

Socio Economic Factors influencing the Productivity of a Manufacturing Unit

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Abstract — Manufacturing is conversion of raw material into usable form with the sufficient use of resources keeping consideration of Environmental parameters. In developing nations manufacturing plays a major role in providing job and consequently contributes in development of the nation. Now a days everything is automized everywhere, but still human intervention is there which leads to human error also. Somewhere we can say human intervention have a direct involvement in sustaining productivity. During long run skill set of worker is also affected depending upon the willingness of the associate. Safety plays a vital role in industries because one silly mistake leads to big issues. Every near miss should be taken up with top level of seriousness because one such case may prove critical some day or the other. Parallely sense of safety is equally important where associate must feel that he is secure.

Key words— Socio Economic Factors, Productivity, Skill-Will matrix, Manufacturing Units, Production house, Manpower, Safety and Sense of Safety

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1 INTRODUCTION

The conversion of Raw Material into finished good through the use of necessary and optimum resources is referred as a Manufacturing Unit. There are two types of resources that contribute for manufacturing Unit: Primary Resources like Land, Labor & Capital, and Secondary Resources like Material & Energy. Generally it is noticed that during setup of any manufacturing unit most of the firms mainly focus on the straight forward parameters and very less concerned about the indirect factors. The indirect factors don't have any impact directly visible on the day to day production, but may prove critical on the long run. Manpower is one of the key resources among all others. It is a key to managerial functions. Productivity of a manufacturing unit is defined as the output with respect to the inputs used during production. Every firm tries to maximize the productivity. To achieve the same several cost saving themes are introduced time to time. Considering the competition in market, cost saving is key to achieve profitability. Many a times it is observed that focus on cost saving deviates the attention towards less visible factors. Utilization of manpower should be efficiently done, because it may lead to unavoidable concerns that lead to productivity loss. Even a small negligency or concern may have serious concern. A healthy working environment prevents any threat to productivity loss in the manufacturing house. Although current manufacturing industry prefers highly automised production units, but still human intervention is still significant. Since Man involvement in production process also brings in the chances of errors, The Social factors also have impact over the productivity of the production house. Although there are several causes some common causes of Low Level of productivity are –

1. Weak Management
2. Outdated Systems follow up
3. Non Synchronized production
4. Associate Dissatisfaction
5. Unsafe environmental conditions

2 MATERIAL & METHODS

A manufacturing Unit is selected with a new production start up, where production systems are to be implemented. There are several factors that indicate the incline or decline of productivity. In our study we have analysed the productivity of a manufacturing house, analysis of production losses is done and contribution of Technical & non technical reasons is noticed. Some Socio Economic factors which have an impact over the productivity, but are not direct factors, some factors are –

1. Safety of associate at work place.
2. Attrition rate in the organization.
3. Fatigue failure during working.
4. Skill mapped with Will of associate.
5. Trainings for continual improvement.
6. Negligence of worker.

Observations are made on general manufacturing Unit & general questions on the subject were raised that helped the management to have an eye over the Socio Economic factors discussed with them, to implement the same & achieve the desired goal or productivity targeted.

3 OBSERVATIONS

Manpower plays a very crucial rule in sustaining and increasing the productivity of any manufacturing unit. Manpower in any industry are considered to be the backbone which drives towards the achievement of desired target and consequently resulting in profitability. Skill is a key factor amongst down the level manpower which is either gained with experience or by proper training followed by on the job work. Over a period of time, doing a same set of job may result in

decrease in interest of worker; this can better be understood by below Skill-Will diagram -

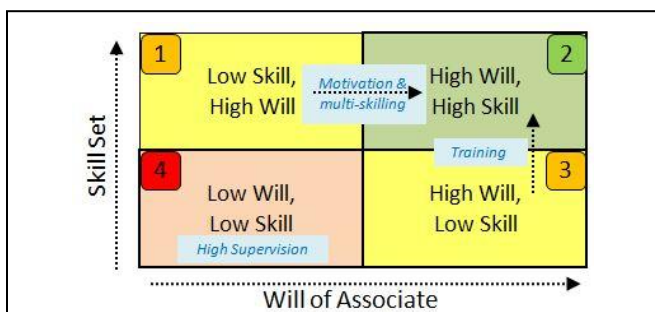


Fig. 1. Showing relationship between Skill Set & Williness of associate to perform the assigned task. Majorly categorized in four quadrants

Generally we find manpower lying in four quadrants as shown above which we will discuss one to one.

Quadrant one - Low Will & High Skill, here the skill of worker is higher which may be a result of long work experience, which over a period of time deteriorated the willingness of worker.

