International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 06,
2019 ISSN: 1475-7192

Mass Customization

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Abstract--- *Mass customization allows customers to customize their goods and takes more time and money. Mass production is still more preferred type of production.The proposed decision support system can be used to determine the characteristics of the mass-production product as well as mass customization ordering stage.Under mass customization environment, a CAD/CAE integrated customization product approach is proposed.To develop methods for mass customization of the product family, a scale-based modular approach is proposed and requires two systems for designing the product family and product design for customisation.The customisation feature can be accomplished by modifying the scale and replacement values, eliminating individual modules depending on the product family model.CODP is dynamic and following the changes of customized products.The paper provides an idea of product mixes for the new system with a thorough analysis of the process, production and customer order characteristics of the goods in the supply chain, and analyses the key problems in implementing the new mass customization and further investigations.*

Keywords--- *CPS, CODP, IOT, Mass Customization, Mass Production, Simulation.*

I. INTRODUCTION

A mass production model emerged which produces a standardized product quickly. The products manufactured by craftsmen are produced more slowly and more expensively than products produced by mass production, these products have started to be seen as luxury[1].There has been a need for a production model that offers all product variety and realizes it cheaply. It is able to achieve the small variety of products in a cost-effective way with the lean production and implementation of technologies such as internet of things (IOT), cyber-physical system (CPS), and data mining and mass customisation aimed to manufacture goods in an industrial environment has emerged[2].The volume graph is given by figure 1.

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Received: September 2019 | Revised: October 2019 | Accepted: November 2019

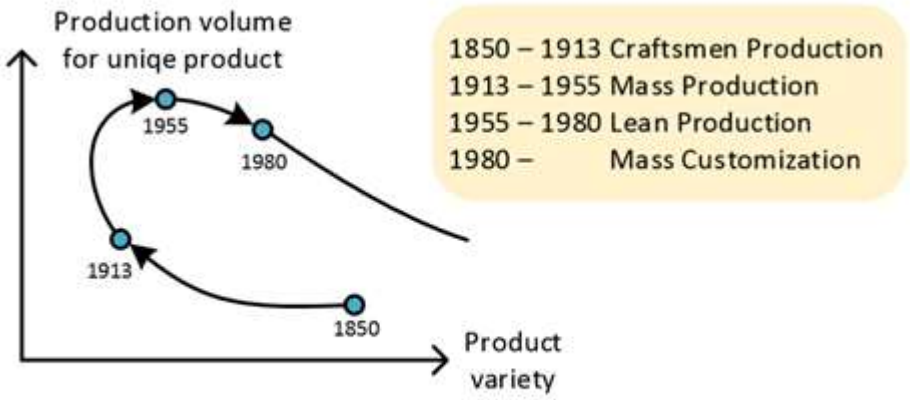

Figure 1: The Volume-Variety Graph of Production Models

Mass Customization allows setting such as colour, feature, characteristic or style to be customized and produces the personalized product according to customer needs in a cheap rate or manner. Mass customisation is the manufacturing method which aims to manufacture special products quickly and cheaply[3]. Billions of different products can be produced with an industrial environment which is designed to be compatible with mass customisation.Mass customization is expected to become popular and used in the medical industry in the near future to manufacture specific medications for patients.Mass customization has advantages for both consumer and fabricator because it helps the consumer to consume goods in cheaper rate while fabricator produces many product in less time. Supply chain and over-stock are not a concern for mass production manufacturers[4].

