

# Organizational Ergonomics and its Framework

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**Abstract:** *The work proposes that the ergonomic infrastructure of any organisation consisting of structural, technical, relational condition between organisational and stakeholders plays an important role as whole in the development of the ergonomics conditions. These conditions focus on positioning of stakeholders towards ergonomics issues, relationship between stakeholders and strategies they used for implementations. It also includes influences of the culture, attitude and exception of the organisation into implementation of ergonomics as engineering process. It is important to include all such elements because it causes issues at the time of ergonomics proactively (design phase), reactively (in response to injuries, discomfort and compensation claim).*

**Keywords:** *Production ergonomics, Organisational relations, Proactive ergonomics, Organizational ergonomics, macro ergonomics, Socio-technical systems.*

## I. INTRODUCTION

It is very difficult to design production based ergonomic system so that it can be compatible and applicable to all companies. Considering manufacturing-based production system, where human and automated recourses are combined to achieve desired product or service in timely and efficient manner. Human in such production system may face physical loading and strain which can cause risk of developing MSDs. Traditionally for a long period, ergonomics was concerned with measuring and preventing musculoskeletal disorders with the help of methods that identifies issues of posture, force and time of work. Those methods are rigorously focused on cumulative physical injuries and limited perspective towards context or situation in which methods and measurements had been done. To accurately consider the context or situation of environment, a holistic system view where human involvement is must be taken into account is required. So, interrelations between two individual elements, sometime as combination of groups, functional units and hierarchies to achieve goal as whole have unique properties and characteristics. Macro ergonomics is defined as “the sub discipline of ergonomics that focus on the design of the overall work system. It includes socio-technical system (system which consider both society and technology aspects) approach to the design of work systems. It combines socio-technology ( the study of the processes on the intersection of society and technology) through overall work system design characteristics to the micro ergonomics design of the human-job, human- machine, and human- software interface to ensure that the entire work system is fully harmonized.” That discipline and practice of ergonomics is very diverse.

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So, the research field of ergonomics is open to many influencing factors and acceptance of quantitative and qualitative research methodologies is required. Evolution of ergonomics as a discipline took place gradually by realisation while applying ergonomics theory on real life conditions. Resulting taking accounts of additional social, cultural and organizational influences that contribute to problems in the human technology interface.

## II. LITERATURE REVIEWS

The following researches gave us a platform for the fresh arguments relating economic gains and advancing production ergonomic.

Pacholski (2011) [6] concluded that even very few literatures are available from an ergonomic practice perspective, rational and political aspects of ergonomics. From the management perspective few literatures exist which connects macro ergonomics with business structures however, all these literatures explain macro ergonomics very briefly in their abstract and suggesting an expansion in theoretical or research methodology notions, rather than a concrete practical approach.

Falck (2010) [3] concluded if ergonomic risk will be eliminated with in time then production system will become more profitable and cost efficient.

Zoellner (2009) [9] said constructivism is the idea that people learn effectively through making things where as constructivist is a practitioner of a style in which mechanical objects are combined into abstract mobile form. Thus, constructivist assumes realities are multiplied result of every individual who experience it. So, it depends upon understanding phenomenon of every individual rather than generalisation.

Imada and Carayon (2008) [5] find that “Improving the physical aspects of work was necessary, but it was not sufficient for ergonomics to improve human conditions (sick). To make a real difference, the discipline must consider the context of that change and forces which facilitate and inhibit ergonomic improvements.”

Vink (2008) [8] determines the involvement of stakeholder into the participatory ergonomics must be ideal and to determine it more research is needed. He gave attention and importance of non-ergonomist stakeholders such as employees, designers top and middle management.

Bucchann and Badham 2008 [2] find that power of any action is sum of ideas, perception of all individuals and cumulative efforts. Goal can be achieved by several ways and he termed it as power base. It is strategy used by one member to interact with another member or agents. Actually, such person is called change agent who can be from inside or outside of the organisation who transforms the organisation for its effectiveness, improvement and development.

