

# Product Design and Development of Dual Table

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**Abstract** Product design is a crucial task and its development requires systematic path for the successful development of the product. To withstand in the competitive market, it is crying need to improve and enhance the feature or part of products in all seasons. Actually it is very difficult and challenging issue to launch a new product or derivative of a product in the market for first moment. In this research work, we have tried to create a new platform of existing derivative product (dual table) by following a systematic and sophisticated way. Here, numerous quality tools & strategic selecting tools like QFD, HOQ, SCAMPER, Cause and Effect diagram, Concept Screening, Concept Scoring and so on are used for giving a successful portfolio for further development of the product. To keep pace with the competitive marketing situation, an economic analysis has been accomplished for profitable launching of the product. Innovative changes in the conventional table contribute and accelerate the design and development of dual table.

**Keywords:** bill of material, fish bone diagram, house of quality, mission statement, quality function deployment

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## 1. Introduction

Product planning is the process of creating a product idea and following through on it until the product is introduced to the market. Additionally, a small company must have an exit strategy for its product in case the product does not sell. Product planning entails managing the product throughout its life using various marketing strategies, including product extensions or improvements, increased distribution, price changes and promotions [1].

In this paper simple design has obtained to reduce the cost and space of computer table. Our product dual table is a combine form of reading or writing desk and drawing table with inclined angle mechanism. This table can be made by using different types of materials. We have discussed all the steps of making this product. We have also discussed all the steps of making this product. We have also discussed the economic calculation and customer need. We have done a lot of surveys and included the survey chart. After doing all this, we think that this product will be a real market capturing product.

## 2. Dual Table and Its Parts

The name of the product which is selected for product planning is "Dual Table". This product is similar with derivatives of existing product platforms. The main apparatus of this product is wooden frame, drawing board, composite thin board and other accessories like screw,

fastener, nut etc. Generally, students use separate tables for reading and drawing. Here both the tables are functionally combined to obtain a Dual Table. It enables the students to perform reading and drawing tasks on the same table by only sliding the normal portion. The table minimizes the time, space and accommodation; even the effort of students so that separate rooms are not needed. As the dual table is capable of sliding, it is easier for the customer to draw by sliding it to and forth as per his need. Usually, a drawing table does not contain a holder for drawing apparatus. But here a new accessories has been attached in order to keep these apparatus ergonomically safe and sound.



Figure 1. Dual Table in normal mode

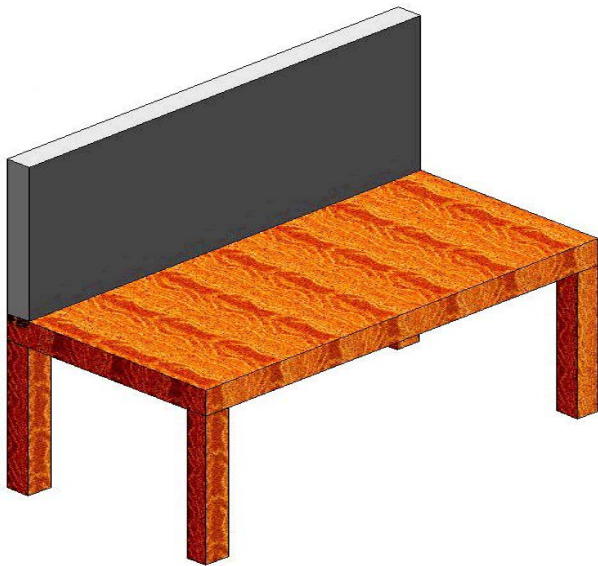


Figure 2. Dual table being converting into drawing mode



Figure 3. Dual table in drawing mode

### 3. Mission Statement

Before beginning the development project, the firm typically specifies a particular markets opportunity and lays out the broad constrains and objectives for the project. This information is frequently formalized as a mission statement. This mission statement specifies which direction to go in but generally does not specify a precise destination or a particular way to proceed [1].

Table 1. Mission statement on “Dual table”

Mission Statement	
Product description	<ul style="list-style-type: none"> <li>• A multipurpose table comprising study table, drawing table and holder for drawing accessories</li> </ul>
Benefit preposition	<ul style="list-style-type: none"> <li>• Dual table saves the money ,time &amp; space</li> </ul>
Primary market	<ul style="list-style-type: none"> <li>• Engineering college &amp; University</li> </ul>
Secondary Markets	<ul style="list-style-type: none"> <li>• Other Schools &amp; college where Engineering drawing is taught</li> <li>• Office equipment market.</li> </ul>
Assumptions and Constraints	<ul style="list-style-type: none"> <li>• Space consuming</li> <li>• Time consuming</li> <li>• Cost effective</li> <li>• New product platform, space reducing thinking, all the components can be easily made by wood with the help of carpenter.</li> </ul>
Stakeholders	<ul style="list-style-type: none"> <li>• Purchasers and users, manufacturer, service providers, distributors and sellers.</li> </ul>

### 4. Identifying Customer Needs

Identifying customer needs is itself a process, for which we present a five step method. We believe that a little structure goes a long way in facilitating effective product development practices and we hope and expect that this method will be viewed by those who employ it not as a rigid process but rather as a starting point for continuous improvement and refinement. [1]

