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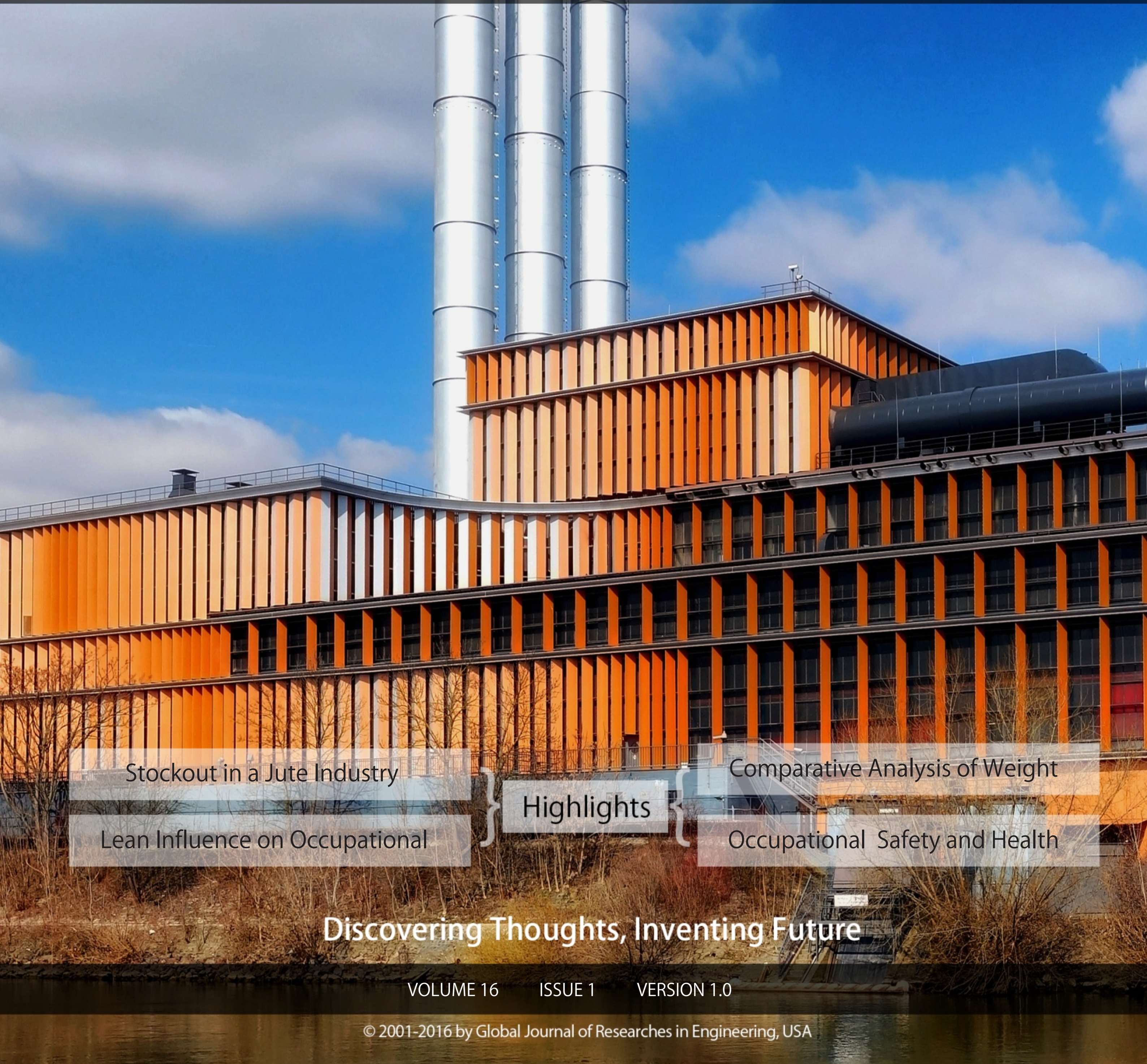

Highlights

- Stockout in a Jute Industry
- Lean Influence on Occupational
- Comparative Analysis of Weight
- Occupational Safety and Health

Discovering Thoughts, Inventing Future

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Lean Influence on Occupational Safety and Health in Manufacturing Industries

By Kassu Jilcha & Daniel Kitaw
Addis Ababa University, Ethiopia

Abstract- This paper attempts to investigate the influence of lean thinking on occupational safety and health problems improvement in manufacturing industries and it also to show how occupational safety and health severely hurts manufacturing industries productivity. Nowadays, developing countries are focused on Technology Transfer and be engaged in developing their manufacturing industries so as to compete globally and for their economic growth. While expanding the development of their manufacturing industries, they are also importing new technologies with which they are not familiar and furthermore, neglecting workplace safety and health hazards impact on productivity and workers well-being. Due to these reasons, much productive working time is lost and high costs have been incurred. To highlight the impact of lean on workplace safety and health, this study was conducted by reviewing recent state-of-the-art literature and taking into consideration secondary data records from Ethiopian Ministry of Labor and Social Affair (MOLSA) for simple illustrative example. Findings from the literatures showed that there is less attention and consideration of lean workplace safety and health in manufacturing industries.

Keywords: lean, workplace safety and health, manu- facturing industry, non-value adding activity.

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Lean Influence on Occupational Safety and Health in Manufacturing Industries

Kassu Jilcha [α] & Daniel Kitaw [σ]

Abstract- This paper attempts to investigate the influence of lean thinking on occupational safety and health problems improvement in manufacturing industries and it also to show how occupational safety and health severely hurts manufacturing industries productivity. Nowadays, developing countries are focused on Technology Transfer and be engaged in developing their manufacturing industries so as to compete globally and for their economic growth. While expanding the development of their manufacturing industries, they are also importing new technologies with which they are not familiar and furthermore, neglecting workplace safety and health hazards impact on productivity and workers well-being. Due to these reasons, much productive working time is lost and high costs have been incurred. To highlight the impact of lean on workplace safety and health, this study was conducted by reviewing recent state-of-the-art literature and taking into consideration secondary data records from Ethiopian Ministry of Labor and Social Affair (MOLSA) for simple illustrative example. Findings from the literatures showed that there is less attention and consideration of lean workplace safety and health in manufacturing industries. The data analysis of illustrative example revealed that there are losses of productive working days, high compensation costs and costs associated with many non-value adding activities. This analysis showed that the Ethiopian manufacturing companies do not have the level of awareness how lean occupational safety and health cuts these costs using lean tools like 6S. Hence, this study forwarded how lean helps to improve workplace safety and health in manufacturing industries.

Keywords: lean, workplace safety and health, manufacturing industry, non-value adding activity.

I. Introduction

Nou Nowadays, organizations compete between themselves in various categories such as faster delivery, price tags, state of art technology and higher quality dimensions [Sharma, 2012]. Ethiopian manufacturing industries are given priority of development by Ethiopian government (Web-1). Ethiopia is in a very fast manufacturing industrial development. In the process of industrial development, workplace safety and health problem are issues that have to be squarely addressed.

In manufacturing industries, there are many problems that occur at workplace. Industrial development creates more employment and requires more usable technologies either new or obsolete. This may lead the manufacturing industries to entertain hazards unless otherwise enterprises devise protective methods of hazards. A large body of existing empirical data analysis shows that industrial accidents focused more on manufacturing and construction sectors (Saad et al, 2012). One of the methods that enable manufacturing industries to reduce those industrial hazards is lean thinking philosophy.

Lean is the method of reducing non-value adding activities in the manufacturing industries (Alireza, 2011; Kilpatrick, 2003, Spencer, 2007). Workplace safety and health hazards improvement helps the manufacturing industries to reduce wastes like time when an employee gets absent, compensation cost of unsafe employee and waste from damaged manufacturing equipment & tools. Documents obtained from Ministry of Labor and Social Affair (MOLSA, 2012) report justifies that most Ethiopian manufacturing industries still have no concern of workplace safety and health matter as their company's critical issue of productivity affecting factor. Hence, lean occupational safety and Health (OSH) is one of the techniques that reduce workplace hazards and risks if properly thought in manufacturing industries.

The importance of work place safety and health hazards improvement is not a questionable issue in the eyes of professionals and researchers' area but, the concern is on how to control its severity from its risks. As studies showed that many researches have not been conducted on lean Occupational Safety and Health (OSH) considering how to reduce or eliminate non-value adding wastes from manufacturing industrial sectors. In general, many studies agreed that developing countries have conducted few researches on OSH overall concerns. In order to run intensive studies and continual workplace safety and health improvement, management and society awareness creations are key elements. In developing countries, top managements have neglected workplace safety and health impacts on productivity and health though developing countries have cheap labor forces.