He specified eight such power bases along with its positive and negative effects.

Poggi (2005) [7] said that improvement of ergonomics into an organization can be done by involvement of politics, culture, and environment along with different types of tactical analysis can be used to achieve the goals. Involvement of other stakeholders and alliances is even required to resolve issues.

Ackerman (2004) [1] observed constructivism as a constructivist learning theory and theory of instruction. It states that building knowledge occurs best through building things that are tangible and shareable.

Hendrick and Kleineret, 2001 [4] according to him macro ergonomics is defined as “the sub discipline of ergonomics that focus on the design of the overall work system. It involves sociotechnical system (system which consider both society and technology aspects) approach to design the work systems. It combines sociotechnology (is the study of the processes on the intersection of society and technology) through overall work system design characteristics to the micro ergonomics design of the human-job, human-machine, and human- software interface to ensure that the entire work system is fully harmonized.”

### III. PROBLEM FORMATION

Most of the literatures of macro ergonomics do not follow day to day ergonomics work in an organisation. They are mainly focused to establish a running and functional production system. So there is gap in research which cause ergonomics practice more complex. Most of the tools and methods are based upon output of work rather than how work has been done. Understanding how practitioner interact with their surrounding context (circumstances) and how they approach towards the challenges with the help of available resources & constraints and depending upon their experiences explains the requirement to develop practical guidelines to pursuit ergonomics objectives in an organizational context.

### IV. PROPOSED PLAN

#### A. Quantitative & Qualitative Methods Of Evaluation

In this, evaluation of all work stations was done with two different methods first was Biomedical engineering method (BME) and second was done by occupational health services (OHS) professionals. Two different groups of ergonomist and occupational health specialist use two different evaluation methods in the gap of time period to study the risk factor rating for work stations. All evaluation were done on number of workstations under study. During OHS national standardised provision were used as acceptable criteria. For both common aim was to categorise the individual work station in red (unacceptable), yellow (need further evaluation) and green (acceptable) code. Then these reports were submitted to specific body for the comparison of the both report.

#### B. Communication Between Ergonomists And Engineers

In this a team of 5 ergonomist and 5 industrial engineers were involved because they have basic academic

knowledge and professional training & experience in the field of ergonomics. So, they can take part in improving the ergonomics in an organisation. Aim of this study is to know what are problems they faced and how they analysis it and how they deal them as being a professional person.

Unstructured interviews were taken to collect their aspects of work practice. Questions were asked on following topics

- a) Their organizational positioning (hierarchy).
- b) Interaction with other stakeholders
- c) How they give priority to the issues
- d) Tools and methods used in daily works
- e) Attitude within organisation

How work and responsibilities were distributed to the employees.

#### C. Relation Between Ergonomist Engineers And Stakeholders

It is based on the same interviews data collected in section B. Here we judge where participant realise himself into the whole process.

Here we study following things

- a) What self-actualisation and self-realisation he feels about the issues.
- b) How they point out the issues
- c) What strategies they use to deal with issues
- d) Techniques used by him to eliminate the issues.
- e) How they will align the problems between the ergonomic goal and stakeholders so that outcome must be acceptable.

This study was focused on strategies made by ergonomist and engineers, pointing the issues with corrective actions, include opinions of stakeholders, floor employees, preparation of comparison, document and informing it to the higher management and owners, making all resources manageable.

#### D. External Guidance (Consultants)

A consultant who visits different types of companies has plenty of data and experience of working in different circumstances and culture of organisations that their knowledge can be used to improve present situations. He can give examples or demonstrate such example to the present company very easily. As he is not part of the system of organisation, he can easily find out those points upon which an organisation can work out to bring improvements.

Now they take interviews of different ergonomist, engineers, management owners etc and find out the current basic issues of the company. He discusses about medical concern of the workers, benefits like compensation that are provided by the companies and government.

They compare all issues from their past knowledge and experiences gained from other companies and correlate it very easily. So, he prepares a frame of reference for the issues and to work upon it.

