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DESIGN, SIMULATION AND SUSTAINABILITY ANALYSISOF BRICK MAKING MACHINE; INNOVATION MANAGEMENT

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ABSTRACT

Design is a creative activity whose aim is to establish the multi-faceted qualities of objects, processes, services and their systems in whole life cycles. Therefore, design is the central factor of innovative humanization of technologies and the crucial factor of cultural and economic exchange .Design is also a tool for innovation in mature markets where technological developments bring only marginal improvements to the end-user, and in low tech markets. Good design can increase sales revenues and profit margin by differentiating products and services, making them more attractive to customers 'Innovation' is the successful exploitation of new ideas**.** It is the process that carries them through to new products, new services, and new ways of running the business or even new ways of doing business. No construction is possible without bricks. Since many centuries brick making has been practiced by human beings. Presently, bricks are easily made by using machines, using new technologies. Generally two types of bricks are manufactured, namely concrete block machines and clay brick machines. Different types of automatic machines use different methods to make bricks. The raw materials used by the machines for making interlocking bricks are fly ash, sand lime, iron oxide, lime sludge, quarry wastes etc. The focus of this project is on the production of concrete bricks, specifically interlocking bricks which offer a speedier, cost effective, environmentally sound alternative to conventional walling materials. It is based on the principle of densification of a lean concrete mix to make a regular shape, uniform, high performance masonry unit. Concrete Block Technology can be easily adapted to suit special needs of users by modifying some design parameters such as mix proportion, water to cement ratio and type of production system. It is an effective means of utilizing wastes generated by stone crushers, The scope of this work includes, to design,, to model, to analysis the materials and to aspect of the project tasks, resource, time frames and possibly their associated cost .Management involves identifying the mission, objective, procedures, rules and manipulation] of the human of an enterprise to contribute to the success of the enterprise. This implies effective communication: an enterprise environment (as opposed to a physical or mechanical mechanism) implies human motivation and implies some sort of successful progress or system outcome

KEYWORDS: Design, Eco Innovation, Brick Making, Sustainability Analysis and Innovation Management.

1. INTRODUCTION

Mankind first of all must eat, drink, and have shelter and clothing, before he can pursue politics, art and religion etc. (Frederick Engels, 1883). Indeed, even after all the ground-breaking advances, discoveries, innovations and developments, made for the last 130 years, in science technology engineering and other fields, humanity, still, remains, essentially, the same, as it must, first, satisfy their basic needs such as food, shelter and clothing, and only then attend to wants, demands, and desires.

Building construction has become complex and sophisticated nowadays. Early types of construction provided minimal shelter from wind, fire attack and rain. Modern day housing provides not just only shelter but a total internal environment where every aspect of security, climate and lightning can be under finger-tip control. With

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this development, there is continuous demand for improved, more efficient and economical as well as environmental friendly construction materials such as baked clay bricks

Bricks can be made of clay or a mixture of sand and cement, but the latter is widely used for building houses in most of the developing countries like Nigeria. However, modern construction work, such as structural design and construction, building, architectural design and some other industrial applications, requires proper selection of materials. Hence, modern brickwork represents a highly complex undertaking planned down to the last detail and completely rationalized in operation. This means that before the realization of such project, careful planning is required to ensure profitability, proper materials selection and operational efficiency in order to minimize investment risk. The economic realities in many developing countries like ours call for development of least-cost brick making techniques, which will be readily available for both in rural and urban areas. In addition, the epileptic power supply in most of these countries makes the manual machine more appropriate. Hence, without compromising on standards and quality, durable and versatile building material, such as brick, produced at the most economical Price using locally fabricated machine is very essential for housing delivery in this part of the world. Bricks exist in different, sizes, colours and their applicability depends on all these factors including the raw materials used in their production

Production of bricks increased massively with the onset of the Industrial Revolution and the rise in factory building in England. For reasons of speed and economy, bricks were increasingly preferred as building material to stone, even in areas where the stone was readily available. It was at this time in London, that bright red brick was chosen for construction to make the buildings more visible in the heavy fog and to help prevent traffic accidents. The transition from the traditional method of production known as hand-moulding to a mechanized form of mass-production slowly took place during the first half of the nineteenth century. Possibly the first successful brick-making machine was patented by Henry Clayton, employed at the Atlas Works in Middlesex, England, in 1855, and was capable of producing up to 25,000 bricks daily with minimal supervision. His mechanical apparatus soon achieved widespread attention after it was adopted for use by the South Eastern Railway Company for brick-making at their factory near Folk stone.

The Bradley & Craven Ltd 'Stiff-Plastic Brickmaking Machine' was patented in 1853, apparently predating Clayton. Bradley & Craven went on to be a dominant manufacturer of brickmaking machinery. Predating both Clayton and Bradley & Craven Ltd. however was the brick making machine patented by Richard A. VerValen of Haverstraw, New York in 1852. The use of brick for skyscraper construction severely limited the size of the building – the Monad nock Building, built in 1896 in Chicago, required exceptionally thick walls to maintain the structural integrity of its 17 storeys Following pioneering work in the 1950s at the Swiss Federal Institute of Technology and the Building Research Establishment in Watford, UK, the use of improved masonry for the construction of tall structures up to 18 stories high was made viable. However, the use of brick has largely remained restricted to small to medium-sized buildings, as steel and concrete remain superior materials for high-rise construction. The oldest discovered bricks, originally made from shaped mud and dating before 7500 BC, were found at Tell Aswad, in the upper Tigris region and in southeast Anatolia close to Diyarbakir. Other more recent findings, dated between 7,000 and 6,395 BC, come from Jericho, Catal Hüyük, the ancient Egyptian fortress of Buhen. In pre-modern China, bricks were being used from the 2nd millennium BC at a site near Xi'an. Bricks were produced on a larger scale under the Western Zhou dynasty about 3,000 years ago, and evidence for some of the first fired bricks ever produced has been discovered in ruins dating back to the Zhou. During the Early Middle Ages the use of bricks in construction became popular in Northern Europe, after being introduced there from Northern-Western Italy. An independent style of brick architecture, known as brick Gothic (similar to Gothic architecture) flourished in places that lacked indigenous sources of rocks. Examples of this architectural style can be found in modern-day Denmark, Germany, Poland, and Russia This style evolved into Brick Renaissance as the stylistic changes associated with the Italian Renaissance spread to northern Europe, leading to the adoption of Renaissance elements into brick building.