In 2012, as illustrated in this study, all Ethiopian manufacturing industry (excluding Addis Ababa, Tigray and Southern parts) has registered a total accident number of 1670 and had significant cost hazards to the manufacturing industries, indirectly to the economy of the country. The time lost during the same year was 11,138 man-days. The accident severity rate of

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manufacturing industry in Ethiopia was calculated as 0.075. This means every individual from her/his 1000 of working hours wastes 0.075 man-days. However, this is used only to show the severity of accidents occurred in the only considered regions. It raises a question of unreliability of well-organized data report obtained from all inclusive manufacturing industries. Had it been registered appropriately, the accidents registered would have been increased (MOLSA, 2012). Therefore, these researches provide insight how lean workplace safety and health improves and reduce ineffective manufacturing workplace safety and health management through 6 S techniques. It also becomes the only study that is attempted in Ethiopia in such a way that it introduces lean workplace safety and health problem solving culture as well as helps to other researchers in providing well organized information on lean safety. This study remaining works are structured as follows: section two focuses on methodology how the article was prepared. Section three discussions on the literature review of occupational safety and health and lean manufacturing. Section four discusses on the results and discussion parts and last section discuses on conclusion.

II. Methodology and Material

The research was conducted by considering two sources of data: (1) from literature review and (2) from data records of illustrative example of Ethiopian manufacturing industries. A literature search was conducted using the databases source like MEDLINE, Emerald, Tayler &France publications, EMBASE (medical literature), PsycINFO (psychological literature), Sociological Abstracts (sociological literature), Accident prevention journals, US Statistics of labor, European Safety and Health database, ABI Inform, Business Source Premier (business/management literature), EconLit (economic literature), Social Service Abstracts (social work and social service literature), Lean thinking databases. The search strategy was also focused on articles or reports that measure one or more of the dimensions within the research OSH model framework. This search strategy was based on a framework and measurement filter strategy developed by the Consensus-based Standards for the selection of health Measurement Instruments. The search strategy also utilized important keywords related to OSH and lean. Controlled vocabularies were used whenever possible. Data from Ministry of Labor and Social Affair (MOLSA) was also collected and were presented for illustration. Data regarding Ethiopian manufacturing industries accident and insurance premium cost were also taken into account for this study approach.

III. Literature Review

Nowadays, work place safety is considered by World Health Organization (WHO) a priority setting for health promotion in the 21st Century [Takala, 1999; WHO, 2010]. In order to bring an accelerated sustainable economic and social development, a country needs to have health and safety certified workforce to improve productivity. Workplace safety and health impact is one of the main driving economic and social development pillar factor. Previously, it was given less consideration due to the fact that the focus was on the short term profit of business than safe workplace consideration. Thus, workplace safety and health was given less courtesy for a long period of time. International Labor Organization (ILO) and WHO reports indicated that in manufacturing industries many employees suffer from workplace injuries and property damage resulted in economic crisis [ILO,2010); WHO, 2010]. Safe workplace and safe work is necessary for reducing those suffers and increasing productivity; hence promotion and protection of safe work and workplace is the complementary aspect of industrial development [Takala, 1999]. In Sub-Saharan African countries about 54,000 fatal and approximately 42 million occupational accidents happen annually that results at least 3 days absence from work of every workers [Tetemke et al., 2014].

The ILO has estimated that the total costs of such accidents and ill health amount to approximately 4% of the world's Gross Domestic Products (GDPs) [ILO, 2006; Kharbanda and Stallworthy, 1998]. Limited financial resources and lack of adequate data has hampered the efforts to combat the problem of industrial and occupational accidents in developing countries [Kharbanda and Stallworthy, 1998]. This is not only hampering but also hindering knowledge transfer and implementation of OSH management techniques.

Hence, lean workplace safety and health study have been conducted in this research. Lean manufacturing is one of the most important techniques that reduce wastes of manufacturing industries (Alireza, 2011). Among many factors that cause waste to manufacturing industries is less consideration of occupational safety and health hazards impact on manufacturing industry environment. Lean manufacturing concepts were first introduced by Womack et al. (1990) aiming to describe the working philosophy and practices of Toyota, the well-known Japanese vehicle manufacturers. Nowadays, Lean Manufacturing concepts are widespread all over the world in different industrial sectors (EPA, 2000; Aitken et al., 2002; Aberdeen Group, 2006). Lean Manufacturing (LM) hence, refers to a business productive operation. It leads to boost the morale of the concept wherein the goal is to minimize the amount of time workers loss, promoting a sense of pride in their work and resources used in the manufacturing processes and ownership of their responsibilities and increases other activities of an enterprise. Its emphasis is on organization's profitability and competitiveness in the eliminating all forms of

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wastage. A key to worker safety in LM operations is the previously separated exposures and this has additive and development of informed, empowered and active workers cumulative effects (Alireza Anvari, 2011). Lean identifies waste/Muda (overproduction, waiting/idle time, unnecessary transportation, non-value- added processing, unnecessary stock on hand/excess inventory, motion and efforts, defects/producing defective goods, unused creativity) [Kilpatrick,2003, Spencer, 2007]. The evolution of lean thinking in any manufacturing industries is shown in Table 1.

Table 1 : The evolution of lean thinking [Liker, 2004]

	Period on Development of Lean Thinking			
	1980-1990	1990-mid 1990	Mid 1990-1999	2000+
Focus on approach	Production cell and line Highly prescriptive, using lean tools	shop -floor Highly prescriptive, imitating lean organization	Value streaming Highly prescriptive, applying lean principle	Value system Integrative, using different management instrument
Industry sector	Automotive vehicle assembly	Automotive-vehicle and component assembly	Manufacturing in general –often focused on repetitive manufacturing	High and low volume manufacturing, extension into service sectors
Typical activity in this phase	Application of JIT technique, 5S, kanban	Emulation of successful lean organizations training and promotion, TQM	Improving flow; process based improvements, collaboration in the supply chain	Improving customer value to improve organizational alignment , decrease variability

As seen in Table 1 lean evolved through different improvement and thinking approaches. As the time of development and human being creativity increases from time to time, lean thinking come to value streaming approaches. These in turn helped industries to focus on customer value and decreased variability.

Lean safety is the creation of a lean workplace safety and health environment in a workplace that requires employee motivation and good management (Alireza, 2011; Gnoni et al, 2013). The same study attempted to discuss 6S (Sort, Set in order, Sweep, Standardize, Sustain +Safety), is the foundation for all improvement programs: waste reduction, cleaner and safer work environment, reduction in non-value added time, effective work and visual workplace vision. The intensification of work leads both to higher plant productivity and to great adverse ergonomics and stress related health effects to workers (Brown, 2007).

Hazard are categorized as health and safety hazards: where health hazard causes occupational illness such as noise- induced hearing loss and safety hazard cause physical harm like cuts, broken bones and so on (Alireza,2011). The major factors in the creation of hazards in companies are: employee demotivation, lack of or unclearly defined working procedure and tasks, lack of control, lack of instructions or appropriate training, unsafe worker behavior, low management commitment to safety, no consensus on what a Safety Management System (SMS) exactly is and on the corresponding scope [Manitoba, 2003, Chan, 2004]; all these can be controlled in LM environments (Alireza, 2011).

Employee safety is a value-added proposition and by taking a Safety-Integrated Process Improvement approach, organization will be able to manufacture products and/or deliver services faster, better, cheaper, and safer.

Table 2 : The value of Safety

Traditional view of safety	Transition	Safety integrated leans
Cost-saving venture	→	Process improvement opportunity
Injury/ illness cost Insurance cost Regulatory cost	→	Process knowledge Sharing information Problem solving
Cost benefit analysis	→	Value –added vision
"what is important about safety is what it costs"	→	"what is important about safety is what we lean"

Table 2 clearly shows the difference between traditional views of safety and safety integrated leans. Traditional safety view is all about cost and injuries while the integrated safety eyes all about process improvement and value adding process.

In general, accompanies' those introduce and practice lean thinking would get benefits like decreased lead times for customers - productivity improvement, reduced inventories for manufacturers- work-in-process, inventory reduced, improved knowledge management/increase process understanding, more robust processes (as measured by less errors and therefore less rework)- quality improvement, reduce Space utilizations, save finances, improve process and easy works (safe working environment) (Melton,2005).

