

# State of Human Factors in Small Manufacturing Sectors of India

B. Singh, A. Singh, R. C. Yadav

**Abstract**—Utmost care of human related issues are essentially required for sustainable growth of micro, small and medium enterprises (MSMEs) of India, as these MSMEs are contributing enormously to socio-economic development of country. In this research, aspects related to human factors and functioning of MSMEs of India were studied. The investigation, based on a survey of 84 MSMEs of India cited that the enterprises are mostly employing unskilled labor whose wages are less with poor training. In spite of reported minor accidents, attention towards safety is poorly paid. To meet-out the production target, MSMEs generally employ over-time and payment towards this overtime is sometimes missing. Hence, honest and humanitarian attention for better human resources is needed to improve the performance and competitiveness of MSMEs of India.

**Keywords**—Human factors, Small and medium enterprises, Working culture.

## I. INTRODUCTION

THE sector comprising micro, small and medium enterprises (MSMEs) can be considered as nurseries for entrepreneurship, often driven by individual creativity and innovation, and contributing enormously to the socio-economic development of a country. MSMEs provide employment to a large populace at a comparatively lower capital cost than the larger enterprises and helps in the industrialization of rural and backward areas, leading to a reduction in regional imbalances by assuring more equitable distribution of national income and wealth geographically. This has led to an unprecedented growth in MSMEs worldwide. They increasingly play a pivotal role in the country's economic progress and recovery, mainly due to their higher rates of employment growth than other industrial sectors, as reported in recent articles of Acharya [1] and Rose et al. [2].

Existing body of literature suggests that small manufacturing enterprises (SMEs) contribute significantly in nation's gross domestic production (GDP), total manufacturing production, exports and employment. For example, SMEs form the backbone of the EU economy, which

is accounting for 99.8% of non-financial enterprises in 2012, which equates to 20.7 million businesses (92.2% micro enterprises, 6.5% small enterprises 1.1% medium enterprises and 0.2% large enterprises). In employment terms, SMEs provided an estimated 67.4% of jobs in non-financial business economy in 2012 [3]. At the start of 2012, SMEs accounted for 99.9% of all private sector businesses in the UK, 59.1% of private sector employment and 48.8% of private sector turnover. SMEs employed 14.1 million people and had a combined turnover of £1,500 billion [4]. In India too, MSMEs contribute 8% of the country's GDP [5]. According to the Annual Report (2011-2012), issued by Ministry of MSMEs, Government of India, MSMEs account for about 45 % of manufacturing output and 40% of the total exports of the country [6]. Many researchers like Harvie [7], Romijn [8] and Singh et al. [9] also advocated for the same. Hence, it is well accepted that MSMEs are contributing a lot towards nation's economy.

MSMEs are labor intensive production units and thus, their performance, competitiveness and growth is severely influenced by the state and attitude of workforce. Thus, it becomes necessary to study the working culture of MSMEs of India, in the respect of human resources. With this in mind, a thorough study has been undertaken in this work in three sectors of MSMEs *i.e.* namely glassware, shoe/footwear and lock manufacturing. Aspects covered in this study included the demographic profile, important issues related to the performance of the enterprises, safety, working characteristics of MSMEs in relation with working days, shifts, over-time, wages, leaves, bonus, gifts, awards, Provident Fund (PF), employees' availability, leaving the jobs with reasons and recruitment, payment of due salary and perks and performance evaluation of employees.

## II. REVIEW OF LITERATURE

### A. Defining Micro, Small and Medium Enterprises

Nowadays, the approach in most of the developing and developed countries is same for defining these enterprises. However, the definition of small enterprises varies from country to country and region to region. In most of the countries, MSMEs are defined either by number of employed personnel, balance sheet total and/or annual turn-over. In Japan, it also includes capital. While in India, the definition is based on the investment ceiling. The criteria for defining MSMEs, followed by many countries are presented in Table I.

B. Singh is serving as an Associate Professor at Aryabhata College of Engineering and Technology, Baghpat – 250 601 (UP) India and pursuing Ph. D. from Uttar Pradesh Technical University, Lucknow, UP, India (phone: +91-9359765680 / 40; fax: +91-121-2962952; e-mail: brjshsngh@gmail.com).

