**Template for Problem Formulation**

**Exercise Activity**

Complete the phase 1 of design process for the below mentioned need statement

**Step1: Identify the stakeholders for the above need statement**

1. Designers : Vinay, Vibhas, Chareesh, Sowmya, Sumehra
2. Clients : SECULET
3. Users : Two-wheeler users.

Team of design engineers acquires information from multiple resources to understand the requirements clearly

**Step2: Interact with clients/ users by asking questions which helps designers to arrive at objectives and functions.**

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| **Questions such as** | **This questions helps the designers to** |
| 1. How costly is the helmet? | **Establishment client’s objectives** |
| 2.How different is your helmet from other helmets? |
| 3.Does it require charging every day? |
| 4.What is the maintenance cost? |
| 5.Does it intrude into my comfort while driving? |
| 6. What is the weight of the helmet? | **Identify constraints** |
| 7. Does the materials used harm my skin? |
| 8. Does it distract my driving? |
| 9. Till which extent can the helmet secure people? | **Establish function** |
| 10. Can we rely on it 100%? |
| 11. Will this helmet cause any damage to the pillion rider? |

**Step 2.2** : Categorize the responces into objectives , constraints and functions .

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| **Responses from clients / users** | **O** | **C** | **F** |
| 1. Helmet should be made from non-toxic materials. | 1 |  |  |
| 1. Helmet should be portable. | 2 |  |  |
| 1. Helmet should not be costly. |  | 3 |  |
| 1. Helmet should not be suffocating. |  | 4 |  |
| 1. Helmet should have a good Fit. |  | 5 |  |
| 1. Helmet Buzzer sound should be tolerable. |  |  | 6 |
| 1. Helmet should be well designed for proper air flow. |  |  | 7 |
| 1. Helmet should be easy to wear and remove. |  |  | 8 |
| 1. Helmet should sustain all temperature conditions |  | 9 |  |
| 1. Helmet should have bearable weight. | 10 |  |  |
| 1. The light should not flash into my eyes. |  | 11 |  |

**Step 2.3 :** Obtain the information through competitive benchmarking to arrive at design requirements.

2.3.1 List historical benchmarks in technology those are associated with the project?

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| In 1914, a British physicist, Eric Gardner, started to see patients with injuries produced by motorcycle accidents. As a consequence of the large number of patients he attended, he got the idea of developing a helmet to cover the head of these reckless riders. |

2.3.2. What are the existing solutions to the problems? (Search through internet, journals patents, books, local shops and online shopping sites etc. Collect information about 4 existing products)

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| YES, there is an existing solution for the above discussed problem. A company called ATLORSMARTHELMET COMPANY which was also featured in a famous show called shark tank India. This company offers Helmet which has functions likes crash detection, Calling to the last numbers in case it detects an Accident and also calling to an nearby hospital. I do agree that this is a very good idea and has Many benefits. |

2.3.3 What is the average cost of the existing products in the market?

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| The average cost of the existing products i.e., a normal helmet is about 1000 -1500.Prices may vary according to the quality of the helmet used. |

2.3.4 What are the design parameters and associated specifications of the existing products.

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| Seculet is a next generation helmet where it has object detecting sensors on the front side of the helmet Which detects any vehicle which comes in the way of the helmet. It is programmed in such a way that it calculates the differences between the two vehicles. For example: If our vehicle is moving at a speed of 70 kmph and the vehicle ahead of us is also cruising at 70 kmph and then suddenly its speed decreases to 30 kmph, a normal human with a naked eye whether the vehicle has slowed down but the sensors detect this speed decrease in the ahead vehicle and it intimates the person riding with a beep and red light as an alert. This alert is placed inside the helmet in such a way that it doesn't distract the rider while riding. By this IDEA we can save many lives. |

**Step 2.4**: **Consolidate the literature survey details and arrive at design requirement.**

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| --- | --- |
| Observation and Literature Survey | Requirements |
| Prevention of accidents due to Seculet. | Most suitable for two-wheeler drivers. |
| Based on safety of the individual | The helmet should be reliable at high speeds |
| Based on the comparison with the existing solution. | The pricing of the helmet should be aggressive so that it attracts many customers. |
| Reduces the accident and death rate in the country. | The helmet should target all classes of people. |

**Step 3: Identify client’s objectives**

**Step 3.1: Prepare a list of design objectives**

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| --- | --- |
| Sl.No. | Objectives |
| 01 | **Helmet should be made from soft and non- toxic metals.** |
| 02 | **Helmet should be made durable to sustain damage at higher speeds.** |
| 03 | **Helmet should contain proper air vents to avoid suffocation and discomfort.** |
| 04 | **Helmet should be easy to carry and portable.** |
| 05 | **Helmet alerts should be placed in such, that it doesn’t distract the rider.** |

**Step 3.2: order the list into sets**

|  |  |  |
| --- | --- | --- |
| **Title:** | | |
| Category 1: SAFETY | Category2: COST | Category3:USER FRIENDLY |
| NON-TOXIC | Inexpensive | Simple in operation |
| GOOD QUALITY | Expensive | Good Quality |
| GOOD AERODYNAMICS | Inexpensive | Air circulation |
| LIGHT WEIGHT | Expensive | Portable |
| PROPER PLACEMENT | Inexpensive | To avoid distraction |

**Step3.3:**

SECULET

COST

SAFETY

USER FRIENDLY

GOOD QUALITY

SIMPLE IN OPERATION

INEXPENSIVE

LESS MAINTENANCE

GOOD QUALITY

NON-TOXIC

**Step 3.4:** Prioritize among various objectives is using a technique called Pair – wise Comparison Chart (PCC)

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| --- | --- | --- | --- | --- |
| **Objectives** | SAFETY | COST | ALERT | SPEED DIFFERNCE |
| SAFETY | 0 | 4 | 3 | 2 |
| COST | 1 | 0 | 2 | 1 |
| ALERT | 2 | 3 | 0 | 4 |
| SPEED DIFFERENCE | 3 | 4 | 1 | 0 |

Rank the objectives in order of decreasing value of importance and the list is

1. SAFETY

2. SPEED DIFFERNCE

3. ALERT

4.COST

*Based on the information gathered through interaction with client, initial survey and completing phase 1.1 the problem statement is formulated as follows*

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| *Problem statement* *version 1.1*  A human’s life is very precious. But in our day-to-day life we see many numbers of accidents which are minor or major and even sometimes lead to death. So, our project need statement is to “To reduce the number of accidents and save the precious lives of humans.” |

**Step 3.5 :** Identify constraints

1. What is the weight of the helmet?

2. Does it distract my driving?

3. Does the materials used harm my skin?

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| *Problem statement* *version 1.2*  There is a need to design a helmet in such a way that its very light in weight and also the materials used in the making doesn’t make affect the human health. The design should be in such a way that it doesn’t affect the drive of the individual. |

**Step 3.6 :** Establish functions

1. Till which extent can the helmet secure people?

2. Can we rely on it 100%?

3. Will the helmet cause any damage to the pillion rider?

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| *Problem statement* *version 1.3*  The helmet should function in a way that it doesn’t cause any damage to the pillion rider. The helmet should be very reliable such that it can withstand any temperatures and conditions. |