We start with the consumer, work back through the design and finally arrive at manufacturing"…Henry Ford. Companies that lack experience of design - particularly SMEs, low-tech companies and companies not located in big cities where design businesses tend to concentrate-often do not know where to turn for professional help in the area of design. Design is also a tool for innovation in mature markets where technological developments bring only marginal improvements to the end-user, and in low tech markets. Good design can increase sales revenues and profit margins by differentiating products and services, making them more attractive to customers.

This is linked to its potential not only to give a mature product a 'new look', but also to weave in - together with marketing -considerations of an intangible nature related to user needs, aspirations, image and culture.

The word 'innovation' refers to 'something newly introduced' Innovation is about applying ideas to create new solutions. This solution may be a new product, a new approach or even a new application of an old product or approach.

Business innovation is not just about the generation of new ideas, but also about execution: bringing an idea to market, making a change or doing something in a new way that generates benefits and value for the business. It is the element of implementation that separates innovation from knowledge and invention.

Innovation by business involves a spectrum of activities. These range from research and development, new product and service development, the introduction of improved organizational activities and other activities such as market research. The magnitude of innovation can range from radical new ideas that transform a market or an industry, to incremental changes that build on existing products or processes for just a few customers. Innovation can be new to the world or new to the business - either way it is a powerful transformative force

The history of sustainability traces human-dominated ecological systems from the earliest civilizations to the present time. This history is characterized by the increased regional success of a particular society, followed by crises that were either resolved, producing sustainability, or not, leading to decline. In early human history, the use of fire and desire for specific foods may have altered the natural composition of plant and animal communities. Between 8,000 and 10,000 years ago, agrarian communities emerged which depended largely on their environment and the creation of a "structure of permanence. The Western industrial revolution of the 18th to 19th centuries tapped into the vast growth potential of the energy in fossil fuels. Coal was used to power ever more efficient engines and later to generate electricity. Modern sanitation systems and advances in medicine protected large populations from disease. In themid-20th century, a gathering environmental movement pointed out that there were environmental costs associated with the many material benefits that were now being enjoyed. In the late 20th century, environmental problems became global in scale. The 1973 and 1979 energy crises demonstrated the extent to which the global community had become dependent on non-renewable energy resources. In the 21st century, there is increasing global awareness of the threat posed by the human greenhouse effect, produced largely by forest clearing and the burning of fossil fuels.

Simulation is a powerful approach to modeling manufacturing systems in that many complex and diverse systems can be represented. Can predict system performance measures that are difficult to assess without a model. It is a proven, successful tool and has been in use since the 1950s. The current languages take advantage of the capabilities of today's microprocessors and provide the user with the needed on-line support for model development, management, and analysis. CAD (computer-aided design) has its roots in interactive computer graphics. Before the CAD era, engineering drawings were prepared manually on paper using pencils and drafting instruments on a drafting table. The advent of interactive computer graphics replaced the drafting table with a computer monitor and the pencil with an input device such as a light pen or mouse. Instead of using physical drafting instruments, software commands and icons on the computer display are used. The drawing can be created, modified, copied, and transformed using the software tools. At the time, CAD stood for computer-aided drafting. Drafting was confined to 2D because of the paper limitation. With the computer, such limitation is removed. Three-dimensional CAD systems were developed in the 1960s. In 3D CAD, objects are modeled using 3D coordinates (x, y, and z) instead of 2D coordinates (x and y). The need for modeling parts and products with complex surfaces motivated the development of free-form surface modelers.

Management (or **managing**) is the administration of an organization, whether it be a **business,** a not-for-profit organization, or government body. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees or volunteers to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources. The term "management" may also refer to the people who manage an organization.

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Today's managers have access to an amazing array of resources which they can use to improve their skills. But what about those managers who were leading the way forward 100 years ago? Managers in the early 1900s had Very few external resources to draw upon to guide and develop their management practice. But thanks to early theorists like Henri Fayol (1841-1925), managers began to get the tools they needed to lead and manage more effectively. Fayol, and others like him, are responsible for building the foundations of modern management theory

2. THE PROCESS OF MANAGING INNOVATION

Just as for technology, there are special tools and decisions within the organization that must occur if innovation is to succeed.

Making Decisions for Managing Innovation

Fostering creativity is essential to managing innovation. However, it is more than encouraging individuals to think outside the proverbial box. It includes developing an environment of discovery in the organization. Delbecq and Mills16 described the characteristics of firms that manage the innovation process well. These firms are characterized by:

- ✓ Separate funds for innovation
- ✓ Periodic reviews of informal proposals by a group outside line management
- ✓ Clear direction on studies to be done and follow-ups that are expected
- ✓ Extensive boundary-spanning activities to learn from others and to gain an understanding of what others are doing
- ✓ Sets of realistic expectations
- ✓ Supportive atmosphere for "debugging" and exploring variations as well as appropriate resources for maintenance and service

Pixar Animation Studios demonstrates the way to build a supportive environment for innovation. This studio has produced the movies Toy Story, A Bug's Life, and Monsters, Inc., among others. It has pioneered the development of new computerized animation technologies, including Marionette, a software for animation, and Ringmaster, a software system for modeling, animating, and lighting. The studio has very creative individuals heading the firm (Steve Jobs, founder of Apple Computer) and others working throughout the firm. To ensure that individuals in the firm have the range of skills necessary, the business started Pixar University, which allows individuals to study for three months on a variety of topics related to Pixar's work. The company seeks to further encourage creativity by limiting its bureaucracy. Thus, the business has sought to create a total environment for creativity. The management of innovation requires that the firm encourage creativity and risk taking by individuals. The firm must employ processes that allow failure and exploration.