A. Singh, Dr. was with Kamla Nehru Institute of Technology, Sultanpur, UP, India. He is now serving as Director, Buddha Institute of Technology, Gorakhpur – 273 209 (UP) India (phone: +91-551-2580413; fax: +91-551-2580415; e-mail: singh.amar15@gmail.com).

R. C. Yadav, Dr. is Professor (Retd.), Mechanical Engineering Department, Motilal Nehru National Institute of Technology, Allahabad – 211 004 (UP), India (phone: +91-9026773444; e-mail: rcyadav1941@gmail.com).

TABLE I  
DEFINING MSMEs (MANUFACTURING / PRODUCTION ENTERPRISES)

Country	Micro Enterprises	Small Enterprises	Medium Enterprises
European Economy (€)	With less than 10 persons employed AND Turn-over or Balance Sheet Total of $\leq$ € 2 million	With 10 to 49 persons employed AND Turn-over or Balance Sheet Total of $\leq$ € 10 million	With 50 to 249 persons employed AND Turn-over or Balance Sheet Total of $\leq$ € 50 million
India (₹)	Investment ceiling for Plant, Machinery or Equipments upto Rs 25 Lakhs	Investment ceiling for Plant, Machinery or Equipments above Rs 25 Lakhs and upto Rs 500 Lakhs	Investment ceiling for Plant, Machinery or Equipments above Rs 500 Lakhs and upto Rs 1000 Lakhs
Japan (Yen)	Capital less than 300 Million yen (US\$ 2.70 million) with number of employee less than 300		
Malaysia (RM)	Sales turnover of less than RM250,000 OR full time employees less than 5	Sales turnover between RM250,000 and less than RM10 million OR full time employees between 5 and 50	Sales turnover between RM10 million and RM25 million OR full time employees between 51 and 150
South Korea (Won)	Less than 10 employees	Less than 50 employees	Less than 300 employees and Capital (and sales) of 8 billion won or less
UK (£)	Turnover of not more than £6.5 million, a balance sheet total of not more than £3.26 million and not more than 50 employees. While, according to Department of Trade and Industry (UK), micro enterprises has employees less than 10		turnover of not more than £25.9 million, a balance sheet total of not more than £12.9 million and not more than 250 employees
US (\$)	Employees less than 10, annual turnover of less than \$3 million and balance sheet total of less than \$3 million	Employees from 10 to 49, annual turnover of less than \$13 million and balance sheet total of less than \$13 million	Employees from 50 to 249, annual turnover of less than \$67 million and balance sheet total of less than \$67 million
1 € = \$1.354023; 1 US \$ = ₹ (INR) 61.603500; 1 Yen = \$0.009590; 1 RM = \$0.303398; 1 Won = \$ 0.000942; 1 £ = \$1.641500 References: [10] - [14]: Currency Calculator (as on January 18, 2014)			

### B. Human Factors in MSMEs

SMEs are labor intensive production units [15] and efficient management of human resources is a crucial factor in determining the growth and prosperity of business enterprises [16]. Challis et al. [17] stated that manufacturing managers are becoming increasingly committed to the need of organizational and human resources investments in order to maximize the value of employee contribution to the operational and business performance of their enterprise. Most managers realize that their success is directly related to effective and continual implementation of process improvements in their enterprises [18]. Demeter and Kolos [19] argued that marketing and manufacturing that included workforce skills and capabilities and workforce participation have larger effect on enterprise performance.

The term 'work environment', when used in the Scandinavian sense, covers a wide range of impacts of work on human beings, including physical, chemical, physiological and psychological conditions [20]. The need of addressing human issues including employee cooperation, employee relations, employee morale/motivation, manpower planning, availability of technological champion, worker involvement in planning, capability of workers in skills, knowledge and attitude, recognition of work groups, continuous improvement programs, training and education to reduce resistance and modification of pay system is to be emphasized [21], [22]. Moreover, Mital et al. [23] undertaken the need to develop an industry-based generic training process that can enhance the skills of workers at all levels, allow them to dynamically cope with changing technology, give them options for personal and professional growth, cut costs, increase productivity and quality of products manufactured. Sohal et al. [24] also supported for the need of worker involvement at all stages along with their training.