While finding the additional features we have met and interviewed a lot of customers. We have gathered raw data from them. They have given statements, advices, and needs of their interest, problems and much useful information. Analyzing all the statements we have made a chart. We have also observed the existing products. The chart is given below-

Table 2. Customer data template filled in with sample customer statements and interpreted needs

Question/Prompt	Customer Statement	Interpreted Need
Typical uses	I need a more flexible drawing table	A roller support provides more flexibility
	I have to often switch from study table to drawing table and vice versa	The dual tables gives both arrangements for drawing and study in itself
	I need a separate place or holder for keeping drawing accessories.	The hollow box in front of the drawing arrangement provides sufficient space for the accessories
Likes	I like the user friendly height of the table	The height of dual table is adjustable
	I like to keep my drawing accessories	This table contains a separate holder for drawing accessories
Dislikes	I don't like fixed angular drawing table	The angle of the drawing arrangement of this table can be changed
	I would like to keep the accessories by me so that I can get those easily	The dual table contains an accessories' holder
	I feel boring and fatigue to go to a separate drawing lab	This tables allows to perform drawing in the same classroom
Suggested improvements	A flexible arrangement to allow me to move the drawing board to and froth	A roller support can allow requisite movements
	A space so that I can keep the accessories	The tables allows such space
	Would be good if it is cost effective	This table is cost effective

Customer needs are expressed as written statement and are the result of interpreting the need underlying the raw data gathered from the customers. Each statement or

observation may be translated into any number of customer needs. We found that multiple analysts say the same interview notes into different needs, so it is useful to

have more than one team member conducting the translation process [1].

By interpreting the data in terms of customer needs we have results and those are given below-

**Table 3. Comparing the customer statements with our product**

Guideline	Customer statement	Need Statement Right	Need Statement Wrong
“What” not “how”	Why don't you make it by metal frame?	The wooden frame is very light weight and easy to use.	Metal frame is more expensive than wood.
Specificity	I need space for keeping my drawing equipment.	Dual table contains hollow shape box for keeping it.	Dual table does not need separate space.
Positive not negative	I need to shift drawing and writing table several times at a day.	Roller group facilitates its flexibility function.	Not necessary to shift the table for drawing and study function.
An attribute of the product	I did like to save my time, money and accommodation.	Accommodation, money and time are minimized.	Dual table minimizes its accommodations accessories.
Avoiding “must” and “should”	I do not like white drawing board sheet.	Dual table's drawing part covered with different color sheet.	The drawing board sheet must not be white colored board sheet.

The list of customer needs is the superset of all the needs elicited from all the interviewed customers in the target market. Some needs may not be technologically reliable. The constraints of technical and economic feasibility are incorporated into the process of establishing product specifications in subsequent development step.

#### Organizing the needs into a hierarchy

##### Primary needs:

- Must have sufficient space
- Easy to clean
- Enough scope for storing
- Cost effective

##### Secondary needs:

- Easy to slide
- Great life time
- Save accommodation

##### Tertiary need:

- It would be better if Dual table attached with chair

- Reduces design cycle time because design changes are minimized
- Develops products in advance of customer demand
- Improves product success in the marketplace because customer requirements are specifically targeted
- Improves customer satisfaction, which helps avoid losing customers when they have to reduce their number of suppliers
- Identifies common parts for reuse, lowering cost and increasing reliability
- Develops hybridized products using the most important features from two products

QFD also addresses environmental issues. When chlorofluorocarbons were banned as a propellant, QFD helped one company reformulate its product without sacrificing customer satisfaction [3].

## 5.2. The QFD process: House of Quality

The ultimate goal of QFD is to obtain information about both spoken and unspoken customer needs and requirements, and incorporate those into product design and production targets and specifications. This process is known as capturing the voice of the customer. Information is gathered from a number of sources: surveys, focus groups, marketing and sales reports, customer complaints, warranty data or direct interviews. These customer requirements are then summarized on a product-planning matrix, where they are prioritized and compared with design and technical requirements, and used as a basis for product design and development [3].

The product matrix is commonly known as a house of quality matrix. It generally consists of six parts: [3]

**Customer requirements (what)**—start by listing customer needs, preferably in their own words. Requirements should be listed hierarchically and prioritized by customer importance (on a scale of one to five, for example). This list is placed vertically down the left side of the matrix.

**Design requirements (how)**—compile a list of quantifiable product characteristics. These form the basis for the technical improvements (how) necessary to satisfy the customer requirements. This list is placed horizontally along the top of the matrix.

**Relationship**—a graph that quantifies the relationship between the customer and design requirements. At the point of the matrix where the customer and design requirements intersect, a symbol is placed indicating their relationship. Commonly used terms include strong

## 5. Quality Function Deployment

Quality function deployment (QFD) is a structured approach to defining customer needs or requirements or translating them into specific plans of product, parts / components, process and production plan, such that those needs are met. The “voice of the customer” (VOC) is the term to describe these stated and unstated customer needs or requirements. The voice of customer is captured in a variety of ways [2].