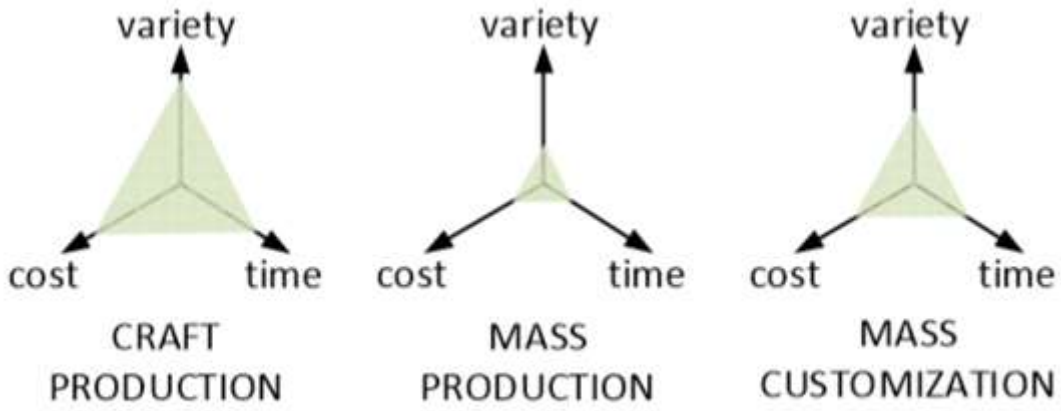

Figure 2: Comparison of Production Models in Terms of Cost, Time and Variety

Mass Customization is generally updated in the order given by the customer with the help of internet and production facilities based on CPS and IOT. Customisation means differentiating the products or services according to the needs of the customer or company. A production process requires phases of design, manufacture, assembly, distribution and distinction can be actualized[5]. The cycle of differentiation brings variation in rates of customisation. Examples can be provided for the simplest level of customization is smart phones and the cabinets which can be placed on it.Across different countries, different packaging of the same product is also an example of customisation at the distribution level.

Received: September 2019 | Revised: October 2019 | Accepted: November 2019

Definitions of the highest level of customization include enabling the consumer to choose the correct module or design of the product[6].

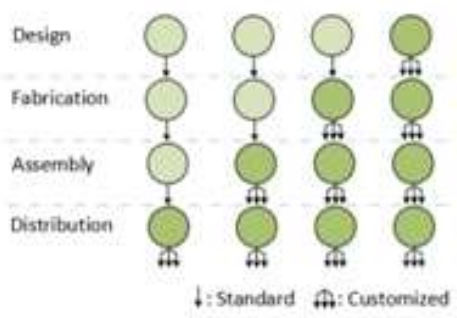

Figure 3: Customization Levels

Modularity is the most popular form of mass customization. The pre-produced modules are configured according to order of the customer and modularity taking into consideration. Dell is an excellent example[7]. The companies are produced modular products can outsource or arrange all of the components from a different company. The mass customisation should be handled completely for its sustainability as supply; production and distribution.There are two major challenges to tackle in order to product experience more attractive. These are time and cost. While the cost is reasonable at today's level due to the developed technology, there is too much waiting time for the product to be purchased.

II. MASS CUSTOMIZATION WITH MULTI-CODPS

Some successful attempts are made to boost the advantages of mass customisation with a single CODP only. This kind of production system positions one CODP to decouple between push modes and pull mode in some supply chain production process.Supply chain for electric bicycles to represent a conventional CODP.The production processes for electric bicycles include wheel assembly, front fork components, bicycle frame, drive components, brace for the wheel and so on. Different processes have different production period that is above the square of the process, i.e. power supply assembly process requires 5 days to complete.The supplier can provide the customers with 26 items according to the different attributes, i.e. battery type, colour.The single CODP mass configuration system allows manufacturers to define the correct point between the pull and push mode production system as CODP. The most common components of the economic scale are the point of the CODP process.Electric bicycle production system, CODP is put on bike frame assembly phase. So, the bicycle frame assembly phase point, they manufacture the components in advance and the output after that point is order-driven.When the CODP decided is set following changes in the product attributes, mass customization with single CODP cannot meet the needs of the industry[8].