IV. Result and Discussion

By integrating safety and health problem solving methods into continuous improvement process, company will decrease costs, lessen downtime, reduce errors related to safety and health hazards, apply safety metrics to value stream mapping (VSM) for process improvements, identify and assess safety waste in processes, work collaboratively and cross-functionally to develop lean and safe solutions, be able to develop return of investment metrics utilizing results of safety-integrated process improvements, sustain improvements, lead a lean and safe organization, improve safety within company and increase company morale. A comprehensive study conducted by Francie Lund and Anna Marriott (2011) would suggest that globalization is having a negative impact on OHS. Hazardous industries have increasingly been transferred to developing countries where there are fewer resources to protect workers (Barten et al. 1996) or where, in some cases such as export processing zones, employers may be exempt from labour legislation (Brown 2004). New global production methods such as Just-In-Time, Lean Production and Total Quality Management have also been associated with greater levels of musculoskeletal disorders and repetitive strain injuries that are caused by repetitive motion, static and/or awkward postures and manipulation of heavy weights (Brenner et al. in ILO 2004). However, since examples of positive effects also found in literature, it is important to move from a simple cause and effect model to a more comprehensive that understand lean as an open and ambiguous concept (Peter et al., 2012). Elimination of waste can also be interpreted as the elimination or minimization of risk that adversely affects wasted human resources and lost time from injuries.

Lean imperatives of faster, better, and cheaper must encompass the issue of running safer as well. A key to worker safety in LM operations is the development of informed, empowered and active workers with the knowledge, skills and opportunity to act in the workplace (5S) to eliminate or reduce hazards [Alireza,2011].

For instants, let us consider illustrative example for Ethiopian manufacturing industries accident registered. Figure 1 shows that the accident registered over 13 years (from 2000 to 2013) in industrial sectors. This data report is used to show the severity of accidents and their economic influence on Ethiopia manufacturing industries. The industrial sectors were more exposed to accident when compared to other sectors (MOLSA, 2012). GTP volume II of the country direction is also on manufacturing industries lead economy. In line with the manufacturing industry development the employment rate also increases. When there is more demand of new employees who are not familiar with workplace environment, they commit and receive more accident severity in this sector (Saad, 2012). Hence, it is easy to foresee the rate of increase of accidents in manufacturing sector.

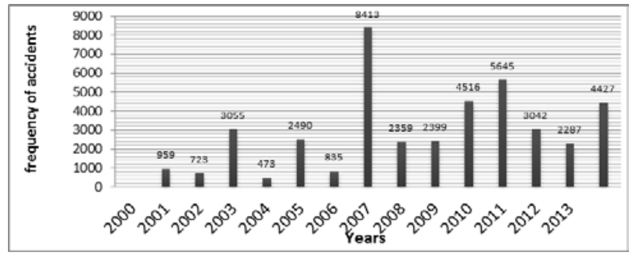

Fig. 1 : Workplace accidents in Ethiopia (MOLSA, 2012)

A data obtained from MOLSA shows us that workplace accident is a very serious issue in Ethiopian manufacturing sectors. Manufacturing sectors comprises 2723 organization in Ethiopia and only 5.3% of them have established OSH committee in their own industries. 95% of the manufacturing sectors have no OSH committee that carries out follow up activities of their workplace safety condition. The data obtained from MOLSA, for instance produce 0.075 accident severity for manufacturing industries (Eqn. 1).

Severity of the accident =

$$\frac{work\ days\ lost\ by\ accident\ *1000}{total\ working\ hours * total\ employees\ number} \quad \text{------ (1)}$$

(11,138*1000)/(2476*59857)= 0.075

As the data record obtained from MOLSA (2012) record reported that 2476 employees exposed to accidents, 11,138 lost working hours with over all registered total workers of 59,857 (excluding Addis Ababa Administration, Tigray region and Southern region) of manufacturing industries. of the total lost working days, manufacturing industry has 0.075 severity of the accidents index. This means in each individual working hour of 1000, there is a lost working day of 0.075 due to workplace accidents. If it had included Addis Ababa, Tigray and Southern part of Ethiopia where there were more manufacturing industrial zones, there would have been amplified industrial accidents and lost working hours. In manufacturing industries, there are 13,874 employees during 2012 of 59,857 employees from around urban industrial sector information. These data record are not representative of the reported regions. However, it helped us to show how much the severity of the accidents in manufacturing industries even There was poor data management system. This poor data recording culture is true in many developing countries as studies have described the lack of data recording and management system. Data recording and management system in developing countries are being underreported (PaiviHamala ̈inena et al., 2006). The clear lack of reliable and large-scale data on OSH risks in developing countries and for informal workers in particular highlights the need to invest more resources in OSH and development research (Francie Lund and Anna, 2011).

Therefore, lean manufacturing philosophy is the best method that reduces this more working day's loss and non-value adding activities cost to the manufacturing industries even though many studies put its negative impact on safety.

Why Lean OSH?

To eliminate workplace hazards and waste of materials and resources, workplace organization, cleanliness, and standardization are imperative. The 5S approach is highly effective at removing hazards and waste from workplace and creating a safer, cleaner, and healthier work environment. Simple techniques are used to develop and improve effective workplace organization, safety, visual communication, and general cleanliness and housekeeping. Implementing 5S to workplace helps to bring the following benefits.

1S – Sort: Identify the items that are needed to perform work in the work areas. Clear (sort-out) all other items from the work area. Its benefits are extra work space, improved safety, improved productivity, improved utilization of materials, supplies, and resource, more visible work flow, improved employee satisfaction (better place to work) and improved quality. 2S - Set In Order: All needed items have a place in the work area and each needed item is in the correct place. Improve ease of or need for retrieval. Its benefits are elimination of time, motion, and effort needed to search for or retrieve tools and supplies (tools and supplies are located at point of use), improved safety through an organized workplace and increased productivity. 3S – Shine: Proactive/preventive housekeeping to keep work areas, work surfaces, and equipment clean and free from dirt, debris, oil, etc. its benefits are cleaner and more satisfying place to work, improved quality, maintenance issues exposed faster (planned downtime vs. unplanned downtime), and improved safety (fewer accidents). 4S – Standardize: Do things in a consistent and standard way. Standardize activities, procedures, instruction, schedules, and the persons responsible for helping keep the workplace clean and organized. Standardize work area layouts and storage techniques wherever possible. 5S – Sustain: Integrate 5S principles into the organization's OHS in order to sustain new standards and continually improvement of the workplace. 6s-safety: it is better than 5s in considering the accidents at work place and saving the life and property damages. So, it integrates the 5s into the lean OSH organization. It is known also as 5S Workplace Organization + Safety. Why add safety to make 6S? It creates greater awareness, more focus and another chance to review. Hence, using 6S helps organizations to make Zero accidents and/or Zero near misses.

V. Conclusion

Many researches have been conducted on lean manufacturing benefits and tools, and they have agreed on lean safety positive and negative influence. However, other researches strengthen that the positive effect of lean safety is taking highest share. In the literature, it has been discussed that in many countries, occupational safety and health management is not the critical issue of manufacturing industries. But, some literatures argued that workplace safety and health is one of the world issues of health and wealth. Most literature discussed that to be successful in productivity improvement; one is lean workplace safety and health in manufacturing industries.

These researches output provide highlight how lean workplace safety and health improves and reduce ineffective manufacturing workplace safety and health management through 6S techniques as discussed in literatures part. It also becomes the only study that is attempted in Ethiopia in such a way that introduces lean workplace safety and health problem solving culture and helps other researchers in providing well organized information on lean safety.

Illustrative example of Ethiopian manufacturing industries accident data has showed that how workplace hazards incur cost and waste of time to the companies. The days lost and the costs paid to the employees as compensations were all wastes of the manufacturing industries in which they were non-value adding activities. Therefore, the companies are considered to exercise lean occupational safety and health so that they can reduce their workplace wastes and increase productivity of their manufacturing industries. The concepts of lean manufacturing industries are also very important to be exercised in manufacturing industries in controlling and managing workplace hazards. Moreover, the researchers recommend while Ethiopian manufacturing industries focus on their development strategy, they should also give due consideration workplace safety, employee well-being and equipment safety so that they can easily raise their productivity and be globally competitive.

References Références Referencias

1. Aberdeen Group (2006). The Lean Supply Chain Report. Lean Concepts Transcend Manufacturing through the Supply Chain.
2. Aitken, J., Christopher, M., Towill, D.(2002). Understanding, implementing and exploiting agility and leanness. Int. J. Logist.: Res. Appl. 5 (1), 59–74. Lean Manufacturing and Safety Management Systems and Clarification of the Relationship Between Them. World Applied Sciences Journal, 15 (1): pp19-26, 2011
4. Barten, F., S. Fustukian, and S. de Haan. 1996. "The Occupational Health Needs of Workers: The Need for a New International Approach.| Social Justice, 23(4): 153-163.