There are four key individual characteristics that enhance the initiative that sparks innovation. If an organization manages the work environment in such a way as to encourage these behaviors, then innovation is more likely. The four behaviors are:

- ➢ Asking questions to identify problems and opportunities
- ➢ Learning new skills
- ➢ Taking risks and being proactive

Aligning strong personal beliefs and values with the organization's values and goals as you consider this innovation process, what becomes clear is that it should be a continuous process in the organization. It is not a process that occurs once and brings the firm all of the innovation it needs. The various aspects of this process will be examined in greater depth throughout the book. To illustrate this process, consider Koch Industries. The firm is one of the largest privately held companies in the United States. Kochrewards individuals for developing new ideas like many firms. But Koch also actively seeks to cross-train individuals in different areas of the firm so they understand how the entire firm works. Additionally, the firm consciously seeks not to punish individuals if they try something new that does not work. The culture at Koch encourages risk taking. The end result is a firm that has been able to diversify from an oil and gas company into one that continually finds new markets into which it can expand.

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3. ECO-INNOVATION

Australia, like the rest of the world, faces major environmental challenges such as industrial pollution, biodiversity loss and deteriorating natural resources. These problems can take a heavy toll on human health, natural ecosystems and the future wealth of Australians. Innovation by businesses to reduce their environmental impacts or improve the environment (so called eco-innovation) is an essential ingredient to creating a green, healthy and wealthy future.

Reducing environmental impact is also important for a business' bottom line. Australian eco-innovators are more than twice as likely to increase their productivity on a yearly basis than other businesses. Research shows that this activity is much more likely to translate into profit when businesses pay close attention to all the elements of their business model. Like all innovation activity eco-innovation is not just about new technology. New methods of organising a business or marketing products and services to customers can also reduce a business' broader impact on the environment. In addition to improving the productivity or profitability of business operations, a focus on reducing environmental impact through innovation can increase market share or open up new markets. Many of these new markets are on Australia's doorstep. By 2030 the population of the world is projected to be over 8 billion. It is expected that countries will be struggling to meet the increased demand for energy, water and food while simultaneously meeting the environmental stresses of global warming, loss of species habitat, ocean acidification and over-harvesting of fauna and flora. These changes will create a large market for new environmentally sustainable products and services. Billions of dollars' worth of export opportunities currently exist for early-mover Australian firms that can meet the demand for new innovative environmental solutions from emerging Asian economies such as India, China and Indonesia. It is projected that these billions will turn to trillions as Asian economies grow.

4. THE POTENTIAL OF DESIGN FOR INNOVATION

Design is an important part of the innovation process. Research shows that design-driven companies are more innovative than others. Although finding a universally agreed definition of design is not the purpose of this Research, it does aim to clarify the links between design and innovation so that ultimately an operational definition of design can be agreed and embedded in a European innovation policy context. Design is considered a strategic tool for user-centered innovation. As such, it is a holistic and multidisciplinary problem-solving approach that takes user needs, aspirations and abilities as its starting point and focus. The potential of design to make products, services and systems correspond better to environmental and social needs has also received increasing attention in recent years. Design as an innovation activity is complementary to R&D in that it transforms research into commercially viable products and services, and brings innovation closer to user needs. It is argued that although discrepancies currently exist between companies of different sectors and sizes, design has the potential to be more widely used, particularly in SMEs, low-tech companies and the service sector.

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DESIGN, MODELLING, SIMULATION AND SUSTANABILITY OF MACHINE AND THE COMPONENTS

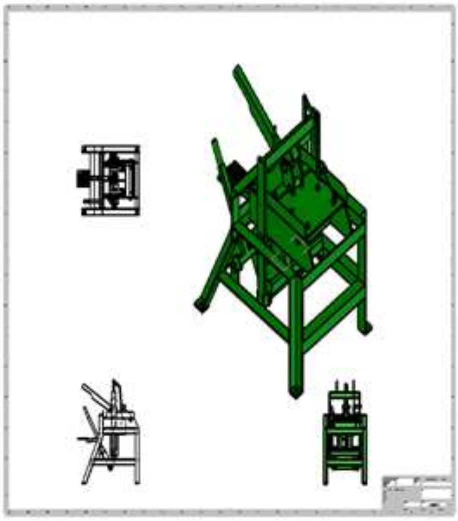
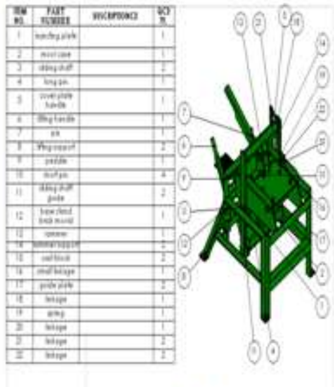