- Define direct discussions or interviews
- Surveys using questionnaires
- Focus groups
- Customer provided specifications while submitting design
- Direct observation
- Warranty data analysis
- Field reports, etc.

### 5.1. Benefits of QFD

The positive advantages of using QFD methodologies have been well documented, including a reduction in design and manufacturing costs. Some users have reduced their product and service development cycle times by as much as 75 percent with similar improvements in measured customer satisfaction. Other important benefits include:

- Improves communication and information sharing among different departments

relationship, some relationship and weak relationship. These symbols are also assigned a numerical value.

**Customer perception**—this illustrates and quantifies customer perceptions of your company's and your competitors' ability to meet their requirements. A rating (on a scale of one to five, for example) is given for each customer requirement for each company.

**Technical correlation**—this ranks the importance of each design requirement by quantifying the relationship value and customer importance ranking. This helps to identify where design requirements support or impede one other in the production process

**Design targets (how much)**—determines priorities by assigning importance ratings to specific design requirements. It also measures the technical performance achieved by competitors' products and ranks the technical difficulty involved in developing each requirement. This helps to identify areas for concentrated effort and key elements are assigned for further QFD matrix processing.

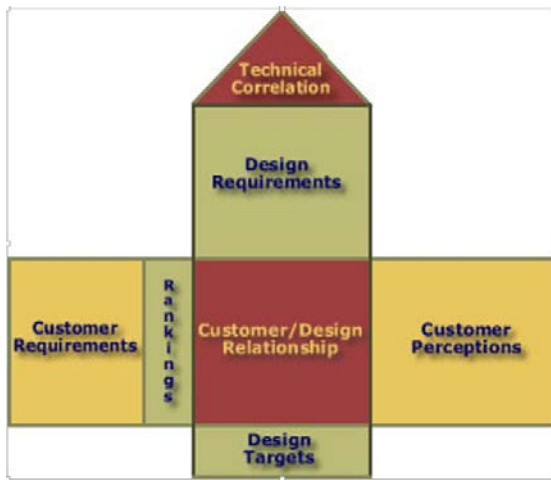


Figure 4. The building block of HOQ [3]

The QFD process generally takes place during four phases, with each phase developing its own version of the house of quality matrix. The initial matrix is the jumping-off point. Each phase involves close cooperation among two or more departments, along with the active participation of the entire project team [3].

1. *Design*—during this phase, the initial matrix is completed. The customer requirements are listed and ranked. The design requirements are determined and the relationships between the two are evaluated.
2. *Planning*—the parts and assembly details necessary to produce the product and fulfill customer requirements are established.
3. *Process*—the details of the manufacturing processes to best produce a product meeting customer needs are determined.
4. *Production*—production and quality control methods are developed to ensure the actual product is in line with the priorities determined in the QFD matrices.

The understanding of the customer's needs is then summarized in a product planning matrix of "House of Quality" (HOQ). Once customer needs are identified, preparation of the product planning matrix or "house of quality" can begin. Customer needs or requirements are stated on the left side of the matrix. These are organized by category based on the affinity diagrams [4].

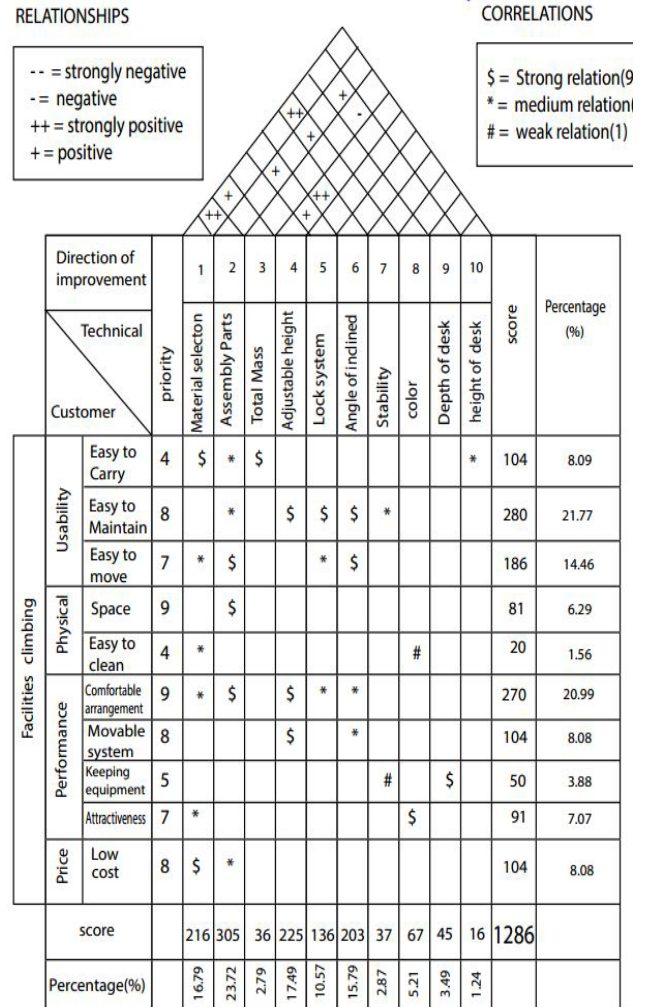


Figure 5. Customer requirement for Dual Table (HOQ)

## 6. Concept Generation of the Product

Concept generation is relatively inexpensive and can be done relatively quickly in comparison to the rest of development process. Thorough exploration of alternatives early in the development process greatly reduces the likelihood that the team will stumble upon a superior concept late in the development process or that a competitor will introduce a product with dramatically better performance than the product under development. Early concept generation is a very affordable way of looking at a lot of alternatives. It develops confidence in the team that you are not going to be surprised later on.