Quadrant two - High Will & High Skill, this seems to be most ideal set where worker is pumped up with zeal of work & can prove to be most effective for the industry.

Quadrant three - High Will & Low Skill, this set is observed when the manpower is fresher or new to work, where requirement of teaching & training is there.

Quadrant four - Low Will & Low Skill, this set of workers requires a non productive work & degree of supervision is very high here.

Over a period of time these quadrants may shift & due attention should be paid in order to achieve the desired productivity.

To increase the productivity following are the ways -
Multi-skilling -For a prolonged period, same kind of work leads to unwillingness of work, so necessary enhancement in skill set is mandatory in order to utilize manpower in best possible way.

Motivation - Time to time counseling & motivation is necessary in order to achieve the desired productivity. Over a prolonged period responsibility & authority should increase which gives associate necessary motivation of working & inspiration to others.

Training - For every new associate or any new task given to any associate training is mandatory in order to achieve the desired productivity.

4 DATA ANALYSIS & INTERPRETATION

We analysed the production report of a manufacturing unit, which is running 04 production lines and we analysed the production on single line, capacity of the line is 1100 units Finished goods per shift. Operation is Assembly of Frame, Consideration of analysis is one month [4weeks]. One day to day manufacturing some losses occurs some times the reason

are technical and some are non technical.

During week 01, productivity target failed in three days. Major reason of failure was absenteeism of worker associates.

During week 02, productivity target failed in two days. Major reason of failure was Machine Breakdown.

During week 03, productivity target failed in one day. Major reason of failure was Minor accident.

During week 04, productivity target failed in one day. Major reason of failure was Minor accident.

Line 1 [Capacity 1100]	Week 1						Major Reason
Operation - Frame assy	Mon	Tue	Wed	Thu	Fri	Sat	Absenteeism
Prod A Shift	1100	1100	1050	1054	1061	1100	
Prod B Shift	1100	1100	1100	1100	1061	1100	
Total Day Prodn	2200	2200	2150	2154	2122	2200	
Manhours	500	500	500	500	500	500	
Plan Productivity	4.40	4.40	4.40	4.40	4.40	4.40	
Actual Productivity	4.40	4.40	4.30	4.31	4.24	4.40	
Line 1 [Capacity 1100]	Week 2						Major Reason
Operation - Frame assy	Mon	Tue	Wed	Thu	Fri	Sat	M/C breakdown
Prod A Shift	1100	1100	1100	1100	960	1100	
Prod B Shift	1100	1100	1100	980	1100	1100	
Total Day Prodn	2200	2200	2200	2080	2060	2200	
Manhours	500	500	500	500	500	500	
Plan Productivity	4.40	4.40	4.40	4.40	4.40	4.40	
Actual Productivity	4.40	4.40	4.40	4.16	4.12	4.40	
Line 1 [Capacity 1100]	Week 3						Major Reason
Operation - Frame assy	Mon	Tue	Wed	Thu	Fri	Sat	Minor Accident
Prod A Shift	1100	1008	1100	1100	1100	1100	
Prod B Shift	1100	1100	1100	1100	1100	1100	
Total Day Prodn	2200	2108	2200	2200	2200	2200	
Manhours	500	500	500	500	500	500	
Plan Productivity	4.40	4.40	4.40	4.40	4.40	4.40	
Actual Productivity	4.40	4.22	4.40	4.40	4.40	4.40	
Line 1 [Capacity 1100]	Week 4						Major Reason
Operation - Frame assy	Mon	Tue	Wed	Thu	Fri	Sat	Minor Accident
Prod A Shift	1100	1008	1100	1100	1100	1100	
Prod B Shift	1100	1100	1100	1100	1100	1100	
Total Day Prodn	2200	2108	2200	2200	2200	2200	
Manhours	500	500	500	500	500	500	
Plan Productivity	4.40	4.40	4.40	4.40	4.40	4.40	
Actual Productivity	4.40	4.22	4.40	4.40	4.40	4.40	