Fig 1_Multiply Views

Fig: 2 Final Drawing



Fig; 3 Detailed Drawing

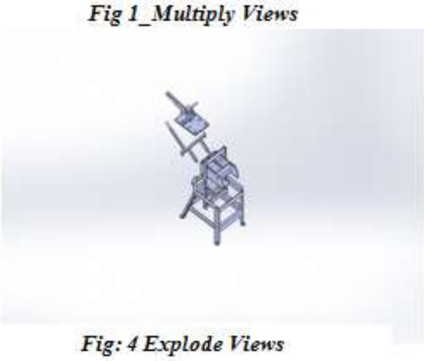


Fig: 4 Explode Views

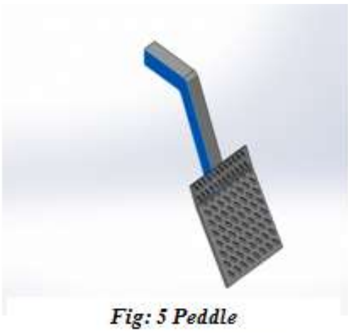


Fig: 5 Peddle

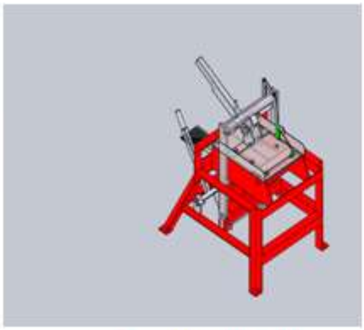


Fig: 6 Sustainability Analysis

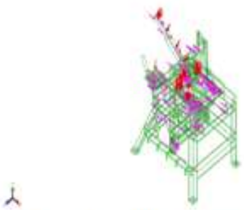


Fig: 7 Simulation Analysis

Fig; 8 Injecting Plate

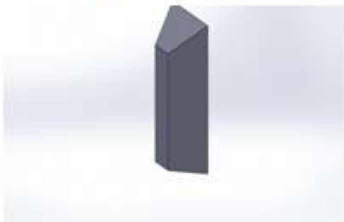


Fig: 9 Cast Block

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Component Environmental Impact

Top Ten Components Contributing Most to the Four Areas of Environmental Impact

Component	Carbon	Water	Air	Energy
injecting plate	69	0.227	0.355	730
base stand brick mould	86	0.038	0.522	1000
moul case	52	0.023	0.316	620
Part2	33	0.015	0.201	400
Part4	31	0.024	0.180	360
Part6	19	8.4E-3	0.115	230
Part5	19	8.3E-3	0.114	230
cast block	11	0.040	0.063	120
peddle	6.4	2.8E-3	0.039	77
long pin	4.9	2.2E-3	0.030	59

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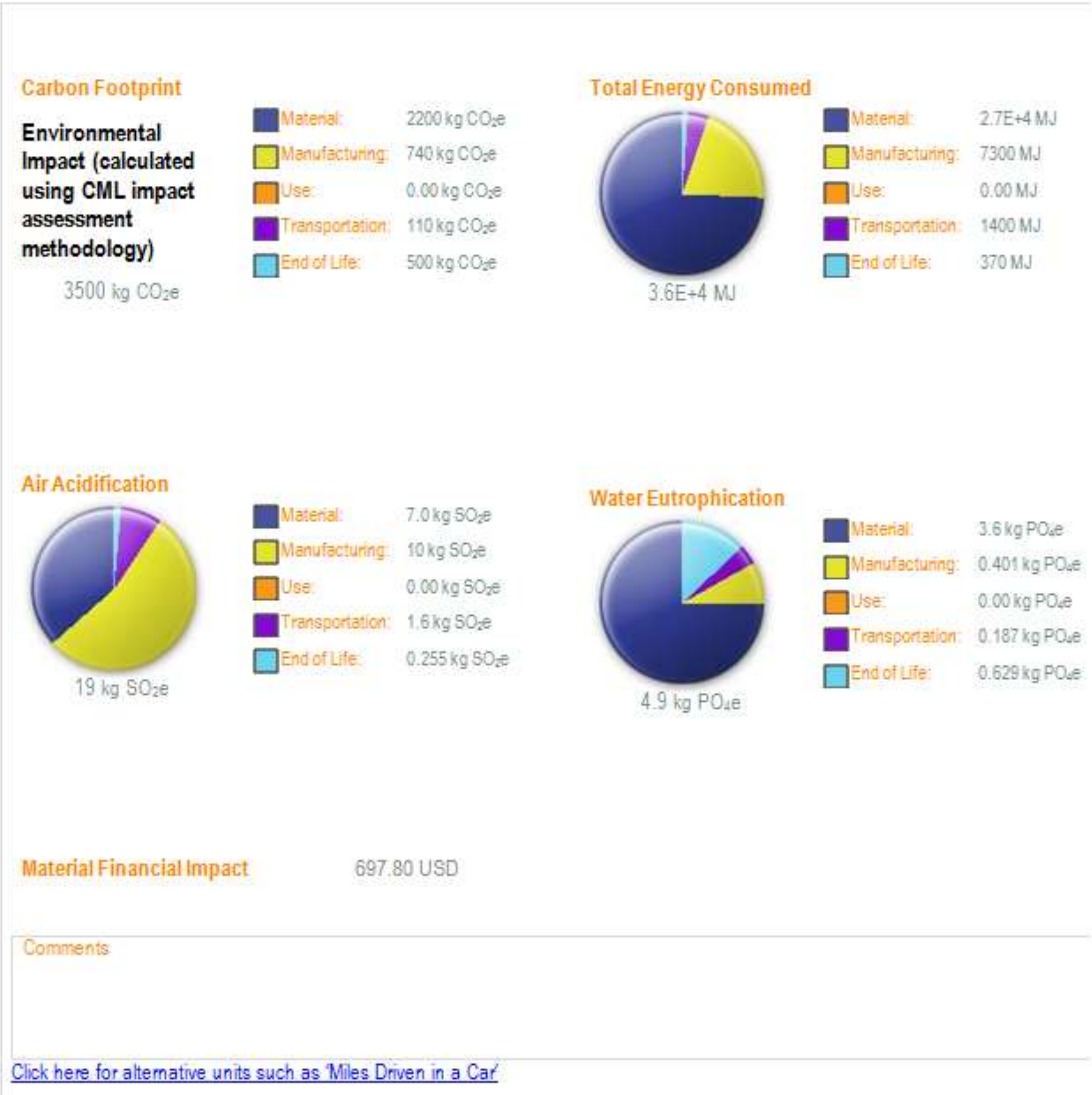