Today, both workers and management are concerned about the quality of work lives, ergonomics and occupational safety and health. Ergonomics can create productive safe and

satisfying work environment [25]. The factors that affect the morale of employee and indirectly productivity are safety, ergonomic working conditions, hygiene working environment, less fatigue, human-friendly systems, health hazards, superior light and ventilation and clean air, water and canteen facilities [26].

However, Klass et al. [27] quoted that yet, human capital programs in the SMEs have traditionally been viewed as cost-prohibitive, limiting their use. Harney and Dundon [28] presented a framework to evaluate Human Resource Management (HRM) in SMEs. Rani et al. [29] argued that mismatches between human performance and task requirement relate to incompatibilities, inappropriateness, unsuitabilities or inconsistencies which, if not addressed, would lead to errors. Excessive reliance on automation technology may be undesirable if the overall goal is to enhance productivity of manufacturing enterprises. A human-centered approach to modern manufacturing may be more effective, based on actual productivity gains, economics, technical feasibility and equipment capability and reliability, and problems created by automated manufacturing technologies [30].

Many enterprises fail to invest properly in workers and their training for usage of new manufacturing technologies, which can lead to an alienated workforce and thereby underperforming manufacturing processes [31]. The barriers that affect the manufacturing system significantly include scarcity of skilled / expert workforce, training to management and its employees, lack of related infrastructure, resistance from employees to the changing conditions and disparity in pay scales of employees [32]. In this way, it can be remarked that care of entire set of human related affairs is required for better functioning and growth of MSMEs.

### III. METHODOLOGY

To collect the responses of the survey, a structured questionnaire was framed. The questions pertaining to the

questionnaire were on a five-point Likert scale. Enterprises were carefully selected from www.indiamart.com, directories of various industrial areas and their physical presence. In total, 271 questionnaires were mailed to different MSMEs throughout the country. These included the manufacturers of glassware (94 units), shoes/footwear (96 units) and locks (81 units). This survey was conducted during the period of May 2009 to February 2010 that took about ten months. Out of 271 questionnaires mailed to the Proprietors/Managers, 2 questionnaires returned undelivered, 1 unit was reported to be closed and 1 was reported to be shifted. A total of 84 valid responses were collected. This gives an effective response rate of 31.23% which seems to be acceptable in Indian context. Personal visits were also conducted to improve the response

rate as personnel from MSMEs are less bothered for such participation.

Statistical Package for Social Sciences (SPSS) V16.0 is used for entire set of computations/analysis. Statistical analysis is done by using descriptive statistics that includes mean, standard deviation (SD) and frequency distribution.

#### IV. DEMOGRAPHIC PROFILE OF PARTICIPATING ENTERPRISES

The nature and characteristics of surveyed enterprises is included in the demographic profile (Table II) that comprised segment wise participation and number of employees. This also consists of performance parameters like annual sales turn-over, involvement in export, market share, past sales growth over last three years and projected sales growth for coming year.

TABLE II  
DEMOGRAPHIC PROFILE OF PARTICIPATING ENTERPRISES

Demographic profile Parameters for of participating enterprises (with the number and % of the respondents)						Total Respondents, Percent
Participation by segment	Glassware Manufacturing Enterprises (31, 36.9%)	Shoe / Footwear Manufacturing Enterprises (30, 35.7%)	Lock Manufacturing Enterprises (23, 27.4%)			84, 100%
Number of Employees	Less than 10 (17, 20.0%)	Between 10-49 (29, 34.5%)	Between 50-199 (30, 36.0%)	Between 200-249 (8, 9.5%)	250 and Above (0, Nil)	84, 100%
Annual Sales Turn-over Enterprises	Up to 50L (15, 17.9%)	Between 51-100L (12, 14.2%)	Between 101-200L (19, 22.6%)	Between 201-500L (13, 15.5%)	More than 500L (25, 29.8%)	84, 100%
Doing Export Market Share	Doing Export (26, 31%)	Not doing Export (58, 69%)				84, 100%
Sales Growth (Over past 3 years; Increase)	Up to 1% (71, 84.5%)	Between 1-5% (12, 14.3%)	Between 6-10% (0, Nil)	Between 11-15% (1, 1.2%)	More than 15% (0, Nil)	84, 100%
	No Increase (1, 1.2%)	Up to 10% (54, 64.3%)	Between 11-20% (28, 33.3%)	Between 21 to 50% (1, 1.2%)	More than 50% (0, Nil)	84, 100%