This introduced the analysis on different culture, politics, attitude, technologies, layouts, and analysis over ergonomic agenda vs. organisation goals, number of absentees,

compensation provided by company. Consultants establish a role to connect higher, middle and lower management including stakeholder, ergonomist and floor staff and make efficient strategies to eliminate ergonomics related issues.

Role of consultants are as follow

- Work as a bridge to connect higher, middle and lower management including stakeholders and floor staffs.
- To make efficient strategies to eliminate ergonomics related issues.
- To form a team with in organisation to work upon ergonomics
- To find out how much training is required
- To introduce proactive and reactive ergonomics culture into the organisation.
- They use different types of tool and techniques to demonstrate the benefits by implementation of the ergonomics into the required areas.
- Arranging visits to another company while the process of demonstration, i.e. conformability.

**E. Tentative Frame Work**

To understand the finding of this research and relevant theoretical elements a tentative frame work is required which provides a guide to a draw a map of ergonomic infrastructure representing all people who are involved in improvement of production ergonomics. The finding of four studies are combined together and a theoretical model is prepared which states the circumstances and relational factor of the person involved in production system who influences the person involved in improvement of production ergonomics. This helps in preparing a model how things affect each other. This guides us in mapping the ergonomics infrastructure.

**V. RESULT AND ANALYSIS**

These studies explain how culture, politic, tactics, strategies, documents, data and hierarchy influence the improvement of the production ergonomics. It is found that without the knowledge of these dimensions, application of ergonomics is not efficient does not matter how sophisticated technologies are used. So, if there is lack of ergonomics infrastructure then it is impossible to attain full efficient ergonomics system. Such integrated approach has more possibilities of acceptance and sustainability.

**A. Quantitative & Qualitative Methods Of Evaluation**

**Table.1 Frequently Used Body Parts**

WORK STATIONS	FREQUENTLY USED BODY PARTS					
	Head	Shoulder	Hand	Wrist	Waist	Leg
Head tube drilling	Yes	Yes	Yes	No	Yes	Yes
Head tube name plate affixing	Yes	Yes	Yes	No	Yes	Yes
Sticker affixing	Yes	Yes	Yes	Yes	Yes	No
Wrapping of card board over each rod of frame	Yes	Yes	Yes	Yes	Yes	No

BB shell tread cutting	Yes	Yes	Yes	Yes	Yes	Yes
BB shell bolt and cup fitting	Yes	Yes	Yes	Yes	Yes	No
Head tube face cup fitting	Yes	Yes	Yes	No	Yes	Yes
Final wrapping with PVC tape.	Yes	Yes	Yes	Yes	Yes	No

**Table 2. Quantitative Evaluations**

S.NO	WORK STATIONS	QUANTITATIVE EVALUATION	
		EVALUATION BY BME	EVALUATION BY OHS
1	Head tube drilling	GREEN	GREEN
2	Head tube name plate affixing	GREEN	GREEN
3	Sticker affixing	GREEN	GREEN
4	Wrapping of cardboard over each rod of frame	GREEN	GREEN
5	BB shell tread cutting	GREEN	YELLOW
6	BB shell bolt and cup fitting	YELLOW	RED
7	Head tube face cup fitting	GREEN	GREEN
8	Final wrapping with PVC tape.	YELLOW	YELLOW

In this we have analysed 8 workstations by two different quantitative evaluation methods in the gap of time period. Rating of workstations was shows little difference. To understand the reason behind difference in rating is not cleared through this quantitative method. To clear it a qualitative approach was required so an interview was conducted with ergonomist present at BME and OHS specialist. Both interview groups stated that there are differences in rating due to difference in parameters, standard used by BME and national standard while considering the middle line (yellow).Even it is transpired that there were corporate cultural contextual factors which also effects the consideration of yellow line. The need of common approach is required. So, middle line is not only highly dependent upon standards but also upon culture, country, and attitude of individual who is conducting evaluation. So a quantitative approach is not sufficient to know the exact fact. A complete holistic view is required. As Occupational health specialist are more expert into their field so taking them as standard not only increase the safety level but even lower the work pressure of ergonomist. Second it will bring socio-technical view into the role.