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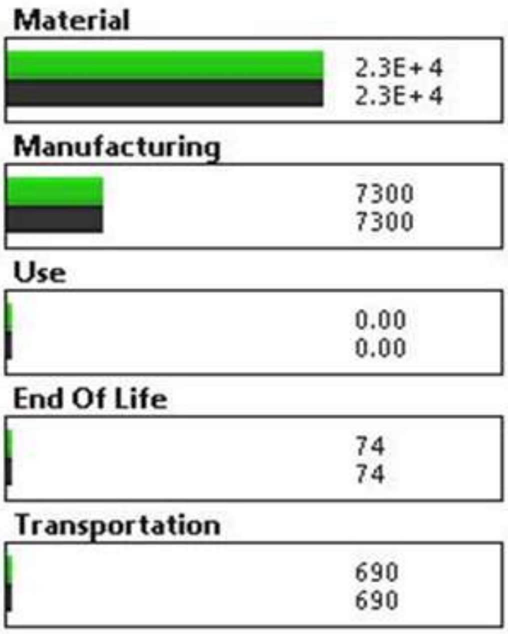
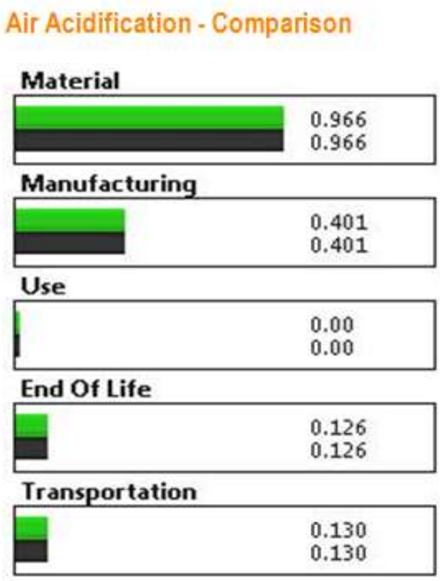
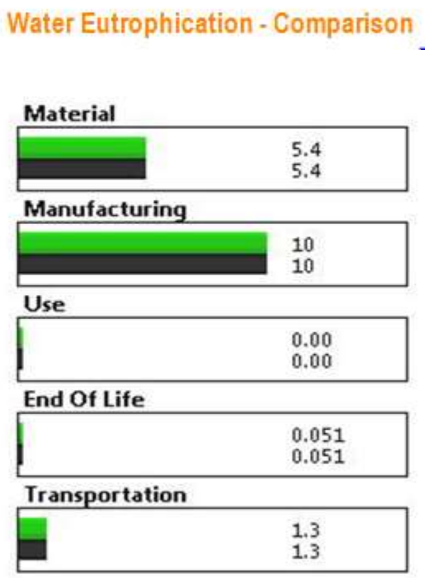
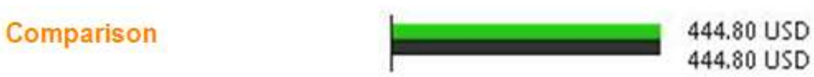
Baseline Assessments









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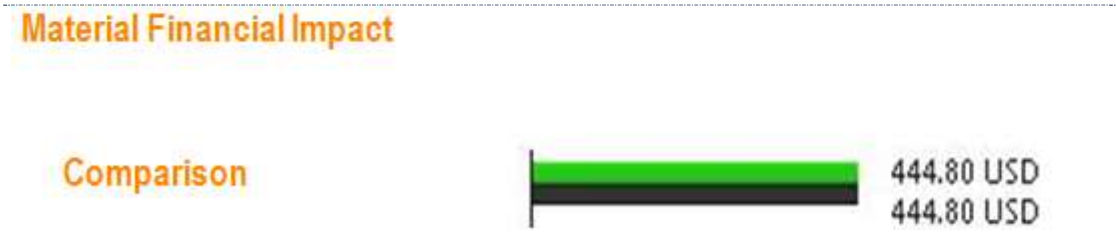

5. RESULTS AND DISCUSSION

From product to value

A product can be seen as a specific result which can be material (an object) or immaterial (a service) and to which is attached a notion of performance in terms of quality, productivity or finance. Value is seen as an evolving "target result" expressed through all the dimensions of an industrial system, be they technical, organizational, behavioral or cognitive. Value is characterized by a spatial extension of performance, evolving from qualitative performance (financial gains or increases in productivity), towards the development of new functions, new uses, production of know-how and knowledge that can then be disseminated and the learning of new behavior. It is also characterized by a temporal extension of performance (for example ten years ago a consumer was not prepared to pay more for a product because it was recyclable or had been made by unemployed workers

6. THEORETICAL SCOPE OF MANAGEMENT

Management involves identifying the mission, objective, procedures, rules and manipulation of the human capital of an enterprise to contribute to the success of the enterprise .This implies effective communication: an enterprise environment (as opposed to a physical or mechanical mechanism) implies human motivation and implies some sort of successful progress or system outcome. As such, management is not the manipulation of a mechanism (machine or automated program), not the herding of animals, and can occur either in a legal or in an illegal enterprise or environment. Management does not need to be seen from enterprise point of view alone, because management is an essential function to improve one's life and relationships. Management is therefore everywhere and it has a wider range of application. [Based on this, management must have humans, communication, and a positive enterprise endeavor. Plans, measurements, motivational psychological tools, goals, and economic measures (profit, etc.) may or may not be necessary components for there to be management. At first, one views management functionally, such as measuring quantity, adjusting plans, meeting goals. This applies even in situations where planning does not take place. From this perspective, Henri Fayol (1841–1925) considers management to consist of six functions:

Views on the definition and scope of management include: According to Henri Fayola, "to manage is to forecast and to plan, to organize, to command, to co-ordinate and to control.