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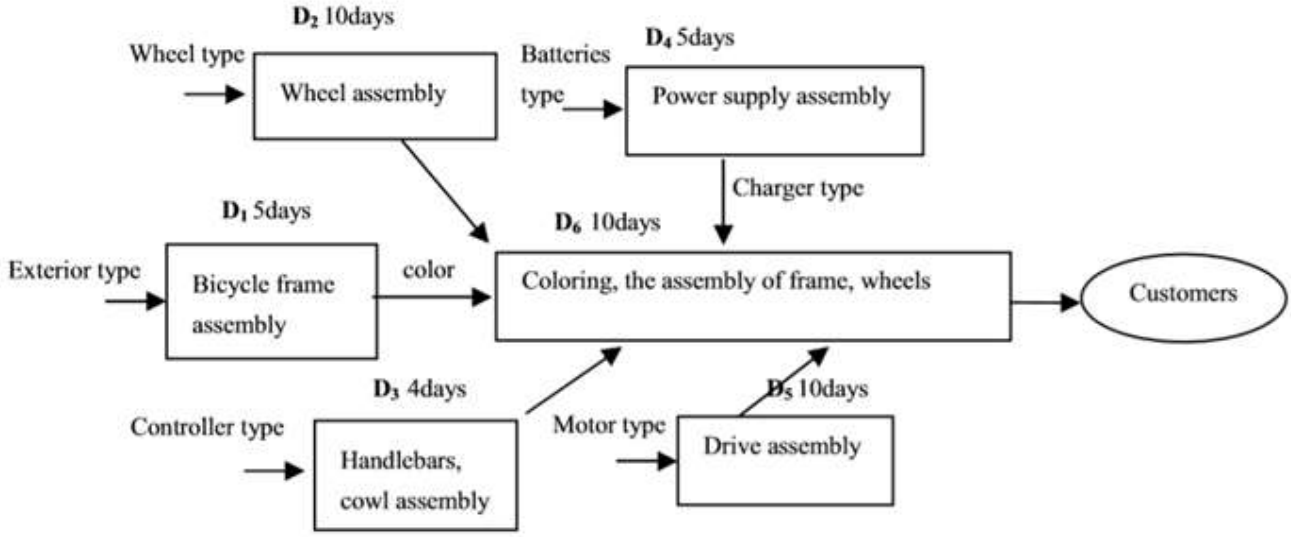

Figure 4: The Process Map of the Electric Bicycle

This form of mass customization mode fulfils personalized orders by allowing customers to wait a while; different customized rates can wait a different time.The current mass customization is not distinguish the products with different custom characters, and put the CODP so that all products had identical lead time.The customer who ordered the more standard products has to wait with the customized products at the same time so their satisfactory needs to decrease.Therefore the single CODP mode may not satisfy the mass customization requirement well[9].

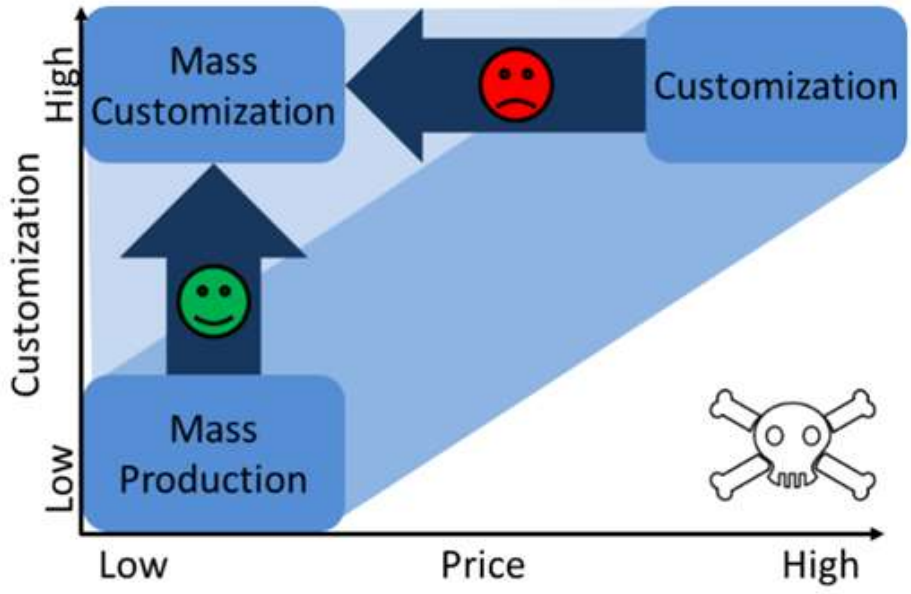

Figure 5: Mass Customization

Mass customization is known to be the happy medium if the buyer wants to ordered products but the product to be produced and sold at a minimum price to cope with mass manufacturing. In some cases, buyers become really picky with their choices in return pressurize the manufacturing companies to respond quickly that could result in incorrect

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responses from the manufacturers. Such situations usually end up in firms quoting a price they can't afford. Mass customization is best option where the manufacturers offer their customers a basic amount and the amount can be increased or decreased depending on the features required.