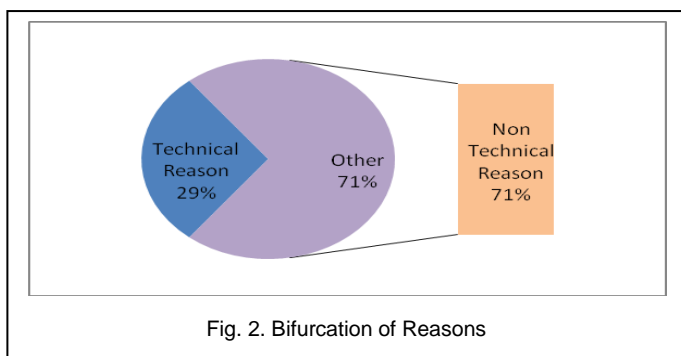


Fig. 2. Bifurcation of Reasons

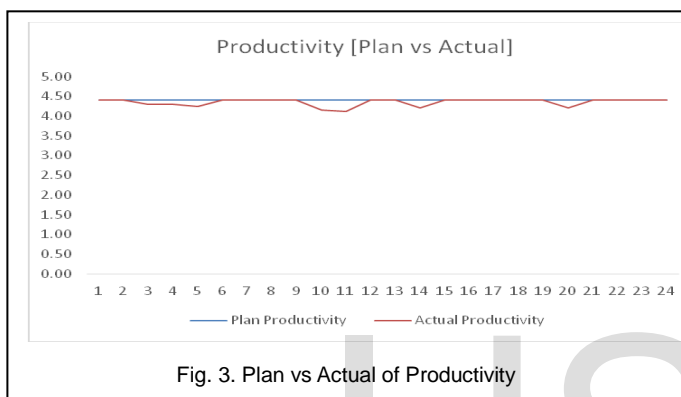


Fig. 3. Plan vs Actual of Productivity

5 RESULTS

Productivity can be mathematically defined as -
 $p = \text{Total Output} / \text{Total Input}$

When a Manufacturing house produces some useful output, with the use of labour & machines, it is called Capital inputs, in general Production function can be interpreted as -
 $Q = f(L, K)$

Where Q = Level of Output
 L = Amount of labour input
 K = Amount of Capital input

We know Cobb Douglas Production function is vastly used in routine engineering calculations since its very convenient to use, in general Cobb- Douglas Factor is termed as
 $Q = AL^\alpha K^\beta$

Where A = Total factor productivity
 α & β = output elasticities of capital and labour respectively.

In general production calculations above method is used and in most of cases it fits perfect also, but some where in long run our targeted productivity decreases because of several other factors, some factors are socio economic factors that hamper productivity in long run.

Safety & Sense of Safety are complimentary to each other, same as Attrition rate & absenteeism.

Safety [A] x Sense of Safety [B] > 1 ;

p is directly proportional to Ax B.

Attrition Rate [C] x Absenteeism [D] < 1;

p is inversely proportional to CxD.

Fatigue [E] < 1; p is inversely proportional to E.
 Near Miss [F] < 1; p is inversely proportional to F.

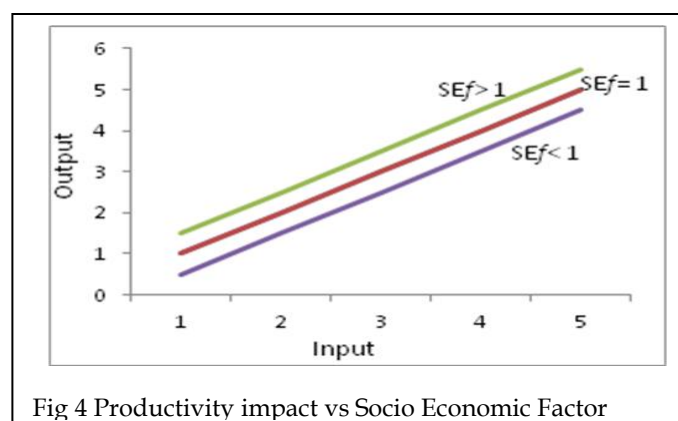


Fig 4 Productivity impact vs Socio Economic Factor

Overall;

$$p = [Ax B] / \{ [Cx D] x Ex F \} AL^\alpha K^\beta$$

$$p = SEf AL^\alpha K^\beta$$

6 CONCLUSION

Socio Economic Factors have a direct impact on the productivity of a manufacturing house, so these should be considered on the initial stage of the plant layout set up. Further better conditions can improve the quality of production and reduce cost of re-work. Safety and sense of safety goes hand in hand, so an adequate amount of Sense of safety is also required to achieve the desired goals.

7 RECOMMENDATION

This study identifies a number of Socio Economic factors that influence the productivity of a manufacturing unit. The study illustrates that good understanding of these factors is necessary for those institutions where Man involvement is significant. The information is also useful in the direction to work on and make investment in. Based on the study following are the recommendation -

1. Every manufacturing house should consider Socio Economic factors during plant set up phase, although the minimum threshold limit is defined as statutory requirements, still maintaining more than that will yield better results,
2. Socio Economic consideration will improve the productivity & help in sustaining the same during the long term period. This can help in long run production planning & forecasting.
3. Manufacturing unit must take the socio economic factors on utmost priority and must have a separate platform where any associate can deliver and share the concern.
4. Every Manufacturing must have adequate safety equipments and must be responsible for giving all associates a sense of safety.

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