- Redmond Malik defines it as "the transformation of resources into utility."
  Management included as one of the factors of production - along with machines, materials and money.
- Gillian Deslandes defines it as “a vulnerable force, under pressure to achieve results and endowed with the triple power of constraint, imitation and imagination, operating on subjective, interpersonal, institutional and environmental levels”.
- Peter Drucker (1909–2005) saw the basic task of management as twofold: marketing and innovation. Nevertheless, innovation is also linked to marketing (product innovation is a central strategic marketing issue). Peter Drucker identifies marketing as a key essence for business success, but management and marketing are generally understood as two different branches of business administration knowledge

7. ENGINEERING MANAGEMENT

Engineering managers oversee 4-P – people, projects, products, and processes. Overseeing manufacturing and production standards, working with creative engineers, and generating technical documentation are just some of the responsibilities. Specialized knowledge and management practices geared toward the engineering

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Environment help to enrich an engineering managers' toolbox to deal with the 4-P's with as much savvy as technical issues

Project

Every project has people in several different roles. The central person is the project manager. He or she plans the project, pulls the team together, communicates with everyone, and makes sure that the job gets done right. Part of the project manager's job is to explain to everyone else what his or her role on the project is and how it is crucial to project success. The project manager must communicate with everyone and persuade each person to do his or her part

8. PROJECT MANAGEMENT

Project management Tasks for the project were divided equally among the three team members. Modeling and Simulation was completed by Rufus, while Obuka, and Mercy managed the tasks and deadlines of the project. Many of the experiments were conducted with at least two members present and each team member was responsible for taking observations and developing design ideas. Online Regular team meetings were held to discuss shortcomings and progress of the project. A Gantt chart can be found in Appendix A displaying the Individual task assignments and deadlines. Resource Overview, over allocated resource and critical Tasks ,This chart was used to guide the team and assure timely completion of the project. Each experiment provided insight for the project and so Gantt chart was updated regularly with new tasks to accomplish.

9. THE TEAM

In addition to the important product design and manufacturing engineering members, the optimal design team should have representation from other functions that are important in the lifetime of the product. Ideal participants include purchasing and key vendors, safety engineering, reliability engineering, and quality control, representatives of the manufacturing line organization, product service, environmental engineering, and production planning and control, and product management—hence the sometimes used term cross-functional design teams. Purchasing personnel should be in attendance regularly at team meetings as long as purchased components are a significant factor. Certain vendors should be called in whenever the component supplied by the vendor is critical to the design or the cost of the product. The product manager is a key and frequent participant. He or she provides the input from the market and the company's sales force. As such, the product manager represents the customer's viewpoint, the most vital one to be considered if the product design is to be successful. The very best-most talented, most motivated-people should be selected for the first try at concurrent DFM. The initial team members not only must be good performers but also should be respected by others in their groups and should have some ability to communicate the benefits of the team approach to their colleagues. One key decision is how broad a charter to give to the concurrent engineering design team. Is the team's responsibility solely to provide the design for the proposed product such that it meets all prescribed objectives? Or does the team have a longer-lasting charter? Should it function as a team for the life of the product, monitoring and coordinating customers' reactions to the product, studying field-service problems and competitors' counterstrategy to the new or improved product, reviewing reliability and product safety statistics, etc.?

10. DESIGN PROCESS

Engineers use CAD to create two- and three-dimensional drawings, such as those for automobile and airplane parts, floor plans, and maps and machine assembly. While it may be faster for an engineer to create an initial drawing by hand, it is much more efficient to change and adjust drawings by computer. In the design stage, drafting and computer graphics techniques are combined to produce models of different machines. Using a computer to perform the six -step'art-to-part' process: The first two steps in this process are the use of sketching software to capture the initial design ideas and to produce accurate engineering drawings. The third step is rendering an accurate image of what the part will look like. Next, engineers use analysis software to ensure that the part is strong enough shown in figure; 7 .Step five is the production of a prototype, or model shown in figures 5, 8 and 9.

11. MODELLING

Modeling is the process of producing a model; a model is a representation of the construction and of interest .A model is similar to but simpler then the system it represent. One purpose of a model is to enable the analyst to

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Predict the effect of change to the system. On the other hand, a model should be a close approximation to the real system and incorporate most of its salient features shown Figure: 2. On the other hand, it should not be so complex that it is impossible to understand and experiment with it. A good model is a judicious tradeoff between realism and simplicity. In the final step the CAM software controls that the part. During the design of the machine, the drafting software was used (see the final drawing figure; 2, detail drawing figure 3 and multiply views figure; 1)

12. SIMULATION

Simulation technology can provide a highly effective means for evaluating the design of a new manufacturing system or proposed modifications to existing systems. This technology can be especially useful in supporting agility, sustainability, supply chain integration, as well as the development of new advanced processes. Manufacturing simulations are often used as measurement tools that predict the behavior and performance of systems that have not yet been implemented, or to determine theoretical capabilities of existing systems. Simulations are essentially experiments. As defined in Jerry Banks Handbook of Simulation, a simulation is: *"*...the imitation of the operation of a real-world process or system over time. Simulation involves the generation of an artificial history of the system and the observation of that artificial history to draw inferences concerning the operational characteristics of the real system that is represented. Simulation is an indispensable problem-solving methodology for the solution of many real-world problems. Simulation is used to describe and analyze the behavior of a system, ask what-if questions about the real system, and aid in the design of real systems. Both existing and conceptual systems can be modeled with simulation." shown in figure 7