Source: Computed outcome of responses collected through conducted survey;

'L' means Lakhs of Rupees (INR), 10 Lakhs = 1 million, 1 US Dollar = ` (INR) 61.603500

Referring to the definition of MSMEs adopted by many countries (Table I) and surveyed data (Table II), about 20% surveyed enterprises belong to micro (0-9 employees), 35% enterprises belong to small (10-49 employees) and 45% enterprises belong to medium enterprises (50-249 employees). It reflects that all the surveyed enterprises belong to MSMEs sector. It is important to note that the three sub-sectors are nearly equally distributed in this survey (Table II), so that our findings are unbiased. Nearly 70% of enterprises reported an annual sale turn-over less than 50 million INR (Indian National Rupee). About 31% enterprises reported that they are engaged in export of their produced products. Thus, it can be inferred that those enterprises which are involved in export, are having annual sales turn-over of more than 50 millions of Rupees as both the cases are having nearly equal percentage. Most of the participating enterprises (about 85%) had a market share of less than a single percent.

#### V. FINDINGS OF THIS SURVEY

##### A. Safety (State of Miss-Happening)

State of miss-happening occurred in a past one year were asked in terms of deaths, partial disability, permanent disability, minor accidents, major accidents, cases of fire and

strikes and lockouts. As reported, there were no case of death, partial disability, major accidents, cases of fire and strikes, and lockouts. Miss-happening in terms of minor accidents was reported by 97.6% respondents (mean = 3.39, SD = 0.88). 8.3% respondents reported for 1 minor accident, 47.6% reported for 2 to 5, 31% reported for 6 to 10 only, and 10.7% respondents reported for more than 10 numbers of minor accidents.

These are the state of reported cases. Generally, small cases of fire and accidents are being observed, but not reported. Safety is the prime factor for satisfactory working, while in Indian context; attention towards safety is poorly paid. Workforce used to take risk for cost saving and for more production. In this regard, safety is to be improved.

##### B. Working Days, Shifts, Over-Time, Wages and Leaves

About 83% respondents reported for single shift (eight hour) working on six days per week while 15%-17% reported for round the clock working (three shifts per day on all week days). About 3.6% reported for 9 hours working in a shift while 13.1 % reported for nine and half hours in a shift. In glassware enterprises, respondents said that after continuous working of 22 days (approximately), production is to be stopped for repair and maintenance of the employed furnace.

In a majority, 66% respondents reported for overtime of 4 to 9 hours per week and in lieu of this overtime, wages were given to workforce. 19% respondents reported that they did not get any paid leave including weekly off, while 21.4% respondents reported that they provide only weekly off of one day

Glassware enterprises generally employ more working hours and more than one shift of working as production is dependent on firing of furnace. In lock manufacturing enterprises, there is no essentiality about the over-time. In case of shoe/footwear enterprises, when targets are to meet, as production is customized, over-time and more shift working is generally employed. It can be argued that most of the MSMEs are operating under standard conditions of one shift of eight hour with six days of working. To meet-out the production target, they employ over-time, which is observed as a regular function. Payment towards this overtime is sometimes missing.

#### *C. Bonus / Gift / Award / Provident Fund and Loan*

About 85% respondents, when asked for offering bonus and gifts on festive occasions, said that they offered gifts and bonus to their workforce. Almost all the respondents (94%) reported that they contributed towards PF account of workforce. It was observed that very less number of employees was on record and all the benefits, wages etc. were applicable to them only. Other workforce was on piece count basis and was fully contractual. Offering bonus / gifts / awards may lead to improve dedication, may encourage worker to do effectively and thus, will improve the performance. It may improve the productivity. Robb and Xie [33] investigated that Chinese parent company managers focus more on short-term measures such as dividend payments for success.

A little few (12%) respondents reported that they provided money as a loan to their employee on various occasions that included marriage of dependents, festivals and other family requirements. Not a single respondent reported that they provided loan facility for home and vehicles. It can be argued that upon working, any workforce member could not get any penny to meet-out his/her needs / urgencies. Disqualifying in fulfilling in urgent needs, worker may try to adopt some unethical means to get the money that will lead to decrease in performance. It reduces the dedication and belongingness to the enterprise. Definitely, all such unhealthy workings lead to reduction in employee morale and hamper the productivity. This practice also influences the motivation of employee.