## Organizational Ergonomics and its Framework

Issues pointed out in this proposal are as follow

- a) No common parameters and standards were defined. Result of which extend of rating the work station was different.
- b) Communication between ergonomist and engineer who are technical sound from ergonomics point of views was not established. The roles of ergonomist, engineers and stakeholders must be defined to align the issue with the ergonomics agenda.
- c) Culture, attitude, circumstances was not taken into account as these factors highly influence the result of the evaluations.

These factors give a requirement for the further study to understand ergonomics at much deeper level to find out culture, circumstances, personal involvement and transformability.

### B. Communication Between Ergonomists And Engineers

**Table 3 Interview of Ergonomist**

Questions asked	No of Ergonomists				
	1	2	3	4	5
Their organizational positioning (hierarchy).	Senior	Assistant	Assistant	Trainee	Trainee
Experience of working with organisation in years	15	5	4.5	0.5	0.25
Working Hour	8	8	8	8	8
Frequency of training	low	mid	Mid	high	high
Interaction with other stakeholders	In Meetings	When required	When required	When required	When required
When they give priority to the issues	When Feasible	Once Noticed	Once Noticed	Once Noticed	Once Noticed
How they give priority to the issues	Past Experience and data analysis	Analysing its effect on working conditions	Analysing its effect on working conditions	Reporting to senior	Reporting to senior
Tools and methods used in daily works	Data and report analysis	Observation and Comparison	Observation and Comparison	Observation Inspection	Observation Inspection

Attitude within organisation	Polite	Cooperative	Cooperative	Cooperative	Cooperative
How work and responsibilities were distributed to the employees	Depending on skills	Depending on Skills	Depending on Skills	Depending on Skills	Depending on Skills
Culture of the organisation	Complex	Complex	Complex	Complex	Complex
Intension of individuals	Positive	Positive	Positive	Neutral	Neutral
Required productivity vs. Target	Lacking	Lacking	Lacking	Lacking	Lacking
Expenditure upon ergonomics	less	less	Less	not aware	not aware
Number of manpower required vs. manpower available.	ok	Lacking	Lacking	Lacking	Lacking
Knowledge of individuals	Excellent	up to mark	up to mark	up to mark	Beginner

**Table 4 Interview of Engineer's**

Questions asked	No of Engineers				
	1	2	3	4	5
Their organizational positioning (hierarchy).	Senior	Assistant	Assistant	Assistant	Trainee
Experience of working with organisation	20	5	3.5	1.5	0.5
Working Hour	8 to 12	8 to 12	8 to 12	8 to 12	8 to 12
Frequency of training	Low	Mid	Mid	Mid	Mid
Interaction with other stakeholders	In Meetings	Daily	Daily	Daily	Daily



When they give priority to the issues	Once Noticed	Once Noticed	Once Noticed	Once Noticed	Once Noticed
How they give priority to the issues	Past Experience and data analysis	Calculate effect on productivity	Calculate effect on productivity	Calculate effect on productivity	Reporting to senior
Tools and methods used in daily works	Report and Data analysis	Observation and Comparison	Observation and Comparison	Observation Inspection	Observation Inspection
Attitude within organisation	Polite	Cooperative	Cooperative	Cooperative	Cooperative
How work and responsibilities were distributed to the employees	Depending on skills	Depending upon workload	Depending upon workload	Depending upon workload	Depending upon workload
Culture of the organisation	Complex	Complex	Complex	Complex	Complex
Intension of individuals	Positive	Biased	Biased	Biased	Neutral
Required productivity vs. Target	Lacking	Lacking	Lacking	Lacking	Lacking
Expenditure upon ergonomics	less	less	less	less	not aware
Number of manpower required vs. manpower available.	ok	Lacking	Lacking	Lacking	Lacking
Knowledge of individuals	Excellent	up to mark	up to mark	up to mark	Beginner