13. SUSTAINABILITY

Simulation technology has been a significant tool for improving manufacturing operations in the past; but its focus has been on lowering costs, improving productivity and quality, and reducing time to market for new products. Sustainable manufacturing includes the integration of processes, decision-making and the environmental concerns of an active industrial system to achieve economic growth, without destroying precious resources or the environment. Sustainability applies to the entire life cycle of a product shown in figure: 6. it involves selection of materials, extraction of those materials, of parts, assembly methods, retailing, product use, recycling, recovery, and disposal will need to occur if simulation is to be applied successfully to sustainability. Manufacturers will need to focus on issues that they have not been concerned with before, for detailed information check figure 6 sustainability analysis, component environmental impact and environmental impact comparison

Design for Environment is the systematic consideration of design performance with respect to environmental, health, safety, and sustainability objectives over the full product and process life cycle. Accordingly, the goal of DFE is to enable design teams to create eco-efficient and eco-effective products while adhering to their cost, quality and schedule constraints. For a company to be successful in this goal, DFE must be integrated seamlessly into the development process, from the analysis of customer needs and establishment of product requirements to the verification that these Requirements have been fulfilled. The availability of guidelines for practicing DFE was identified as the second key element needed to support this process.

14. CONCLUSION

Currently ,Nigeria are facing problem in the area of training people to match up with the sweeping innovation in science technology like the recent innovation in computer –CAD,CAM,CAA CIM CAP CAE, Software tools that have been developed to support these activities are considered CAE tools which are used to analyze robustness and performance of component and assemblies. A major obstacle to the design engineer at present is the fact that he or she is now required to be an expert in many disciplines. It is no longer satisfactory to develop a product that simply functions well and has desirable features. Management is a universal concept dealing with the use of people to achieve organizational goals. European scholars and writers tend to see the average Nigerian worker as being unsuitable, and uncommitted to the factory work. It is impossible to design completely safe products because they would be too costly. Therefore, the engineer often must design to industry standards for similar product. Base on this discussion the following policy are necessary, efforts should be made to adopt and popularize the design-**DFX, DFA, DFE** ETC especially for the benefits of mankind who make up a great percentage of the Nation's population. If, the use of machine design innovations adopted, the problem in brick making and other agricultural processing Equipment will be minimized and hunger and poverty will be eradicated.

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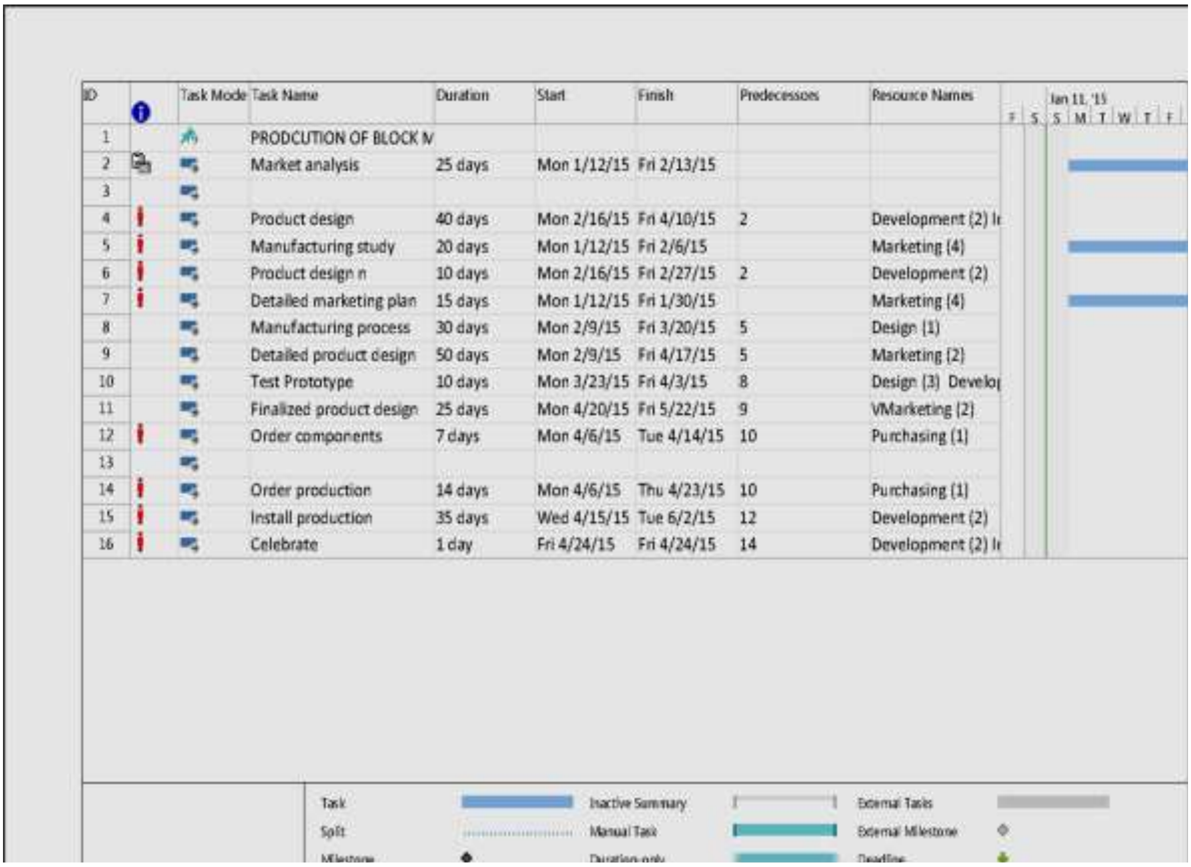
APPENDIX A GANTTCHART