### 6.1. Brainstorming

Brainstorming is a process for developing creative solutions of problem. It is a group or individual creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members. In this case the SCAMPER technique is used to produce crucial and significant ideas or requirements.

By brainstorming, the significant concepts are emerged that mentioned below:

- It can be attached with chair
- It may have a bag stand

- It can be added with an additional table lamp
- It may be contained an additional board which can be attached with class work sheet
- It can be made with adjustable height
- It may have a drawing sheet holder.

6.2. SCAMPER

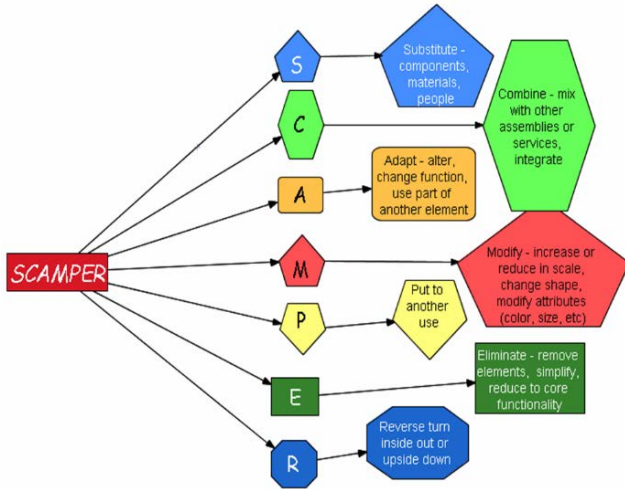


Figure 6. The SCAMPER technique illustration

Table 4. Making of SCAMPER according to our product

S	Substitute	What can we substitute to make an improvement?
		We substitute an adjustable inclined surface for drawing
C	Combine	What materials can we combine?
		We use steel for stand and plastic or plywood or hardboard for board surface.
A	Adapt	What part of the table could we change?
		We could change the height of the adjustable arrangement for the table.
M	Modify	What will happen if we modify the table?
		We are using rubber pad at the end of the legs in order to be balanced.
P	Put to Other purpose	In what other purpose it can be used?
		It can be used for both study and drawing as well as to keep drawing equipment.
E	Eliminate	What would happen if we removed any of the components?
		If we eliminate the equipment storing box It will be uncomfortable.
R	Reverse	What will happen if we use the other way?
		The design will be ruined.

6.3. Research

According to the process of House of Quality our product is researched. From this some features found from the voice of customers.

- **Adjustable Inclined surface for drawing:** The drawing surface can be inclined as per its use.
- **Provided additional box:** An additional box can be provided with table to carry important things.
- **Folding system:** The drawing arrangement can be folded according to its use.
- **Additional paper rack:** A rack can be provided to keep drawing paper.

- **Balanced table level:** The table level can be balanced by providing rubber pads at the bottom of the legs of the table.

User narrative

From the voice of customer few feature are found that is

- It will be better if the table can be moved easily.
- I need a space to keep our books and copies.
- I don't like if the table vibrates while drawing.
- I need to move it silently.

User creation

According to the demand of user some features are added with Dual table. Those features, which are come from the user, are converted into the desired design. Basically we focused in students mostly engineering students who needs to learn Engineering Drawing.

- It will be better if it contains a T-scale holder.
- We want to keep our bags in the table.
- We don't like if the table vibrates while drawing.
- It will be more effective if we can keep our drawing paper in the table, containing paper rack.
- We want to move my table silently.
- It will be better that if my table will be easier to clean.

Description recombination

After completed all the steps of concept generation again we discuss with our group members about the problem of products. From our group members' concept and the voice of customers some common features are found and at last we conclude that those features will be added.