#### *D. Availability of Employees*

There were three types of employees majorly as Skilled Labour, Semi-skilled Labour and Unskilled labour in MSMEs of India. Regarding the requirement of labour, all respondent reported that there was always requirement of unskilled labour (mean = 4.02 and SD = 0.54). 77.4% respondent reported that they did not require any semi-skilled labour (mean = 0.77 and SD = 1.39), while 95.2% respondents reported for not requiring any skilled labour (mean = 0.17 and SD = 0.62). The data reflects that most of the enterprises are employing

unskilled labor. It improves rate of rejection as enterprises never offer any kind of training.

It was observed that during festive and crop harvesting / cutting season, most of the worker used to go for extra earnings by opting either leave or over-time as serving during nights. It may lead to rejection. Workers are eager to earn more during this short duration. It hampers the production and this state of poor production may be overcome by employing new employees. With this, few of them may rejoin else joins somewhere else.

#### *E. Recruitment Procedure*

Respondents were asked about the method of workforce recruitment. Recruitment of workforce might be carried out by personal contacts (97.6% adopted), with the reference of existing employees (adopted-91.7%), employing interviews (17.9% said yes), employing advertisements (2.4% said yes), and conducting campus placements (no response). Most cited methods included personal contacts and reference of employees. As local labor is required and with the reference only, one can have correct and better knowledge about person, skills, work culture etc. about the employee to be recruited. Moreover, in case of emergency, employee may be more dedicated and may has less complaining nature when recruited based on personal relations.

#### *F. Number of Employees Leaving the Job and Reasons*

Almost all the respondents (99%) reported that they neither hire nor need any skilled labor. Regarding the semi-skilled labor, about 87% respondent reported that neither require nor recruit any semi-skilled labor. In case of un-skilled labor, which was the major proportion of entire workforce, only 6% respondents reported that the labor were fixed and did not leave the job. In the same line, 36.9% respondent reported for regular recruitment of up to 5 numbers, 21.4% reported for 6-10, 15.5% reported for 11-15 and 20.2% reported for recruitment of more than 15 numbers of unskilled labor per month, as these labor left the job averagely.

The reasons 'why people change the job or left the job?' were tried to find-out. In this regard, six leaving cause were asked to rate by respondents that included leaving job due to more salary (mean = 3.27 and SD = 0.95), leaving job due to better environment (mean = 3.42 and SD = 3.40), leaving the job due to personal problem (mean = 2.89 and SD = 0.92), leaving the job due to organizational problem (mean = 1.49 and SD = 0.55), leaving the job due to rift among the employees (mean = 1.42 and SD = 0.50) and leaving the job owing to laying-off (mean = 1.49 and SD = 0.53). The most cited reasons included in search of better environment and due to salary. It can be argued that with the successful adoption of newer technologies, skills level of employees will improve and thus, wages will also be improved. Moreover, change of job will be easier. When an employee feels satisfied in terms of salary (more salary due to more skills), the changes of change of job reduces.

### G. Payment of Due Salary / Perks etc.

Respondents were asked about the notice given from either side before leaving the job and its duration. 78.6% respondents reported that there was no provision of notice for receiving / giving before leaving the job while 21.4% respondent reported that there was provision of notice and its duration is of 30 days from either side. When asked for payment of due salary / perks / PF / salary against balance leaves for those employees that leaves the job, 39.3% respondent reported that there was no rule / provision of payment of due PF / salary while 60.7% respondents reported for payment of due PF / salary. Regarding the payment in lieu of due leaves, only 7.1% respondent reported for payment of due salary in lieu of credited leaves while 92.9% respondent refused for payment against the leaves. There is no liability of paying / refunding due salary / perks / wages from either side as enterprises feel that they are our employee only and workers feel that we are getting salary as we are working only. There is lack of feeling and understanding of team and belongingness.

### H. Evaluation of Employees' Performance

Respondents were asked whether they evaluate their employees' performance or not. 95.2% respondents reported that there is no evaluation of employees' performance. Only 4.8% respondents reported that they evaluate the employees' performance. Since, largely worker are on piece-count and contractual – daily-wages basis, so, enterprises feel that there is no need for their evaluation.