Unstructured interviews were taken to collect their aspects of work practice. As the data collected were influenced by

- Many levels of managements
- Ergonomist
- Engineers
- Stakeholders
- Floor employees

So, it became more complex to achieve the goals of the ergonomics. As requirements of production, workloads, costs are such many factors which heavily influence the

priority given to ergonomics at different situations. Many a time when a floor employees or workers do not want to adapt change and starts learning things from new level because their working hands and mind set is already set upon previous one so it very necessary for ergonomist to be little friendly with the floor employees.

Many times, misunderstanding happens between engineers and ergonomist. What an ergonomist can contribute is misunderstood. No doubt engineers are prepared for all types of technical and design work but small changes in ergonomics can bring much better outputs so to make communications much better between engineer and ergonomist they must communicate in form of data, design, mathematical expression,

Then it is role of engineers and ergonomist to prepare a comparison chart to represent how things can be better once such changes will be applied. With the help of which they can suggest high level management including owner of the company so the things can be acceptable. As engineers are more powerful into an organisation from the technical point of view so they can work as mediator for floor employees and high-level management.

In this we notice importance of the interaction of ergonomist and engineers because both of them are professionally trained upon ergonomics. They point out the issues at their level and communicate with each other in the form of data, design and matrix which gives base for the further determination of the solution and calculation of time, manpower, cost etc. It brings influences of stakeholders, floor employees and higher management. During the interaction they found many peoples who are not ready to accept the change that helps to judge how to train them and what strategies required to deal with them for the approval of the new concept.

This proposal help in

- Understanding the role of the ergonomist and engineers for the improvement of production ergonomics.
- Finding issues related to ergonomics
- Developing a common platform to have communication between ergonomist and engineers.
- Behaviour strategies
- Finding the persons who required training of ergonomics.

In this proposal many points were not cleared such as

- How an engineer and ergonomist essence their role (improver or mediator)
- Ability to make judgement independently on ergonomic work
- Level of knowledge of ergonomics
- Strategies made by ergonomist and engineers
- What are the corrective actions?
- What will be negative and positive aspects by the change into production ergonomics

This gives a pathway for the next proposal to understand ergonomics at much deeper level.

C. Relation Between Ergonomist Engineers And Stakeholders

Table 5 Identification of Stakeholders Who Relate To Problem

Problem creators	Creators have authority to raise an issue in front of an organisation on the basis of ergonomics agenda. They bring attention to the issues and also determines it priority levels. Once they find a strategy for the solution they share it with other stakeholders.
Problem Sponsors	Sponsors are not directly affected by the issues but without their support desired results can be achieved. They support the result for the political, financial or emotional point of view. They do not participate directly into implementation of solutions.
Problem convincers	Convincers help in convincing the decision matter by preparing logical, analytical and comparison documents in the form matrix, data and textures.
Problem owners	Problem owners are the persons who take the responsibilities of concerned issues and keeps on monitoring the work progress. There role is to find out when a problem when a problem is solved up to satisfactory level. They are more open to the communication with stakeholders and which brings contributions of stakeholders into the work progress.
Solution builders	Solution builders are those who to examine the issues, give their suggestions and eventually helps in solving it. They can either give the complete solution for the issues or only give contribution while giving some adds on suggestions.
	They can give suggestions in three ways
	· Expert: - Being an expert of the field they can help in decision making for the problem owner.
	· Lobbyists: - They give solution for a specific part of the issue but not solving complete issue.
Problem Subjects	· Facilitators:- They can suggest a way for the for the solution of the complete issues.
	Subjects are the person about whom problem is concerned. They are directly affected by the issues. They are suffering consequences of the negative effects of the issues. They may or may not be the part of the problem creators on focusing the issues and bringing it up on ergonomics agenda.

Table 6 Identifying different types of stakes holders and their role.