6.4. Concept Classification Tree

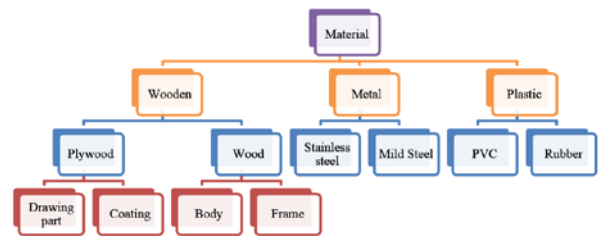


Figure 7. Concept classification table for material

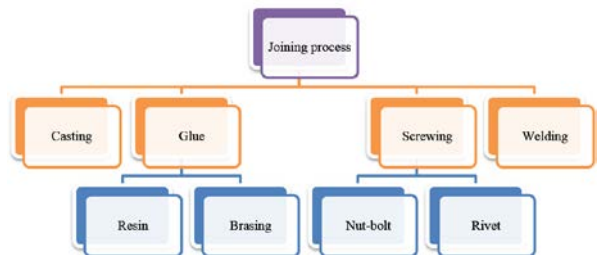


Figure 8. Concept classification table for joining process

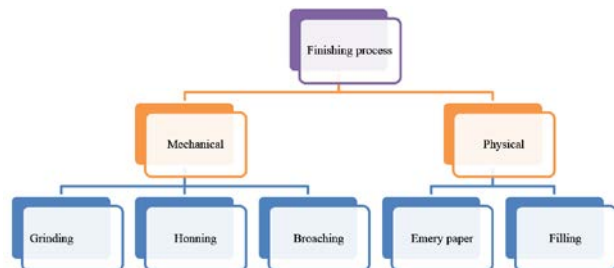


Figure 9. Concept classification table for finishing process

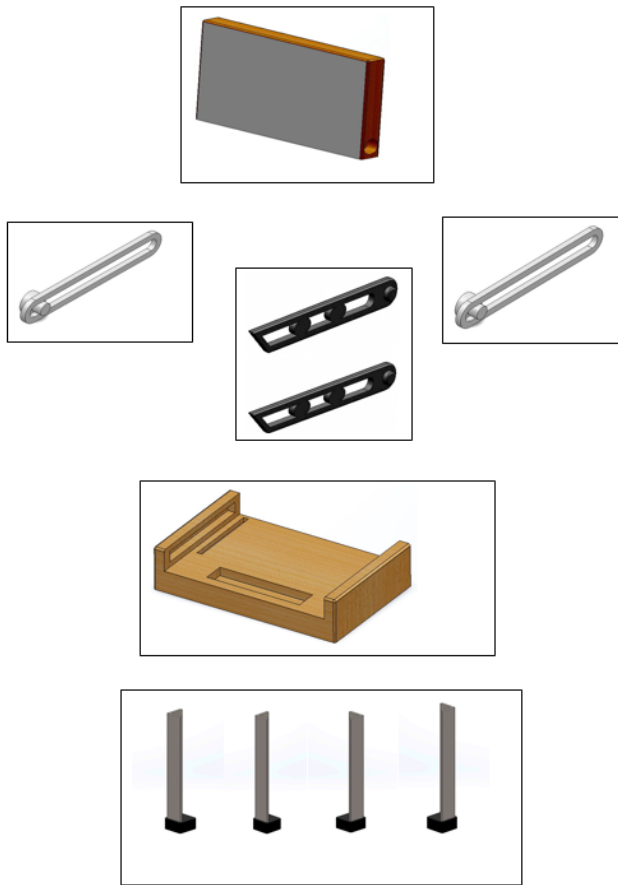


Figure 10. Schematic diagram for assembly parts for dual table

### 6.5. Brain writing

When we discussed with our group members about this product we write all feature initially and then we decided that which feature should be added to our existing product. These features are-

- It can be comfortable with chair
- It can be more comfortable with table lamp
- It can be suitable for everyone for its adjustable height
- It can be more effective for its drawing sheet holder.

### 6.6. Cause & Effect Diagram

It is the final and most effective part of concept generalization. This part consists of an important diagram called the fish-bone diagram. The fish-bone diagram has been plotted below in the respect of our product-

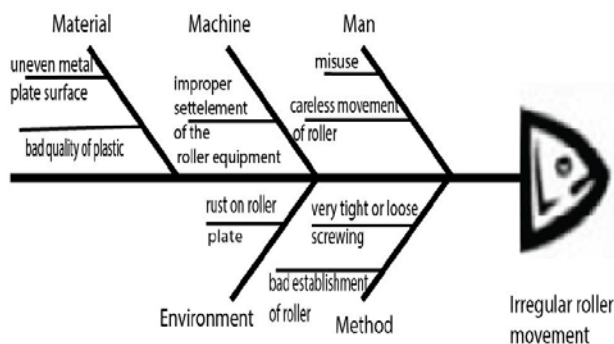


Figure 11. Cause & effect for irregular roller movement

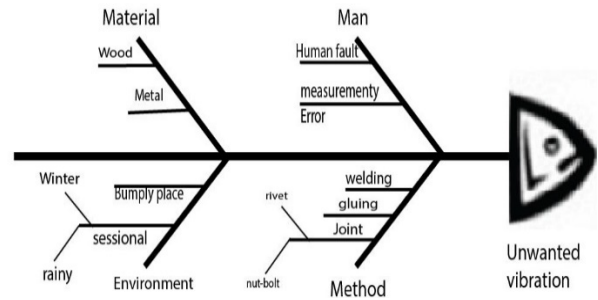


Figure 12. Cause & effect for unwanted vibration

## 7. Concept Selection for The Product

Concept selection is an integral part of the product development process. It is the process of evaluating concepts with respect to customer needs and other criteria, comparing the relative strengths and weakness of the concepts, and selection one or more concepts for further investigation, testing, or development. Early in the development process the product development team identifies a set of customer need. By using a variety of methods, the team then generates alternative solution concepts, in response to these needs. Concept selection is the process of evaluating concepts with respect to customer needs and other criteria, comparing the relative strengths and weaknesses of the concepts, and selecting one or more concepts for further investigation, testing, or development. Although concept selection is a convergent process, it is frequently iterative and may not produce a dominant concept immediately. A large set of concepts is initially winnowed down to a smaller set, but these concepts may subsequently be combined and improved to temporarily enlarge the set of concepts under consideration. Through several iterations a dominant concept is finally chosen [1].