5. Brown, G.D. 2004. "Why NAFTA Failed and What's Needed to Protect Workers' Health and Safety in International Trade Treaties." Issued by The Maquiladora Health and Safety Support Network. Available at: http://mhssn.igc.org/trade-2004.pdf
6. Brown, G.D. and D. O'Rourke, 2007. Lean manufacturing comes to China: a case study of
7. Chan, A.H., W.Y. Kwok and V.G. Duffy, 2004. Using AHP for determining priority in a safety management system. Industrial and Data Management Systems, 104: 430-445.
8. Cheryl Haslam, Jane O'Hara, Aadil Kazi, Ricardo Twumasi, Roger Haslam (2015), Proactive occupational safety and health management: Promoting good health and good business, Safety Science xxx: ppxxx–xxx, Article in Press
9. Environmental Protection Agency (EPA), 2000. Pursuing Perfection: Case Studies Examining Lean Manufacturing Strategies, Pollution Prevention, and Environmental Regulatory, Management Implications.
10. Francie Lund and Anna Marriott (2011), Occupational Health and Safety and the Poorest, Women in Informal Employment: Globalizing and Organizing (WIEGO) Working Papers, School of Development Studies, University of KwaZulu-Natal's Research Report Serie
11. ILO. 2004. Economic Security for a Better World. ILO Socio-Economic Security Programme. International Labour Office: Geneva.
12. International Labour Organization (2006). Occupational health and safety: synergies between security and productivity. ILO, Geneva committee on Employment and Social Policy. [Cited 2015 Mar 14].
13. International Labour Organization (2010). Work related accidents and diseases take a heavy toll worldwide. 2010 [cited 2015 Mar 14].Available from: http://www.scielosp.org/scielo.php
14. Kharbanda OP. and Stallworthy EA. (1998). Safety in the chemical industry: Lessons from major disasters. Heinemann Professional Publishing. Oxford, UK.
15. Kilpatrick, J., 2003. Lean Principles. Utah manufacturing extension partnership. Utah. An Empirical Study of Malaysian Construction Industry.
16. Liker J. (2004), The Toyota Way - 14 Management Principles from the World's Greatest Manufacturer. New York, NY: McGraw-Hill
17. M.G. Gnoni, S. Andriulo, G. Maggio, P. Nardone (2013), ''Lean occupational'' safety: An application for a Near-miss Management System design, Safety Science, 53:pp 96–104
18. Manitoba Labour and Immigration Workplace Safety and Health Division, 2003. Workplace Safety and Health Program Committee Manual.12903 Manual.
19. Melton (2005). The Benefits of Lean Manufacturing, What Lean Thinking has to Offer the Process Industries. Journals Trans IChemE, Part A. Chemical Engineering Research and Design, 83(A6): 662–673,doi:10.1205/cherd.04351
20. Ministry of Labor and Social Affair (MOLSA, 2012). Industrial Relation, Workplace safety and health and work accident. Ministry of labor and Social affair, 2012report, Addis Ababa, Ethiopia
21. Paivi Hamala ¨inena, Jukka Takala, Kaija Leena Saarela (2006), Global estimates of occupational accidents, Safety Science, 44, 137–156.www.elsevier.com/locate/ssci
22. Peter Hasle, Andres Bojesen, Per Langaa Jensen and Pia Barmming (2011). Lean and the working environment: a review of the literature. International journal of Operation and production Management, Vol 32, No.7; pp829-849
23. R.Sharma (2012), Conceptual Framework For Improving Business Performance With Lean Manufacturing And Successful Human Factors Interventions–A Case Study, International Journal for Quality research, Vol. 6, No. 3: pp 259-270
24. Saad Mohd Said, Fatimah Said, Zairihan Abdul Halim, 2012. The determinant of Industrial accidents in the Malaysian Manufacturing sectors. African Journal of Business management, 6(5): pp1999-2006
25. Spencer, D.P.P.G., 2007. Applying Lean Manufacturing Principles Across the IT Organization. INFOSYS Technologies Limited.
26. Takala J. (1999). International agency efforts to protect workers and the environment. Int J Occup Environ Med., I5:30-37, http://dx.dio.org/10.1179/oeh.1999.5.1.30.
27. Tetemke D., et al. (2014). Knowledge and practices regarding safety information among textile workers in Adwa tow, Ethiopia. Sci Post print, 1, 1: http://dx.doi.org/10.14340/spp.2014.01A0004
28. Tom Joosten, Inge Bongers And Richard Janssen (2009), Application of lean thinking to health care: issues and observations, International Journal for Quality in Health Care; Volume 21, Number 5: pp. 341–347
29. Womack, J.P., Jones, D.T., Roos, D., 1990. The machine that changed the world. Sloan Manage. Rev.
30. World Health Organization (2010). The health promoting work place. 2010 [cited 2015 Feb15].

31. Web1: http://www.mofed.gov.et/ consulted 19, October, 2015
32. Web2: https://www.osha.gov/Publications/safety-health-addvalue.html; consulted 20, October , 2015

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Comparative Analysis of Weight Loss% of Different Fabrics (Lycra Pique, Rib and Interlock) Under Different Chemical Concentration

By Muhammad Mufidul Islam & Minhaz Ahmed
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Abstract- Process loss in textile processing is a must occurring issue due to suitability in the subsequent process& removal of unwanted materials. But there should be a minimum range of process loss% in each process and a data is required to calculate accurate process loss% in each process. Our experiment is to calculate process loss% in a pretreatment process up to enzyme wash and finally treated with silicon wash. If the calculation in process loss% is not accurately calculated, there is serious effect on garment cutting and sewing section due to shortage in fabrics and finally short quantity is become essential that is an economic issue and most unwanted matter in a composite factory. Our finding is different power loss% for different structured fabric for chemical concentration. Here is our focusing issue is that process loss% is not same for different structured fabric even considering same concentration.

Keywords: *weight loss%, fabric structure, chemical concentration, enzyme wash, silicon wash.*

GJRE-G Classification : *FOR Code: 039903*

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Muhammad Mufidul Islam [α] & Minhaz Ahmed [σ]

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Keywords: weight loss%, fabric structure, chemical concentration, enzyme wash, silicon wash.

I. Introduction

Weight loss% can be defined as percentage decay in a material or parentage process loss of that material after the completion of a process. We did this experiment through a enzymatic process of same and different concentration for accordingly same and different structured knit fabrics. So due to same chemical action, attacking performance is not same due to different structured knit fabrics. Knit fabrics' surface is not same due to different structure or looping mechanisms.

Figure : Polo Pique

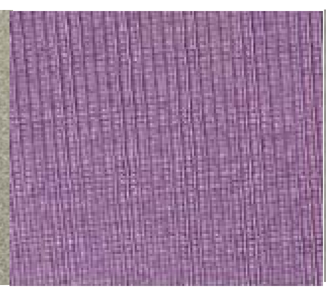

Figure : 1x1 Rib

Figure : Interlock

Surface properties such as softness and smoothness increase with density. Double knits show higher total hand values than single knits [1]. The tightness or cover factor indicates the relative tightness or looseness of a plain knit structure [2].

We have worked with enzymes and silicon softener as our main chemical agents. Enzymes are very efficient catalysts for biochemical reactions. They speed up reactions by providing an alternative reaction pathway of lower activation energy. The enzyme is used to form a reaction intermediate, but when this reacts with another reactant the enzyme reforms weight loss% is increased proportionally with the amount of enzyme used for the same period of time and vise-versa [3]. The rate of an enzyme-catalyzed reaction depends on the concentrations of enzyme and substrate. As the concentration of either is increased the rate of reaction increases [4].