Problem creators	How did the issues come into focus
	What benefits are expected from solving the problems
Problem Sponsors	What are the benefits by keeping the problem on agenda?

Problem convincers	What obstacles are expected by the convincer
	At what point they have got the charges for their role and who had given those charges.
Problem owners	When is the issues considered as solved
	How can ergonomics agents gain access to issues
	who is appointed problem solver by the problem owner?
Solution builders	What are suggestions they could provide that involved in decision making?
	Up to what extend their suggestions can work?
	who can break down the problem?
Problem Subjects	How they affected by the issues?
	What will be the benefits upon them by solving the issues?
	How they can be involved in finding or implementing the solution?

This proposal was focused on

- a) Strategies made by ergonomist and engineers
- b) Pointing the issues with corrective actions
- c) Include opinions of stakeholders, floor employees
- d) Preparation of comparison document and informing it to the higher management and owners.
- e) Making all resources manageable.

This proposal was unable to deal with problem like

- a) Working culture
- b) Attitude of individuals
- c) politics and policies of the company
- d) what changes going into the other companies for the same type of issues
- e) Lack of confidence while performing an experiment.
- f) Lack of guidance and support

This gives a pathway for the next proposal to understand ergonomics at much deeper level.

D. External Guidance (Consultants)

Table 7 Identifying Factors of Sociotechnical

Project levels	What are the areas which cause the issues such as safety, engineering design or operations?
	How communication can been carried out between stakeholders
	Does issues required proactive or reactive ergonomic approach that is is issue related to ongoing process or to while establishing a new project.
	To find out time required for the completion of the project?
	Are ergonomist are working as a team or individuals?

	What are the possibilities of acceptance for the new ergonomics approach or technologies?		compliments etc.
	What are benefits going to achieve by implementing the solutions.	Coercion	Stakeholders have authorities to charge penalties upon those who are not working according to the agenda of ergonomics. Example verbal action, withdrawing facilities etc.
Company levels	What are areas (department) that are under influence of the issue?	Authority	The stakeholders have authority to give direction with in their department. Examples make other members of the department to obey the regulation, reporting to senior person, being leader of their team.
	Does those (department) have the solutions of the issue?	Referent	Stakeholders can become ideal and a motivation factor for others. For example in terms of attitude, punctuality, disciple, work output etc.
	Is proposed solution is short termed or long termed?	Expert	They can work as an expert because they have sound knowledge and experience in their field of working.
	What is the time required to find the solution?	Information	The stakeholders have lots of data and information which can be very useful and save precious time of ergonomist.
	What are the concern factors involved into the issues like engineering design, safety etc.	Affiliation	Stakeholders have authorities and they borrow power from associations. Examples acts as mentor for all supervisors, follow the regulation by superiors, can take action according to the performance of the subordinate.
Personal level	What is the position of the human factor personnel into the hierarchy of the organisation?	Group	Stakeholders is a part of group belonging to an organisation. Example works in collective problem solving, gives their opinion and can work as a team leader etc.
	Does ergonomist have commendations with other stakeholders of the organisations?		
	What is the knowledge level of ergonomist upon business, product and process?		
	What are supports provided by the senior level managements?		
	Are ergonomist are able to align ergonomics related issues and its solution to the company needs and goals		
Extra company level	Does solution of the issues concerned from outside of the organisations		
	Are government bodies, organisational health professional and consultants are required to find out the solutions.		
	What are the solutions used by the other companies.		
	What are those companies who can be chosen as ideal and can help in demonstration and feedbacks?		
Temporal Dimension	Estimating how far the company has reached in integrating the ergonomics into their business policies and what are the areas still need progress.		
	What are expertises of organisational ergonomists and from what time and in which areas they are serving the organisation?		

**Table 8 Power Base between ergonomist and Stakeholders**

Reward	The stakeholders have the authorities to value the rewards which will be given in return of compliance. Examples rewards,
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- It introduced the analysis on
- Different culture
  - Different Politics
  - Different Attitude
  - Different technologies
  - Different layouts
  - Analyse ergonomic agenda vs. organisation goals
  - Number of absentees
  - Compensation provided by company
  - Arranging visits to another company while the process of demonstration, i.e. conformability.