If evaluation is introduced with proper training and re-training, the rejection rate will be lower and quality production will rise, that will improve the performance of the enterprises in terms of increase in turn-over, less rejection, increased sales and thus, more profit.

## VI. DISCUSSION

Many researchers necessitate the addressing of human factors. In this research, state of working and affairs related to human factors in MSMEs of India are investigated. On the basis of outcomes of study, it is reported that retentions of employee is crucial and care should be taken to train them and then to retain them. Need for hiring / over-time should be analyzed carefully and extra wages should be paid to all such working employees, which will definitely improve the belongingness and quality production. The enterprises should feel the responsibility to help their employees financially. The rules should be adopted to provide loan for personal needs as marriage of daughter, medical need etc. The state of leave is somewhat acceptable. The leave rules suggested by government may be incorporated by all the enterprises as uniformly will help in building trust among the employees and management. Working environment should ergonomically be designed. It will definitely help in employees working without much stress and fatigue and will help in improving productivity.

Thus, it can be said that proper care and investment in human resources is an essential requirement for acquiring sustainable growth of MSMEs of India. Present state of human

resources of MSMEs of India reflects that skilled workforce is not properly available, wages are not proper and employees are not participating in the required activities due to lack of motivation, encouragement and confidence.

## VII. CONCLUSIONS

Although the importance of MSMEs in the growth of advancing nations is undisputed, this sector suffers from the lack of superior state of working culture and human factors. In order to understand the affairs related to working culture and human factors, a comprehensive study was conducted through questionnaire. The outcomes of this study reflect that miss-happening in terms of minor accidents was reported. Most of the MSMEs were having six days of weekly working and single shift production. However, to meet-out product requirements, most of them employed over-time with or without extra wages. Bonus and gifts were offered. PF was also given. Enterprises were mostly employing unskilled labor whose wages were less and training level were also less. Retention of employees was crucial. The reasons cited for leaving the job include search of better environment and salary. Most of the employees could not get due salary / perks when they leave the job.

On the basis of this research, it can be suggested that entire workforce must be encouraged and motivated for their active and efficient functioning, to ensure its sustainable growth. It can be achieved through improving state of functioning, condition of workplace safety, and imparting training to the workforce. This study cannot be taken as reference in policy making or in generalizing the case as it is based on responses of participated 84 MSMEs of India only. Further, to broaden the aspect and coverage, the study must be planned in much larger way. Future studies and researches in this regard will help manufacturers, policy framers and researchers to reach to a common consensus.

## ACKNOWLEDGMENT

The authors are very grateful to the personnel of participating enterprises for their valuable responses. The authors are thankful to the anonymous referees whose valuable comments have been incorporated to improve the quality of this paper. The authors are also thankful to the editor and entire editorial board of this journal for his availability and help in the entire process of publication of this paper.

## REFERENCES

- [1] S. S. Acharya, "Innovative MSMEs Financing To manage and balance growth targets, capital requirements and achieving higher profitability", Compendium 12 Test Layout 1 Dated October 11, 2012, pp. 013-016, 2012.
- [2] A. M. N. Rose, B. Md. Deros, M. N. Ab. Rahman, and N. Nordin, "Lean manufacturing best practices in SMEs", Proceedings of the 2011 International Conference on Industrial Engineering and Operations Management, Kuala Lumpur, Malaysia, January 22-24, 2011, pp. 872-877, 2011.
- [3] SMEs in European Union (EU) in 2012: at the crossroads, Annual report on small and medium-sized enterprises in the EU, 2011/12, <http://ec.europa.eu/enterprise/policies/sme/facts-figures->