The concept screening & scoring methods help us to refine and improve the concepts, leading to one or more promising concepts upon which further testing and development activities will be focused.

### 7.1. Concept screening

Concept screening is based on a method developed by the late Stuart Pugh in the 1980s and is often called Pugh concept selection (Pugh, 1990). The purposes of this stage are to narrow the number of concepts quickly and to improve the concepts [1].

#### Step 1: Preparing the selection matrix

To prepare the matrix, the team selects a physical medium appropriate to the problem at hand. Individuals and small groups with the short list of criteria may use matrices on paper similar to table for their selection process. For larger groups a chalk board or flip chart is desirable to facilitate group discussions.

#### Step 2: Rating the concepts

A relative score of "better than" (+), "same as" (0), or "worse than" (-) is placed in each cell of the matrix to represent how each concept rates in comparison to the reference concept relative the particular criterion. It is generally advisable to rate every concept on one criterion before moving to the next criteria. However with a large number of concepts, it is faster to use the opposite-to-rate each concept completely before moving on to next concept.

Table 5. Concept screening matrix for Dual table

Selection Criteria	Concepts						
	A	B	C	D	E	F	G
	Sliding part	Roller	Equipment holder	Adjustable height	Adjustable inclined angle	Safety	Cleanliness
Ease to use	+	+	0	+	+	-	0
Ease to handling	+	+	0	0	+	0	0
Easy to transform	+	+	0	0	0	+	0
Ease of storing	-	0	+	0	0	0	-
Ease of manufacturer	-	-	-	0	0	-	0
Ease of maintain	+	+	-	+	+	+	0
Sum '+'s	4	4	2	2	3	2	0
Sum '0's	0	1	3	4	3	2	5
Sum '-'s	2	1	2	0	0	2	1
Net score	2	3	0	2	3	0	-1
Rank	3	1	5	3	1	5	7
Continue?	yes	yes	combined	yes	yes	combined	no

**Step 3: Ranking the concepts**

After rating all the concepts, the team sums the number of “better than”, “same as” and “worse than” scores and enters the sum of each category in the lower rows of the matrix. From our example on table.

Table 6. Relative performance rating table

Relative Performance	Rating
Much worse than reference	1
Worse than reference	2
Same as reference	3
Better than reference	4
Much better than reference	5

**Step 4: Combining and improving the concepts**

Having rated and ranked the concepts, the team should verify that the results make sense and then consider if there are ways to combine and improve certain concepts. Two issues to consider are:

- Is there a generally good concept which is degraded by one bad feature? Can a minor modification improve the overall concept and yet preserve a distinction from the other concepts?

- Are there two concepts which can be combined to preserve the “better than” qualities while annulling the “worse than” qualities?

**Step 5: Selecting one or more concepts**

Once the team members are satisfied with their understanding of each concept and its relative qualities, they decide which concepts are to be selected for further refinement and analysis. Based upon previous steps, the team will likely develop a clear senses of which are the most promising concepts. The number of concepts selected for further review will be limited by team resources (personal, memory. And time).

**7.2. Concept Scoring**

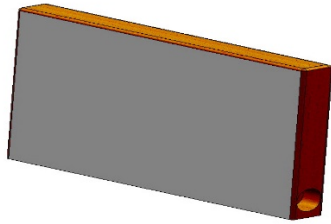
Concept scoring is used when increased resolution will better differentiate among competing concepts. We weigh the relative’s importance for our product named “automatic gas stove”. The importance of the selection criteria and focuses more refined comparison with respect to each criterion. The concept scores are determining by the weighted sum of the ratings. We focused on the differences related to the concept screening.

Table 7. Concept scoring table for Dual table

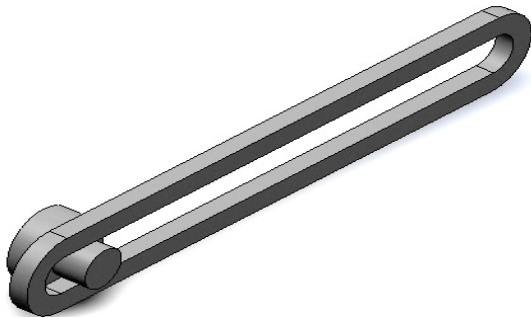
Selection criteria	Weight %	Concepts									
		B		E		A		D		FC	
		Roller		Adjustable inclined angle		Sliding part		Adjustable height		Safety & Equipment holder	
		Rating	weighted score	Rating	weighted score	Rating	weighted score	Rating	weighted score	Rating	weighted score
Ease to use	25	5	1.25	6	1.5	4	1.00	6	1.50	1	0.25
Ease to handling	15	4	0.60	1	0.15	6	0.90	5	0.75	7	1.05
Easy to transform	15	7	1.05	1	0.15	7	1.05	3	0.45	2	0.30
Ease of storing	05	1	0.05	1	0.05	1	0.05	1	0.05	8	0.40
Ease of manufacturer	30	6	1.80	7	2.10	5	1.50	4	1.20	6	1.80
Ease of maintain	10	2	.20	5	0.50	3	0.30	1	0.10	2	0.20
Total score			4.95		4.45		4.8		4.05		4
	Rank		1		3		2		4		5
	Continue?		develop		no		develop		no		no

**Step 6: Reflecting on the results and the process**

Finally we have decided to develop two features i.e. roller and sliding part from the combination of above table and these two features are within our cost and manufacturing capability.