The amount of enzyme present in a reaction is measured by the activity it catalyzes. The relationship between activity and concentration is affected by many factors such as temperature, pH, etc. An enzyme assay must be designed so that the observed activity is proportional to the amount of enzyme present in order that the enzyme concentration is the only limiting factor [5]. For a given enzyme concentration, the rate of reaction increases with increasing substrate concentration up to a point .Above which any further increase in substrate concentration produces no significant change in reaction rate. This is because the active sites of the enzyme molecules at any given moment are virtually saturated with substrate [5].Weight loss percentage can be calculated as:

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Weight Loss %=(Previous gray weight-Present weight) x100/ Previous gray weight

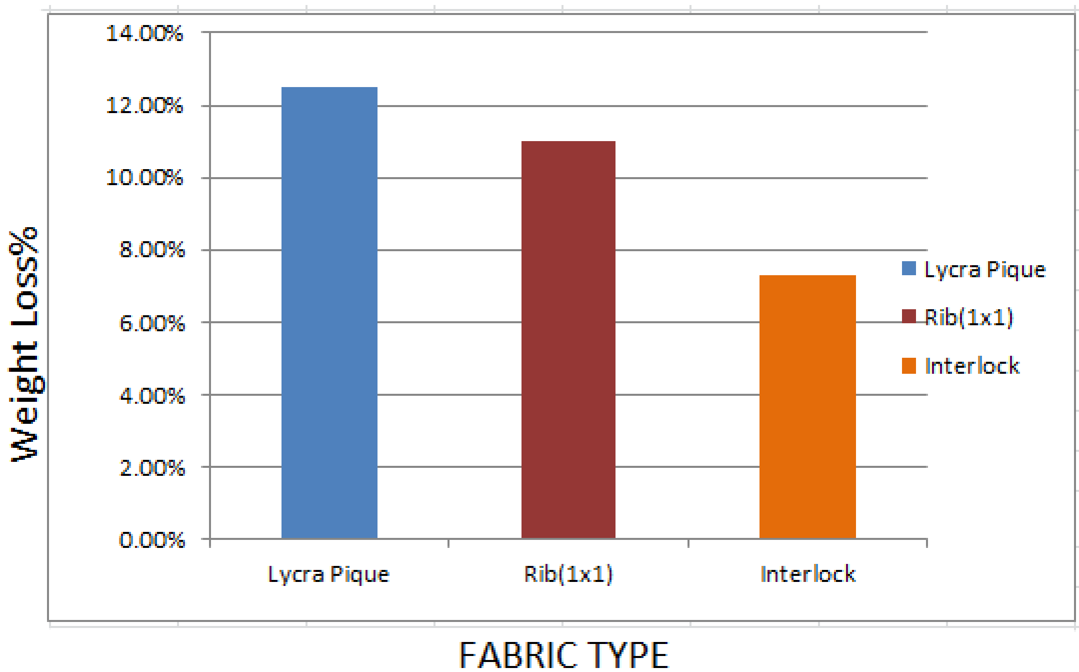
II. Materials and Methods

1. Firstly we considered 3 types of knit fabrics of different lots namely Lycra Pique, Plain Rib (1x1) & Interlock.
2. Then, for the first lot of Lycra Pique we found 12.5% weight loss% due to the action of Enzyme wash (1%) and then treated with silicon softener (1%).
3. Afterwards we found 11.03% and 7.3% loss for Plain Rib (1x1) & Interlock respectively for the same chemical actions.
4. Now we decided to change the chemical concentration % of Enzyme solution by twice compared to before.
5. Then we found the weight loss% with a significant value. We thought may be the result of weight loss% can be twice compared to previous but the result was not that.
6. It was found that weight loss was 16.02% for lycra pique.
7. Following the methods, we found 14.9% and 8.6% for Plain Rib (1x1) &Interlock respectively.
8. We used the following formula for calculating weight loss % : Weight Loss %=(Previous gray weight-Present weight) x100/ Previous gray weight.

III. Result & Discussion

Table: 01 Weight loss% of Fabrics with 1% Enzyme wash

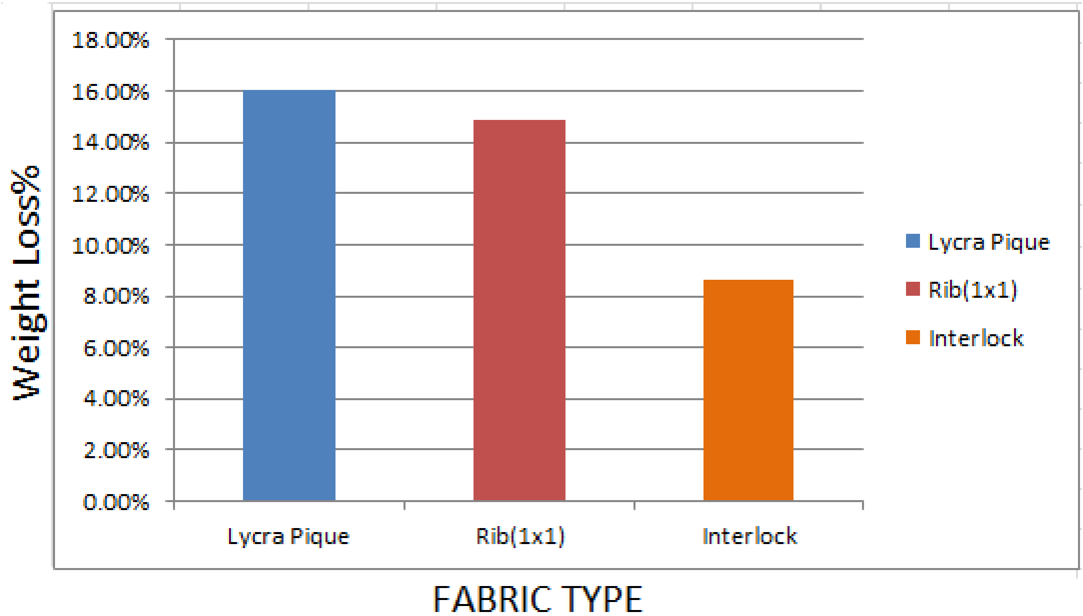
Serial number	Fabric type	GSM(gram per square meter)	Chemical concentration	Weight Loss%
1.	Lycra Pique	170	Enzyme wash (1 gram/liter) + Silicon softener (1%)	12.5%
2.	Plain Rib(1x1)			11.03%
3.	Interlock			7.3%



Graph: 01 Graphical Representation of Weight loss% for 3 different lots of fabrics with 1% Enzyme wash

Table: 02 Weight loss% of Fabrics with 2% Enzyme wash

Serial number	Fabric type	GSM(gram per square meter)	Chemical concentration	Weight loss%
1.	Lycra Pique	170	Double Enzyme wash (2gram/liter) + Silicon softener (1%)	16.02%
2.	Plain Rib(1x1)			14.9%
3.	Interlock			8.6%



Graph: 02 Graphical Representation of Weight loss% for 3 different lots of fabrics with 2% Enzyme wash

IV. Conclusion

In our composite factories, process loss% is considered same even for different structured knit fabrics. As a result problems may be arisen during maintaining accurate supply chain management. Our experimental data is an important guideline for the industries to calculate process loss% for considering not the common knit fabric issues but structural differences in the fabrics which have a significant impact on process loss%.

References Références Referencias

1. http://urpjournals.com/tocjnls/14_13v3i1_4.pdf
2. http://ggfjournals.com/assets/uploads/MIN-151_GIAS_18-21.pdf
3. http://trj.sagepub.com/content/70/12/1033.abstract
4. http://trj.sagepub.com/content/70/1/28.short
5. http://www.worthington-biochem.com/introbiochem/enzymeConc.html\
6. http://www.rsc.org/Education/Teachers/Resources/cfb/enzymes.htm

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Economic Lot Scheduling of Time Varying Demand with Stockout in a Jute Industry

By Subrata Talapatra, Ghazi Abu Taher & Mehedi Islam
Khulna University of Engineering & Technology, Bangladesh

Abstract- The economic lot scheduling problem (ELSP) creates challenge between lot sizing and sequencing. The ELSP's primary goal is to minimize the total setup and holding expenditures of different products on a single machine. ELSP is a mathematical model. It deals with a company's planning what to manufacture, when to manufacture and how much to manufacture. This paper deals with the Economic Lot Scheduling (ELS) of a Jute industry for time varying demand with Stock out. This model will help to understand the total production time and allocate individual time against each product. This also increases the cycle time for a given aggregate inventory. In reality, demands and capacities are varying with time. An aggregate plan is expected to give time varying capacities since the plan is to meet fluctuating demand. It is therefore necessary to model the more realistic situation where the demand and capacity vary each day. This model will provide a production schedule of a set of items in a single machine to minimizing the long run average holding and set up cost under the assumptions of time varying demand and production rates, allowing material stock out.

Keywords: economic lot scheduling problem (ELSP); inventory; time varying demand; multi-product; lot-sizing and scheduling; sequence-dependent setups.

GJRE-G Classification : *FOR Code: 290502p*

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Strictly as per the compliance and regulations of :

Economic Lot Scheduling of Time Varying Demand with Stockout in a Jute Industry

Subrata Talapatra [α], Ghazi Abu Taher [σ] & Mehedi Islam [ρ]

Abstract- The economic lot scheduling problem (ELSP) creates challenge between lot sizing and sequencing. The ELSP's primary goal is to minimize the total setup and holding expenditures of different products on a single machine. ELSP is a mathematical model. It deals with a company's planning what to manufacture, when to manufacture and how much to manufacture. This paper deals with the Economic Lot Scheduling (ELS) of a Jute industry for time varying demand with Stock out. This model will help to understand the total production time and allocate individual time against each product. This also increases the cycle time for a given aggregate inventory. In reality, demands and capacities are varying with time. An aggregate plan is expected to give time varying capacities since the plan is to meet fluctuating demand. It is therefore necessary to model the more realistic situation where the demand and capacity vary each day. This model will provide a production schedule of a set of items in a single machine to minimizing the long run average holding and set up cost under the assumptions of time varying demand and production rates, allowing material stock out.