- analysis/performance-review/files/ supporting-documents/2012/annual-report\_en.pdf [Accessed on February 14, 2013].
- [4] Small Business Statistics, issued by Federation of Small Business, UK, <http://www.fsb.org.uk/stats> [Assessed on February 16, 2013].
- [5] Economic Survey (2010-2011): Government of India, <http://indiabudget.nic.in/es2010-11/echap-09.pdf> [Accessed on February 14, 2013].
- [6] Annual Report 2011-2012, issued by Ministry of MSMEs, Government of India, <http://msme.gov.in/MSME-Annual-Report-2011-12-English.pdf> [Accessed on February 14, 2013].
- [7] C. Harvie, "The contribution of SMEs in the economic transition of Vietnam", *Journal of International Business and Entrepreneurship Development*, Vol.2, No.2, pp.1-16, 2004.
- [8] H. Romijn, "Technology support for small-scale Industry in Developing countries: A review of concepts and project practices", *Oxford Development Studies*, Vol. 29, No.1, pp.57-76, 2004.
- [9] B. Singh, R. Narain, and R. C. Yadav, "Adoption of advance manufacturing technologies in micro, small and medium enterprises of India", *International Journal of Indian Culture and Business Management*, Vol. 7, No. 1, pp. 24-52, 2013.
- [10] B. Singh, R. Narain, R. and R. C. Yadav, "Identifying critical barriers in the growth of Indian Micro, Small and Medium Enterprises (MSMEs)", *International Journal of Business Competition and Growth*, Vol. 2, No. 1, pp. 84-105, 2012.
- [11] D. Tarka, "High-growth Micro Enterprises: Managing the risk aspects of enterprise growth", International conference on Innovation / Business Education and Entrepreneurial Training, London, April 4-5, 2004, pages 1-18, (<http://129.3.20.41/eps/mic/papers/0403/0403004.pdf>) [Accessed on March 03, 2011], 2004.
- [12] J. Yang, "Small and Medium Enterprises (SME) adjustments to Information Technology (IT) in Trade Facilitation : The South Korean Experience", *Asia-Pacific Research and Training Network on Trade*, No. 61, pp. 01-39, 2009.
- [13] Performance of MSMEs in Japan, A report from the Economist Intelligence Unit entitled 'SMEs in Japan: A new growth driver?' (2010), [http://viewswire.eiu.com/report\\_dl.asp?mode=fi&fi=1227698307.PDF&rfr=0](http://viewswire.eiu.com/report_dl.asp?mode=fi&fi=1227698307.PDF&rfr=0) [Accessed on February 27, 2011].
- [14] Currency Calculator; <http://www.x-rates.com/calculator.html> [Accessed on January 18, 2014].
- [15] K. Kishore, M. Majumdar, and V. Kiran, "Innovative HR strategies for SMEs", *IOSR Journal of Business and Management*, Vol-2, No.6, pp. 01-08, 2012.
- [16] J. S. V. G. Sarma, "A Study on significance of job satisfaction and commitment of employees in Small Scale Industries", *IOSR Journal of Business and Management*, Vol-2, No.6, pp. 45-52, 2012.
- [17] D. Challis, D. Samson, and B. Lawson, (2002) 'Integrated manufacturing, employee and business performance: Australian and New Zealand evidence', *International Journal of Production Research*, Vol. 40, No. 8, pp. 1941-1964.
- [18] R.A. Reid, (2006) 'Productivity and quality improvement: an implementation framework', *International Journal of Productivity and Quality Management*, Vol. 1, No. 1, pp. 26-36.
- [19] K. Demeter, and K. Kolos, (2009) 'Marketing, manufacturing and logistics: an empirical examination of their joint effect on company performance', *International Journal of Manufacturing Technology and Management*, Vol. 16, No. 3, pp. 215-233.
- [20] O. Broberg, (2007) 'Integrating Ergonomics Into Engineering: Empirical Evidence and Implications for the Ergonomists', *Human Factors and Ergonomics in Manufacturing*, Vol. 17, No. 4, pp. 353-366.
- [21] C. A. Chung, (1996) 'Human issues influencing the successful implementation of advanced manufacturing technology', *Journal of Engineering and Technology Management*, Vol. 13, pp. 283-299.
- [22] J. A. Farris, E. M. V. Aken, T. L. Doolen, and J. Worley, (2009) 'Critical success factors for human resources outcomes in Kaizen events: An empirical study', *International Journal of Production Economics*, Vol. 117, pp. 42-65.
- [23] A. Mital, A. Pennathur, R. L. Huston, D. Thompson, M. Pittman, D. B. Kaber, L. Crumpton, R. R. Bishu, K. P. Rajurkar, V. Rajan, J. E. M. McMulkin, S. Deivanayagam, P. S. Ray, and D. Sule, (1999) 'The need for worker training in advanced manufacturing technology (AMT) environments: a white paper', *International Journal of Industrial Ergonomics*, Vol. 24, pp. 173-184.
- [24] A. Sohal, D. Samson, and P. Weill, (1991) 'Manufacturing and technology strategy : a survey of planning for AMT', *Computer-Integrated Manufacturing System*, Vol. 4, No. 2, pp. 71-79.
- [25] M. Iqbal S. A. Iqbal, A. N. M. Rahman, and A. H. M. Samsuzzoha, (2011) 'Ergonomics and Design', International conference on Industrial Engineering and Operations Management, Kuala Lumpur, Malaysia, January 22-24, 2011, pp. 845-851.
- [26] K. V. Sambasivarao, and S. G. Deshmukh, (1995) 'Selection and implementation of advanced manufacturing technologies', *International Journal of Operations and Production Management*, Vol. 15, No. 10, pp.43-62.
- [27] B. S. Klaas, M. Klimchak, M. Semadeni, and J. J. Holmes, (2010) 'The adoption of human capital services by small and medium enterprises: A diffusion of innovation perspective', *Journal of Business Venturing*, Vol. 25, pp. 349-60.
- [28] B. Harney, and T. Dundon, (2006) 'Capturing complexity: developing an integrated approach to analyzing HRM in SMEs', *Human Resource Management Journal*, Vol. 16, No. 1, pp. 48-73.
- [29] M. R. A. Rani, M. A. Sinclair, and K. Case, (2000) 'Human mismatches and preferences for automation', *International Journal of Production Research*, Vol. 38, No. 17, pp. 4033-4039.
- [30] A. Mital, and A. Pennathur, (2004) 'Advanced technologies and humans in manufacturing workplaces: an interdependent relationship', *International Journal of Industrial Ergonomics*, Vol. 33, pp. 295-313.
- [31] S. E. Fawcett, and M. B. Myers, "Product and employee development in advanced manufacturing: implementation and impact", *International Journal of Production and Research*, Vol.39, No.1, pp.65-79, 2001.
- [32] H. Singh, and J. S. Khamba, "Evaluating the barriers for Enhancing the Utilization Level of Advanced Manufacturing Technologies (AMTs) in Indian Manufacturing Industry", <http://www.iiis.org/CDs2008/CD2009SCI/IMETI2009/PapersPdf/F565XC.pdf> [Accessed on February 25, 2013], 2008.
- [33] D. J. Robb, and B. Xie, "A survey of manufacturing strategies in China-based enterprises", *International Journal of Production Economics*, Vol. 72, pp. 181-199, 2001.