Because these can be correlated with past knowledge of the consultants who visit various industries and have gone through number of cultures, attitude of individuals and polices of the organisations. Consultants have deep knowledge over upgrading of technologies and layout which makes production ergonomics more efficient.

A consultant guides an organisation to work upon proactively rather than reactively it helps in saving cost and efforts to improve the production system at latter stage. A consultant takes major decision-making process and become signing authority for the implementation of ergonomics and be ready for its consequences. This gives confidence to the team appointed within the organisation to work accordingly.



So, the knowledge collected from the consultant seems valuable for the ergonomic participants and upper level managements. They became more aware towards how ergonomic can be more efficient in an organisation as they gave path to communicate with employees of other companies. Most of the time for an employee, it is very difficult to point out issues against the present system because he faces lots of objections as other thinks, they are pointing their faults. In such cases consultants are very useful. They rarely have such fears because they are arranged by the higher management for those things and even management do not take it other ways as those suggestions have been demonstrated in front of them.

Consultants work upon present system and introduce reactive ergonomics while bringing step by step changes into the present circumstances so that ergonomic agenda can be fulfilled and they prepare proactive ergonomics agenda including goals of the organisation for the upcoming projects. They take responsibilities of the positive and negative aspects going to occurs and became the signing authority for their responsibilities. Such risk cannot be taken by direct employees because they have fear of job insecurities and system.

### E. 7 Steps Involved In Mapping Of Ergonomics Infrastructures

1) Identifying the ergonomist agents (human and non-human)

In this all human and non-human recourse, available to help in improvement of ergonomics are listed so that it will cover all important area required to implement it

2) Formulating the issue to be solved.

In this step all issues are listed and rechecked by the experts. Experts observe the issue very thoroughly and evaluate its priority to be solved.

3) Identifying the stakeholders who relate to the issues

In these steps an analysis is done to point out the influence of the issue. List of the person affected by issue and person and experts required for solving of issue is prepared. At this stage only time required for solution and implementation is estimated. Then finally consequence of implementation is discussed.

4) Answer the questions

Now with help of identified stakeholders upon the found issued the analysis find the practical solution by aligning the issue with organizational goal and ergonomic agenda.

5) Stratify the issue

In this step socio-technical approach is used to relate issue and its solution with stakeholders

6) Identifying power bases in relation to other stakeholders

In this process ergonomic agents interact with stakeholders and further documents prepared upon issues are communicated with higher management. Stakeholders are very useful as they are expert of their department and daily work.

7) Identifying opportunities for using strategies

The data collected are analysed to find out which solution is the best suitable in terms of cost and output.

So, mapping of ergonomic infrastructure works as guide to find the issues and relate it with stakeholders. It guides us to adding opinions of related stakeholders. It helps in forming a strategy needed for the approval and handle the

situations which may arise as obstacles during planning and implementation.

## VI. CONCLUSION

- a) This analysis has contributed to macro ergonomics knowledge by focusing on evolution methods used by an organisation, influences of relationship between ergonomist engineers and stakeholders.
- b) It is proposed that production ergonomics cannot be improved by adopting method alone. It involves culture, communication, attitude, policies, and documentation with the help of relational support.
- c) It has been found that ergonomics agent is influenced by socio-technical environments, stakeholders and upon the person who takes responsibilities for ergonomics issues and solutions.
- d) It is very important for ergonomist to communicate with engineers and stakeholders to prepare the documents containing matrix time cost and manpower required for implementation.
- e) Any change upon present circumstances must be done step by step and in small segment which will not only reduce the cost but even save production losses.
- f) Small success not only helps in demonstrations but also gives confidence to the organisation that results are positive.
- g) Proactive ergonomics approach must be adapted by the organisation with help of consultants.
- h) Help in preparing tentative framework for mapping of ergonomics infrastructure.

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