III. REALIZATION TECHNIQUE OF THE INTEGRATION SYSTEM

System uses ASP.NET technology for web design, and uses ADO.NET and ODBC for database connections. The secondary 3D product development uses the Solid Works API, VB6.0 and relies on the application monitor using VRML.CAE analysis uses ANSYS and the secondary language APDL for production. Server technical architecture, as shown in Figure 3, is divided into web browser, application server and database server layer.The client through the program makes a solicitation to the application server. On the off chance that it is ASP.NET documents, by the Web server to run it, and the outcomes into HTML record by means of HTTP to come back to the customer; if the record move is the item structure parameters, required customer and server for continuous correspondence, web server got plan parameters through the COM part innovation to convey to the application server and start the Solid Works CAD programming for optional improvement, likewise spare the outcomes to the database server. Web server passed the outcomes to the program for clients to see. At the point when director/propelled client acknowledge the structure result, they acquire geometry and non-geometry data through human-PC cooperation. The data will create APDL record, which will be submitted to CAE server. On the off chance that it has inert time, ANSYS will begin and run. Among of the data move, Win Sockets are used to impart on-going[10].

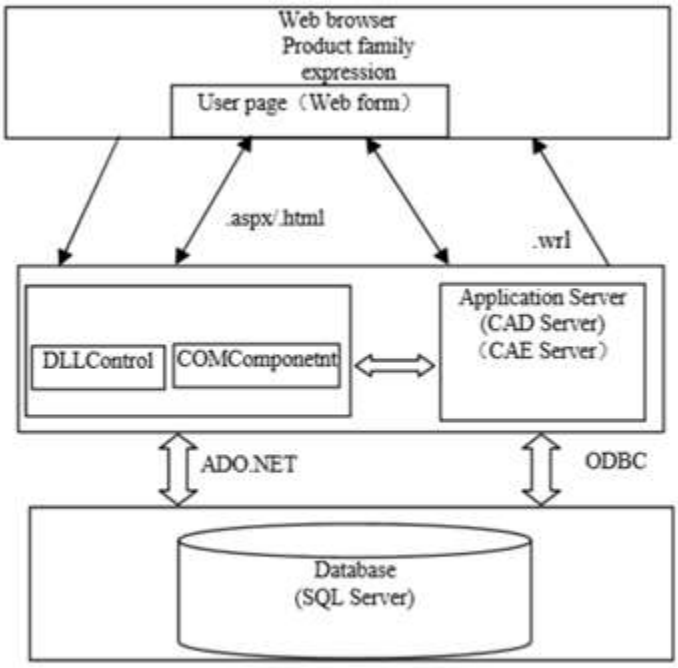

Figure 6: Technique Architecture of the System

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IV. CONCLUSION

A data-driven recommendation system for evaluating mass production products and assisting mass customisation customers is proposed.The number of data used for processing and more precise results can be obtained. This increase the processing time however it is also found that the number of modules and components has an effect on the time elapse.Core technology, architecture and methods of implementing product family design are studied. The internet based customer-driven CAD/CAE integrated system is developed using the grinder for the application unit.The result of customization is used for mechanical analysis to achieve a reasonable analytical product in the design phase and an improved product life cycle in order to achieve simultaneous engineering.The new mass customization method is more uniform, making the producer by complex multi-CODPs follows the customer orders.If all CODPs are overlapping, the system becomes the traditional method of mass customization; if all CODPs move to the point of distributors, it becomes the system of mass production; if all CODPs move to the point of manufacturers it becomes the system of customisation.The new system's supply chain is more complex, and more difficult to manage and control. To help development it takes a smarter information system.The practice of the new system is difficult to find a reality supply chain, so use the simulation method to approve its effect.

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Received: September 2019 | Revised: October 2019 | Accepted: November 2019