**Figure 13.** Sliding part concept for Dual table (Concept A) to develop & effect for unwanted vibration



**Figure 14.** Roller concept for Dual table (Concept B) to develop

**8. Concept Testing for the Product**

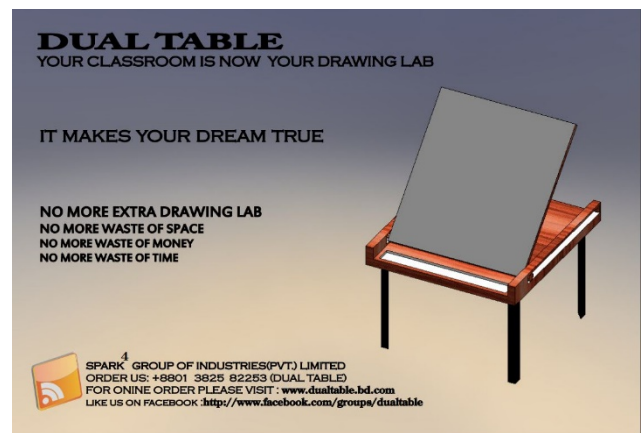
Concept testing is necessary to know the demand of any product to the potential customers. it is appropriate at several different points in the development process. When identifying the original product opportunity. When selecting which of two or more concepts should be pursued. When assessing the sales potential of a product concept, and when deciding whether to continue further development and commercialization of the product. It has been performed by using field surveys, personal interviews and focus groups, in combination with various quantitative methods, to generate and evaluate product concepts. The concept generation portions of concept testing have been predominantly qualitative. Advertising professionals have generally created concepts and communications of these concepts for evaluation by the basis of their own experience as to which concepts they believe represent product ideas that are worthwhile in the consumer market [1].

We communicated the concept with the customer by verbal description, sketch, photos and rendering, simulation, physical appearance models etc. We made a storyboard for advertising our product. Most concept test surveys first communicate the product concept and then measure customer response. When a concept test is performed early in the concept development phase, customer response is usually measured by asking the respondent to choose from two or more alternative concepts. Additional questions focus why respondents react the way they do and how the product concepts could be improved. Concept tests also generally attempt to

measure purchase intent. The most commonly used purchase-intent scale has five response categories:

- Definitely would buy.
- Probably would buy.
- Might or might not buy.
- Probably would not buy.
- Definitely would not buy.

In many cases the team also interested in estimating the demand for a product in the period following launch, usually one year. Here we present a model for estimating the sales potential or durables. By durables we mean products that last several years, and for which there is, therefore, a negligible repeat-purchase rate. These products are in contrast to consumer packed goods, like razor blades, toothpaste, or frozen food, for which forecasting models must be consider rates of trial and subsequent repeat purchase [4].



**Figure 15.** The advertisement of the product

Before proceeding with the model, forecasting sales of new product is subject to a great deal of uncertainty and exhibits notoriously high errors. We estimate

$$Q = N \times A \times P$$

Where,

Q = Quantity of the product

N = Number of potential customers who bought this product

A = Fraction of these potential customers

P = Probability of the product purchased if available and if customer is aware of it.

$$P = C_{definitely} \times F_{definitely} + C_{probably} \times F_{probably}$$

Where,

C<sub>definitely</sub>= Calibration constants

F<sub>definitely</sub>= Fraction of survey respondents indicating in the concept test survey that they would definitely purchase.

F<sub>probably</sub> = Fraction of survey respondents indicating that they would probably purchase.

F<sub>definitely</sub> = 0.30, F<sub>probably</sub> = 0.25 C<sub>definitely</sub>= 0.45, C<sub>probably</sub> = 0.20. Then

This is an existing category. The multi-page notice board are currently sold in this market at a rate of (N=70,000) units per year. We want to sell this product through a single distributor that accounts for 30% of the sells (A = 0.30). From concept test,

F<sub>definitely</sub> = 0.35, F<sub>probably</sub> = 0.25, C<sub>definitely</sub>= 0.40, C<sub>probably</sub> = 0.30. Then



$$P = 0.40 \times 0.35 + 0.25 \times 0.30 = 0.215$$

$$Q = 70,000 \times 0.30 \times 0.215 = 4515 \text{ units / year}$$

So, the quantity of the product expected to be sold is 4515 units/year.