**Brijesh Singh** has about 14 years of teaching experience. He is presently pursuing PhD in the area of AMT. His areas of interest include Supply Chain Management, Computer Aided Manufacturing and Advance Manufacturing Technology. He is serving as an Associate Professor of Aryabhata College of Engineering and Technology, Baghpat – 250 601 (UP) India (web: <http://www.acet.in>; phone: +91-9359765680/40; fax: +91-121-2962952; e-mail: brjshngh@gmail.com).

**Dr. Amar Singh** has about 30 years of teaching experience at Department of Mechanical Engineering, Kamla Nehru Institute of Technology, Sultanpur – 228 118 (UP) India. His areas of interest include Supply Chain Management, Operations Management, Computer Aided Manufacturing, Industrial Engineering and Advance Manufacturing Technology. He has contributed research papers in refereed international journals and conferences. Presently, he is serving as Director, Buddha Institute of Technology, Gorakhpur – 273 209 (UP) India (web: <http://www.bit.ac.in>; phone: +91-551-2580413; fax: +91-551-2580415; e-mail: [singh.amar15@gmail.com](mailto:singh.amar15@gmail.com)).

**Prof. R.C. Yadav** has about 35 years of experience in teaching, research and administration. He has held several important positions in his academic career. He has been a Director of three technical institutes in India. He received his PhD from the University of Loughborough (UK), and also served as a Visiting Professor at Al-Fatah University, Tripoli, Libya. His areas of interest include Computer Aided Manufacturing, Supply Chain Management, Production and Industrial Engineering. He has contributed research papers in refereed international journals and conferences. He is Professor (Retd.), Mechanical Engineering Department, Motilal Nehru National Institute of Technology, Allahabad – 211 004 (UP), India (phone: +91-9026773444; e-mail: [rcyadav1941@gmail.com](mailto:rcyadav1941@gmail.com)).