Long-term strategies for improving competitiveness, or even simply for ensuring survival, are the job of senior managers, and all the internal organisational implications of such changes in the environment must be considered urgently. Two of these will be: the appropriateness of current manufacturing methods, including plant and machinery and control methods, and
human resource management practices. By keeping abreast of best practice, through professional journals, interaction with the University, and attending informational talks and seminars, will all help towards a long-term integration of external opportunities into internal systems, through an appreciation of modern methods and practices, and an exposure to the market, social and economic realities that are upon us.

Second, all managers’ commitment to the necessity for change is crucial. Senior management must communicate effectively their own feelings and devotion to the basic philosophies and principles of productivity-improvement methods. Only then will it be possible for middle managers, supervisors, and workers to be convinced that the organisation is serious about productivity improvements.

Third, strategic and long-term investment in training and development is absolutely necessary. And the starting point is top management development. If training and development in skills, knowledge, and attitudes leads to increased employee commitment, flexibility, competence and motivation, then there will be less need for close supervisory control. And if all managers at all levels are also up-to-date, then their commitment, enthusiasm will in turn communicate trust and commitment.

Fourth, there must be complete involvement in the systems reform by all employees. Everyone in the organisation, at all levels, from offices to technical service, from headquarters to remote sites, must be involved in any transition. People are the only source of ideas and innovation, and their knowledge, expertise, and co-operation have to be harnessed to get the bright ideas implemented.

Fifth, it is important to avoid the “bandwagon” syndrome: organisations must not expect too much too soon from a change effort. Many improvements in productivity through major change programmes are characterised by long implementation times, although Mauritian firms may well be thankful for their relative small sizes (by international standards), since it is well-known that small and Greenfield firms can expect short implementation periods of less than five years.

Sixth and last, if changes in manufacturing methods in manufacturing firms are to succeed, it is important for managers, supervisors, and other staff to recognise the value of good communication as a vital link in maintaining and increasing standards of performance. Effective communication is a two-way exercise. Therefore, a structure and culture which encourages people on the shop-floor to contribute to the work method/s must be fostered. Also, there must be full disclosure of goals and implications of any change effort, since hidden agendas of any kind will simply derail any principles on which productivity improvement programmes are based.
REFERENCES