The primary benefit of the concept test is in getting feedback from real potential customers. The qualities insights gathered through open ended discussions with respondents about the proposed concepts of concept testing. The team benefits from thinking about the impact of the three key variables in the forecasting model:

- The overall size of the market
- The availability and awareness of the product
- The fraction of customer who are likely to purchase

Considering alternative markets for the product can sometimes increase the first factor. The second factor can be increased through distribution arrangements and promotion plans. The third factor can be increased through changes to the product design that improve the attractiveness of the product. In considering these factors a sensitivity analysis can yield useful insights. Finally we

note that experience with a new product is likely to be applicable to future, similar products. The team can benefit from its experience by documenting the results of its concept testing and by attempting to reconcile these results with subsequent observation of product success.



## 9. Economic Analysis for Dual Table Product

This is the most important part for successful product launching and business profit gaining. Here a bill of material has been made and a break-even point has been estimated for our product.

### 9.1. Bill of Materials

Bill of materials consist the list of components, sub-assemblies, assemblies, parts, to produce one unit of the end items or final product. It's one of the three primary inputs of MRP.

Table 8. Bill of Material of Dual Table

Assembled parts	Schematic view	Material	Quantity/unit	Price/quantity	Price/unit
Sliding part		plywood	1	600	600
Base plane		wood	1	800	800
Leg		steel	4	150	600
Roller		steel	2	90	180
Stand		steel	2	50	100
Rubber pad		rubber	4	10	40
Screw		iron alloy	10	1	10
Nutt bolt		iron	4	4	16
Washer		steel	4	0.5	2

Assembly cost = 150 BDT (Bangladeshi Taka)

$$\text{Bill of material} = \begin{pmatrix} 600 + 800 + 600 \\ +180 + 100 + 40 \\ +10 + 16 + 2 + 150 \end{pmatrix} \text{BDT} = 2498 \text{ BDT.}$$

## 9.2. Economic Analysis

Product development teams needed tools to help it make this and other decision. The process of basic cash inflow and outflow are to be estimated for products economic analysis. There is the economic analysis and about break-even point.

Variable cost

Transport cost/100 units- 15000 BDT

Labor cost/100units- 10000 BDT

Total=25000 BDT

Fixed cost

Machining cost 28000 BDT  
 Rental cost 20000BDT

Total=48000 BDT

Per unit cost =  $2498 + (15000/100) + (10000/100)$  BDT  
 = 2748 BDT

Product will be sold in the market = 3435 BDT / unit

Our per unit product cost is 2748 BDT. Our company wants to have 25% profit. For that very reason, the sale price of this product stands 3435 BDT/unit

We know that,

$$Y = mx + c \tag{1}$$

Here,

$m = 2748$  BDT  
 $c = 48000$  BDT

Again,

$$Y = 3435x \tag{2}$$

From equation 1 & 2 we get

$$3435x = 2748x + 48000$$

$$\text{So. } x = 69.87$$

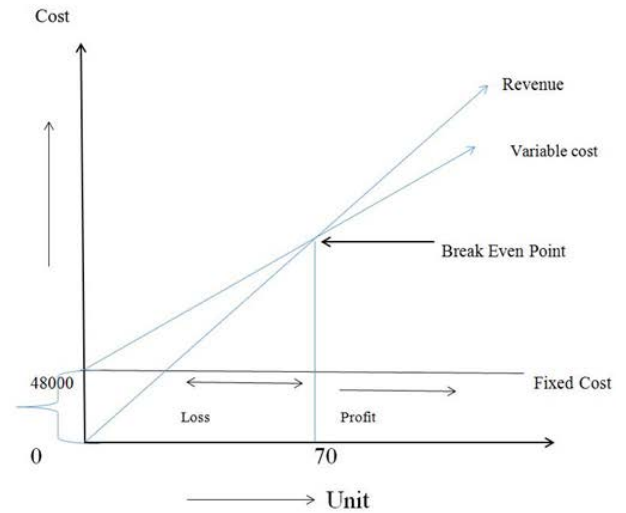
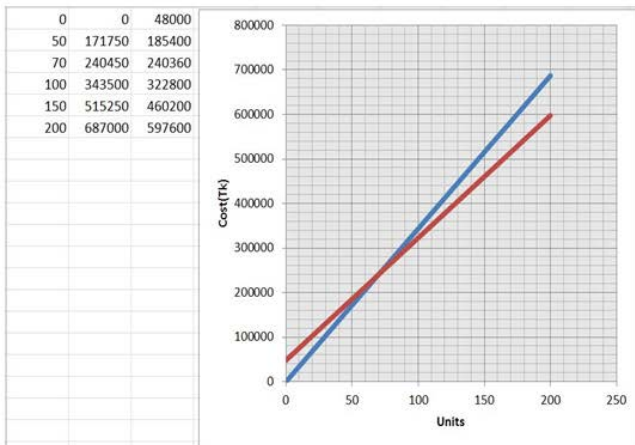


Figure 16. Break-even point of dual table

So, to get profit at least 70 units have to be sold. So every arrangement should be prepared considering these units for choosing 25% profit.

### 10. Conclusion

Product development is a set of activities beginning with the perception of a market opportunity and ending in the production; sale, and delivery of the product. Here we tried to establish a basic production model of dual table in the field of product design and development and tried to propose an optimum economic analysis for launching the product in market.

### Acknowledgement

Product development and launching it in market have become a great problem or challenge in global market. This was actually a heavy tough work for us and we had

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