Keywords: economic lot scheduling problem (ELSP); inventory; time varying demand; multi-product; lot-sizing and scheduling; sequence-dependent setups.

I. Introduction

The Economic Lot Scheduling Problem (ELSP) is assumed that the production facility in the in-control state producing items of high quality. It finds the problem of production sequence, production times and idle time of several products. It will minimize the inventory and setup cost also. In this model, the items are produced and consumed simultaneously for a portion of the cycle time. The rate of consumption of items is varying throughout the month. The cost of production per unit is same irrespective of production lot size. Here stockout is permitted. It is assumed that the stockout will be satisfied from the units produced at a later date with a penalty. The items are not produced between the period, while the inventory consumes and the next cycle begins. Then another item might be produced. There must be a setup time between the two items. The total cycle length is T.

A particular product is produced at a rate of P, the demand of that product is D. Then, inventory will built up at a rate of P-D. Because the product consumes while production. The built up inventory will consume at a certain number of period, then cycles begins again. The operation of this model is shown in Fig.1.

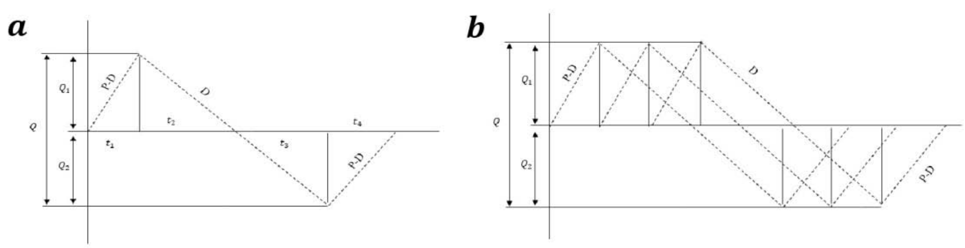

Fig.1 : (a) Manufacturing model of inventory,(b) Total cycle time for a particular facility

In the economic lot scheduling problem, it is not assumed that changeover times is sequence dependent. So, when the changeover times are sequence independent, then the economic lot scheduling problem essentially tries to minimize the total cost which is the sum of the ordering cost and carrying cost (Srinivasan, G., Quantitative Models in Operations and Supply Chain Management, sbn: 978-81-203-3981-1) .

a) Nomenclature

C_0	Cost / set up
C_c	Carrying cost / unit / period
C_s	Shortage cost / unit / period

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II. Development of Disaggregation Method with Stockout

Three products are produced such as sacking, Hessian, CBC (Carpet Baking Clothe). The daily demand and the inventory of these products remain constant. The demand and inventory of the products are summarized form the last three years data as shown in Table 1.

Table 1 : Day to day demand and inventory data of Khalishpur Jute Mill

	Sacking	CBC	Hessian	
Inventory (tons/day)	10	4	7	
Demand (tons/day), D_1	18	6	11	P_1 = 35 tons/day
D_2	20	7	10	P_2 = 37 tons/day
D_3	16	9	8	P_3 = 33 tons/day
r = Inventory/Demand	0.555	0.666	0.636	

The capacity in each of the 3 days are 35, 37, 33 tons/day, respectively. Allocation time have to find for making the products.

The value of r represents the demand that can be met with the existing inventory. The production of jproduct has to be started before r_j hours. The products are sorted according to increasing value of r. The order is found as Sacking- Hessian- CBC. The products will be produced in the said order. The process flow also depends upon the value of r. The maximum value of r is 0.666, from which the cycle time is counted considering the demand constant.

It is assumed that, the reasonable upper limit of the cycle time is $(r+\frac{1}{r}) = 2.166$. Therefore, capacity for 2.166 days,the equivalent daily demands are 18, 6 and 10 tons/day for the three products respectively and equivalent daily capacity is 35 tons/day.

For Sacking, $\frac{Demand\ \ for\ 2.1\ days}{2.1} = \frac{18+20+0.1\times16}{2.1} = 18$ tons/day

For CBC, $\frac{Demand\ \ for\ 2.1\ days}{2.1} = \frac{6+7+0.1\times9}{2.1} = 6$ tons/day

For Hessian, $\frac{Demand\ \ for\ 2.1\ days}{2.1} = \frac{11+10+0.1\times8}{2.1} = 10$ tons/day

Now, using the demand of each product to construct a manufacturing model with shortages (Panneerselvam, R., Production and operations management, 2nd edition, Chapter-9, Page-214),

For Sacking,

D = 18 tons/day, P = 25 tons/day, C_0 = 0.25, C_c = 0.10, C_s = 0.50

Economic Batch Quantity (EBQ),

$$Q = \sqrt{\frac{2C_0}{C_c}\times\frac{PD}{P-D}\times\frac{C_c+C_s}{C_s}} = \sqrt{\frac{2\times0.25}{0.10}\times\frac{(25\times18)}{(25-18)}\times\frac{(0.10+0.50)}{0.50}} = 19.639 \text{tons/day}$$

Maximum inventory, $$Q_1 = \sqrt{\frac{2C_0}{C_c}\times\frac{D(P-D)}{P}\times\frac{C_s}{C_c+C_s}} = \sqrt{\frac{2\times0.25}{0.10}\times\frac{18(25-18)}{25}\times\frac{0.50}{(0.10+0.50)}} = 4.5825 \text{ tons/day}$$

Maximum stockout, $$Q_2 = \sqrt{\frac{2C_0C_c}{C_s(C_c+C_s)}\times\frac{D(P-D)}{P}} = \sqrt{\frac{2\times0.25\times0.10}{0.50(0.10+0.50)}\times\frac{18(25-18)}{25}} = 0.9165 \text{ tons/day}$$

Cycle time, $t = \frac{Q}{D} = \frac{19.639}{18} = 1.091$

Production and consumption times,

$$t_1 = \frac{Q_1}{P-D} = \frac{4.5825}{(25-18)} = 0.654, t_2 = \frac{Q_1}{D} = \frac{4.5425}{18} = 0.2545, t_3 = \frac{Q_2}{D} = \frac{0.9165}{18} = 0.0509, t_4 = \frac{Q_2}{P-D} = \frac{0.9165}{(25-18)} = 0.1309$$

$$t' = t_1 + t_2 + t_3 = 0.6546 + 0.2545 + 0.0509 = 0.96$$

$$t = t_1 + t_2 + t_3 + t_4 = 0.6546 + 0.2545 + 0.0509 + 0.1309 = 1.091$$

Similarly for CBC,

D = 6 tons/day, P = 10 tons/day, C_0 = 0.25, C_c = 0.10, C_s = 0.50

Q =9.4868, Q_1 = 3.1622, Q_2 = 0.6324, t=1.5811, t_1=0.7905, t_2=0.5270, t_3=0.1054, t_4=0.1581, t' =1.4229

For Hessian,

D = 10 tons/day, P = 15 tons/day, C_0 = 0.25, C_c = 0.10, C_s = 0.50,Q =13.4164, Q_1 =3.7267, Q_2 = 0.7453, t=1.3416

t_1= 0.745, t_2=0.3726, t_3=0.0745, t_4=0.1490, t'=1.1924

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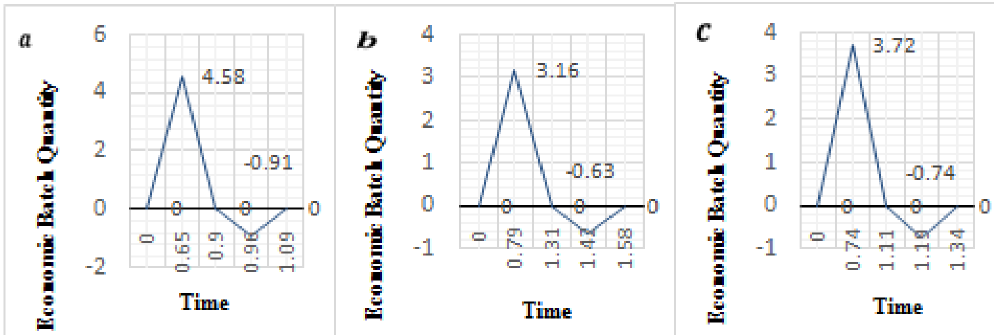