ID		Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1			PRODCUTION OF BLOCK M					
2			Market analysis	25 days	Mon 1/12/15	Fri 2/13/15		
3								
4			Product design	40 days	Mon 2/16/15	Fri 4/10/15	2	Development (2) I
5			Manufacturing study	20 days	Mon 1/12/15	Fri 2/6/15		Marketing (4)
6			Product design n	10 days	Mon 2/16/15	Fri 2/27/15	2	Development (2)
7			Detailed marketing plan	15 days	Mon 1/12/15	Fri 1/30/15		Marketing (4)
8			Manufacturing process	30 days	Mon 2/9/15	Fri 3/20/15	5	Design (1)
9			Detailed product design	50 days	Mon 2/9/15	Fri 4/17/15	5	Marketing (2)
10			Test Prototype	10 days	Mon 3/23/15	Fri 4/3/15	8	Design (3) Develo
11			Finalized product design	25 days	Mon 4/20/15	Fri 5/22/15	9	VMarketing (2)
12			Order components	7 days	Mon 4/6/15	Tue 4/14/15	10	Purchasing (1)
13								
14			Order production	14 days	Mon 4/6/15	Thu 4/23/15	10	Purchasing (1)
15			Install production	35 days	Wed 4/15/15	Tue 6/2/15	12	Development (2)
16			Celebrate	1 day	Fri 4/24/15	Fri 4/24/15	14	Development (2) I

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CRITICAL TASKS

A task is critical if there is no room in the schedule for it to slip.

Learn more about managing your project's critical path.

Name	Start	Finish	% Complete	Remaining Work	Resource Names
Manufacturing study	Mon 1/12/15	Fri 2/6/15	0%	160 hrs	Marketing (4)
Manufacturing process	Mon 2/9/15	Fri 3/20/15	0%	240 hrs	Design (1) Development (2)
Test Prototype	Mon 3/23/15	Fri 4/3/15	0%	80 hrs	Design (3) Development (2)
Order components	Mon 4/6/15	Tue 4/14/15	0%	56 hrs	Purchasing (1)
Install production equipment	Wed 4/15/15	Tue 6/2/15	0%	280 hrs	Development (2) Industrial (1)

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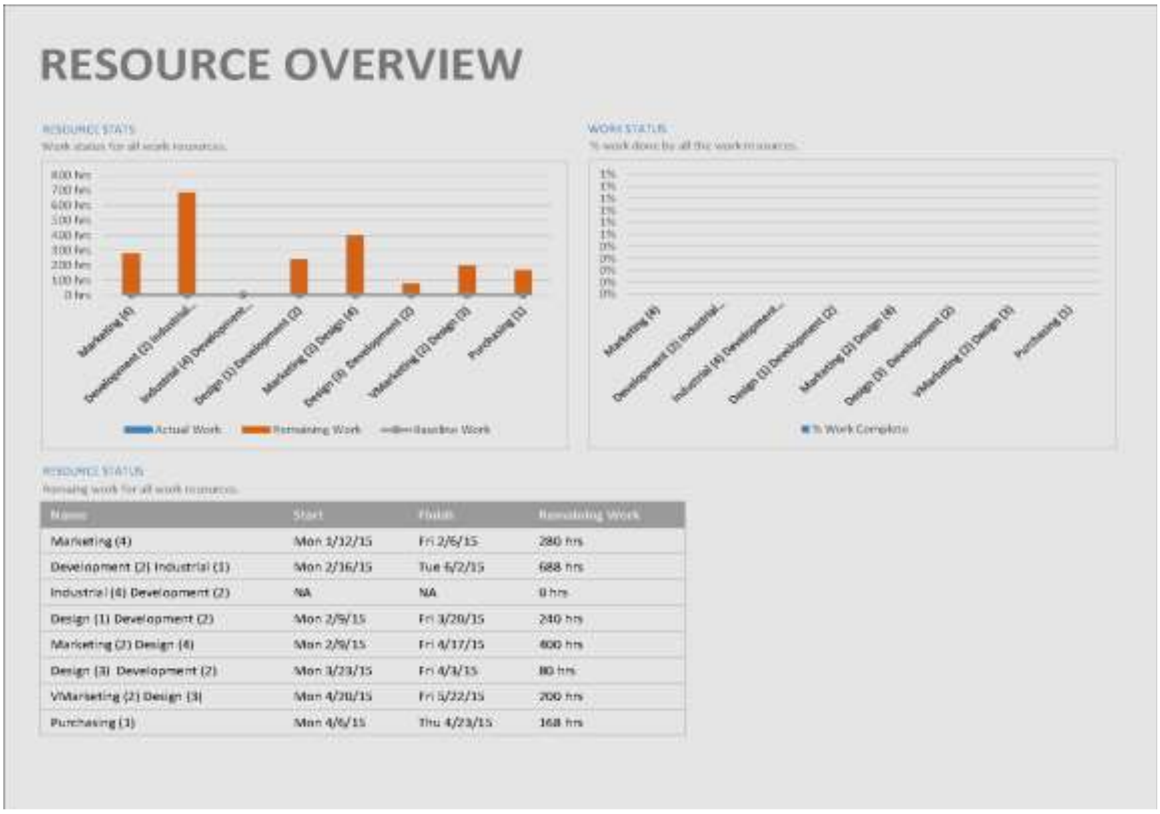

Name	Start	Finish	Remaining Work
Marketing (4)	Mon 1/12/15	Fri 2/6/15	280 hrs
Development (2) Industrial (1)	Mon 2/16/15	Tue 6/2/15	688 hrs
Industrial (4) Development (2)	NA	NA	0 hrs
Design (1) Development (2)	Mon 2/9/15	Fri 3/20/15	240 hrs
Marketing (2) Design (4)	Mon 2/9/15	Fri 4/17/15	400 hrs
Design (3) Development (2)	Mon 3/23/15	Fri 4/3/15	80 hrs
VMarketing (2) Design (3)	Mon 4/20/15	Fri 5/22/15	200 hrs
Purchasing (1)	Mon 4/6/15	Thu 4/23/15	168 hrs

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