Fig. 2 : Inventory model with stockout for (a) Sacking, (b) CBC and (c) Hessian

LP (Linear Programming) formulation is,
Objective function: maximize T
The constraints are,
Subject to

$$t_j \leq r_j \text{ --- } (1)$$

$$(t_{He} - t_{Sa})35 + 1.091 \times 35 \geq T \times 18[\text{production time for Sacking}] \text{ --------- } (2)$$

$$(t_{CBC} - t_{He})\, 35 + 1.5811 \times 35 \geq T \times 10[\text{production time for Hessian}] \text{ ----- } (3)$$

$$(t_{Sa} + T - t_{CBC})\, 35 + 1.3416 \times 35 \geq T \times 7[\text{production time for CBC}] \text{ ------- } (4)$$

$$t_{Sa} \leq 0.555[\text{production time limit for Sacking}] \text{ ------------- } (5)$$

$$t_{CBC} \leq 0.666[\text{production time limit for CBC}] \text{----------------- } (6)$$

$$t_{He} \leq 0.636[\text{production time limit for Hessian}] \text{------------- } (7)$$

$$t_{Sa}, t_{CBC}, t_{He}, T \geq 0$$

Where,

$$t_{Sa} = \text{Production start time for sacking}$$
$$t_{He} = \text{Production start time for Hessian}$$
$$t_{CBC} = \text{Production start time for CBC}$$
$$T = \text{Total cycle time}$$

Here TORA software is used for solving the problem.The optimal solution is given by,
$X_1 = t_{Sa} = 0 \leq 0.555$, $X_2 = t_{CBC} = 0.0143 \leq 0.666$, $X_3 = t_{He} =$ 0.636 $\leq$ 0.636, $X_4 = T = 3.3581$

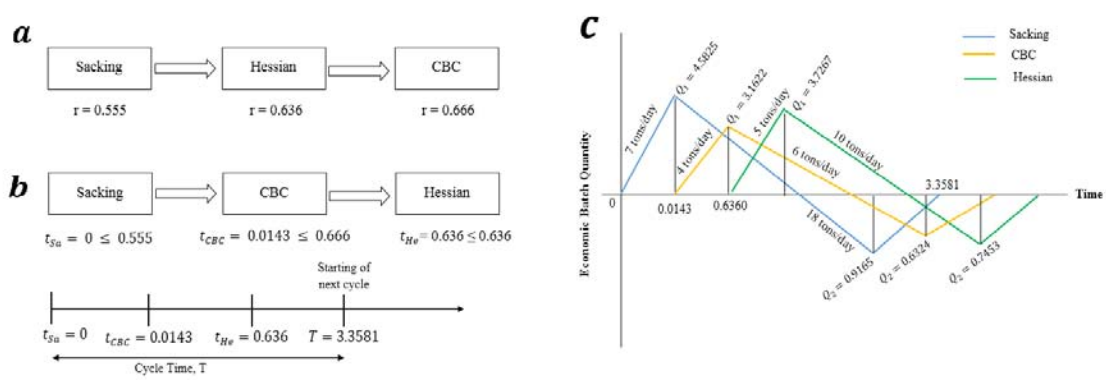

Fig. 3 : Sequence of production according to (a) value of r, (b) stockout of product, (c) EBQ of each product

This becomes the first cycle and this is implemented for $T = 3.3581$ days. The inventories of the three products at the end of 3.3581 days aresummarized in the table 2.

Table 2 : Day to day demand and inventory data of Khalishpur Jute Mill

	Sacking	CBC	Hessian	
Inventory (tons/day)	-50	6	65	
Demand (tons/day), D_2	20	7	10	P_2 = 37 tons/day

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D_3	16	9	8	P_3 = 33 tons/day
D_4	18	6	11	P_4 = 35 tons/day
r	-2.5	0.857	6.5	

The maximum value of r is 6.65, from which the cycle time is counted, that is 1 day. Again, it is assumed that, the upper limit of the cycle time is$(1+\frac{1}{r}) = 6.65$. Therefore, capacity for 6.65 days, the equivalent daily demands of the three products are found 7, 3 and 5 tons/day respectively and equivalent daily capacity is 35 tons/day.

Again, the model gives the following values considering the stockout.

For Sacking,

D = 7 tons/day, P = 10 tons/day, C_0 = 0.25, C_c = 0.10, C_s = 0.50

$Q = 11.83$, $Q_1 = 2.95$, $Q_2 = 0.59$, $t = 1.69$, $t_1 = 0.9833$, $t_2 = 0.4214$, $t_3 = 0.0845$, $t_4 = 0.1966$, $t' = 1.4892$

For CBC,

D = 3 tons/day, P = 7 tons/day, C_0 = 0.25, C_c = 0.10, C_s = 0.50

$Q = 5.61$, $Q_1 = 2.67$, $Q_2 = 0.53$, $t = 1.81$, $t_1 = 0.6675$, $t_2 = 0.89$, $t_3 = 0.1766$, $t_4 = 0.1325$, $t' = 1.7341$

For Hessian,

D = 5 tons/day, P = 8 tons/day, C_0 = 0.25, C_c = 0.10, C_s = 0.50

$Q = 8.94$, $Q_1 = 2.79$, $Q_2 = 0.559$, $t = 1.788$, $t_1 = 0.93$, $t_2 = 0.558$, $t_3 = 0.1118$, $t_4 = 0.1863$, $t' = 1.599$

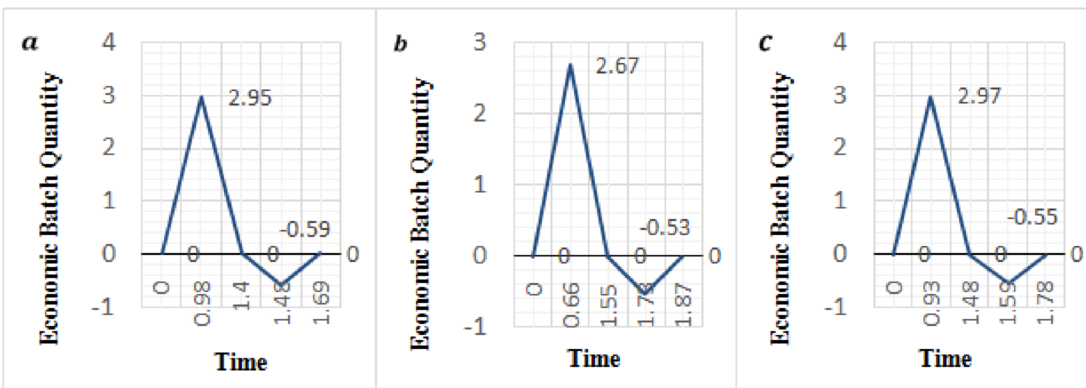

Fig. 4 : Manufacturing model of inventory with stockout for (a) Sacking, (b) CBC and (c) Hessian

LP formulation is

Objective function: maximize T

Subject to

$t_j \leq r_j$ -- (1)

$(t_{CBC} - t_{Sa})35 + 1.69 \times 35 \geq T \times 7$[production time for Sacking] ----------- (2)

$(t_{He} - t_{CBC})\ 35 + 1.87 \times 35 \geq T \times 3$[production time for CBC] --------------- (3)

$(t_{Sa} + T - t_{He})\ 35 + 1.78 \times 35 \geq T \times 5$[production time for Hessian] ------- (4)

$t_{Sa} \leq 0$[production time limit for Sacking] ---------------- (5)

$t_{CBC} \leq 0.857$[production time limit for CBC] -------------- (6)

$t_{He} \leq 6.5$[production time limit for Hessian] ------------- (7)

$t_{Sa}, t_{CBC}, t_{He}, T \geq 0$

TORA software is used for solving the problem. The optimal solution of our problem is given by,

$X_1 = t_{Sa} = 0 \leq 0$, $X_2 = t_{CBC} = 0.857 \leq 0.857$, $X_3 = t_{He} =$ 0.0786 $\leq$ 6.5, $X_4 = T = 12.7350$

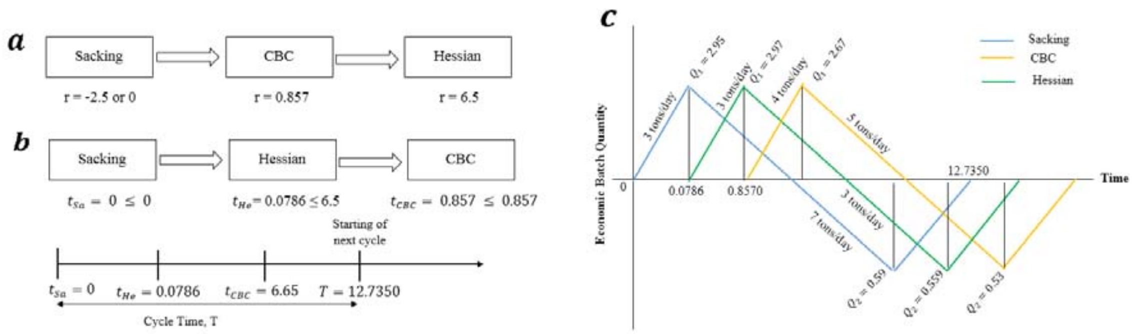

Fig. 5 : Sequence of production according to (a) value of r, (b) stockout of product, (c) EBQ of each product

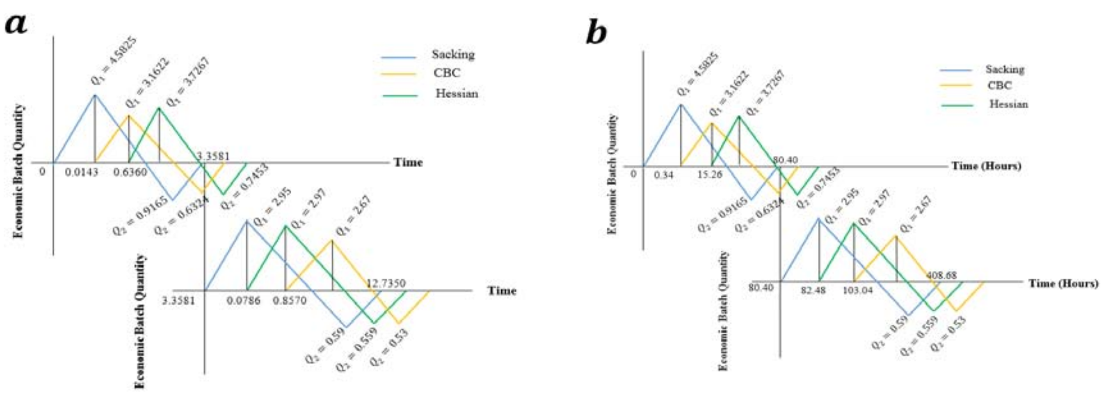

Fig. 6 : (a), (b) Sequential manufacturing model of Khalishpur Jute Mill Ltd

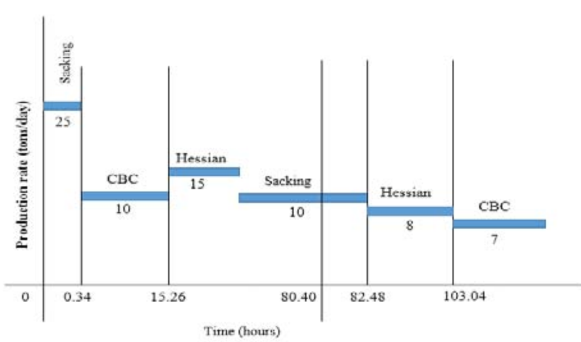

Fig. 7 : Production Schedule of Khalishpur Jute Mill Ltd

III. Result and Discussion

This paper translates the ELS of a Jute industry for time varying demand with Stock out. At the beginning of every cycle, the existing inventories are worked out. The expected inventory at the end of each cycle has been calculated. These values are used to compute r_j for finding the sequence of production. The order of production has changed in the two cycles because of the values of r_j. Again the shortage of inventory in each cycle has also changed the order of production. Therefore, it is observed that, the order of production does not depend upon the values of r_j, but depends on the values of stockout of inventories. The change of order satisfies all the constraints and factors. Finally the starting time of each product is calculated by LP. This is acceptable and the model provides flexibility in this regard.

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References Références Referencias

1. Delporte C and Thomas L. Lot sizing and sequencing for N products on one facility. Mngt Sci23: 1070–1079, (1978).
2. Elmaghraby S. The economic lot scheduling

problem: reviews and extensions. Mngt Sci24: 587–98, (1978).
3. Gallego G and Roundy R (1992). The extended economic lot scheduling problem. Nav Res Log39: 729–829.
4. Gallego G (1993). Reduced production rates in the economic lot scheduling problem.Int J Prod Res31: 1035–1046
5. H. Bae, I. Moon, W. W.Yun Economic lot and supply scheduling problem: a time-varying lot sizes approach, 52 (8) (2014), pp. 2422–2435
6. Hwang H, Kim D and Kim Y (1993). Multiproduct economic lot size models with investment costs for setup reduction and quality improvement. Int J Prod Res31: 691–703.
7. Khouja M (1997). The economic lot scheduling problem under volume flexibility. Int J Prod Econ48:73–86
8. M.L. Pinedo, Planning and Scheduling in Manufacturing and Services, DOI: 10.1007/978-1-4419-0910-7_7, © Springer Science + Business Media, LLC 2009.
9. Panneerselvam , R., Production and operations management, 2nd edition, Chapter-9, Page-214.
10. Srinivasan, G., Quantitative Models in Operations and Supply Chain Management, sbn: 978-81-203-3981-1.
11. Subrata Talapatra, Ghazi Abu Taher, "Implementation of Disaggregation Method in Economic Lot Scheduling of a Jute Industry under Constant Demand" has been published in International Conference on Mechanical, Industrial and Energy Engineering 2014. 26-27 December, 2014, Khulna University of Engineering & Technology, Khulna-9203, BANGLADESH.

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Fellows

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN ENGINEERING (FARSE)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards "FARSE" title to individuals. The 'FARSE' title is accorded to a selected professional after the approval of the Editor-in-Chief /Editorial Board Members/Dean.

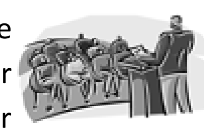
- The "FARSE" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSE or William Walldroff, M.S., FARSE.

FARSE accrediting is an honor. It authenticates your research activities. After recognition as FARSE, you can add 'FARSE' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:

FARSE designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

Once FARSE title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA).The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

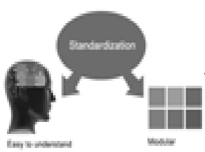


You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The FARSE can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSE, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.



The FARSE will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

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The FARSE is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSE can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSE member can decide its price and we can help in making the right decision.

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The ' MARSE ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The "MARSE" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSE or William Walldroff, M.S., MARSE.

MARSE accrediting is an honor. It authenticates your research activities. After becoming MARSE, you can add 'MARSE' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefitscan be availed by you only for next three years from the date of certification.

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We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSE member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSE, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

Auxiliary Memberships

Institutional Fellow of Open Association of Research Society (USA)-OARS (USA)

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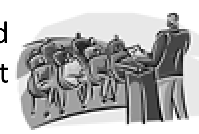
The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.



The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

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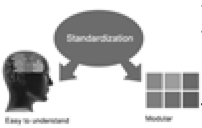
We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.



After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

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- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

"

- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

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The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

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(II) Choose corresponding Journal.

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(C) If these two are not conveninet , and then email the paper directly to dean@globaljournals.org.

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- Font type of all text should be Swis 721 Lt BT.
- Paper Title should be of Font Size 24 with one Column section.
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You can use your own standard format also.
Author Guidelines:

1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript’s Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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Before submitting your research paper, one is advised to go through the details as mentioned in following heads. It will be beneficial, while peer reviewer justify your paper for publication.

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The Global Journals Inc. (US) follows the definition of authorship set up by the Global Academy of Research and Development. According to the Global Academy of R&D authorship, criteria must be based on:

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2) Drafting the paper and revising it critically regarding important academic content.

3) Final approval of the version of the paper to be published.

All authors should have been credited according to their appropriate contribution in research activity and preparing paper. Contributors who do not match the criteria as authors may be mentioned under Acknowledgement.

Acknowledgements: Contributors to the research other than authors credited should be mentioned under acknowledgement. The specifications of the source of funding for the research if appropriate can be included. Suppliers of resources may be mentioned along with address.

Appeal of Decision: The Editorial Board's decision on publication of the paper is final and cannot be appealed elsewhere.

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3. SUBMISSION OF MANUSCRIPTS

Manuscripts should be uploaded via this online submission page. The online submission is most efficient method for submission of papers, as it enables rapid distribution of manuscripts and consequently speeds up the review procedure. It also enables authors to know the status of their own manuscripts by emailing us. Complete instructions for submitting a paper is available below.

Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.

To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

4. MANUSCRIPT'S CATEGORY

Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5.STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

(c) Up to ten keywords, that precisely identifies the paper's subject, purpose, and focus.

(d) An Introduction, giving necessary background excluding subheadings; objectives must be clearly declared.

(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and to make suggestions to improve briefness.

It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

Format

Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

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Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

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The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

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Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

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The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

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Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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