IE301 Product Design and innovation
Exercise (2) [Customer needs and product specification]

Identify Customer needs

1- *Translate the following lists of customer statements about a student book bag into proper needs statements. Organize the needs into hierarchy needs and establish the relative importance using Kano Approach.*

> 1- *"See how the leather on the bottom of the bag is all scratched; it's ugly."*
> 2- *"When I'm standing in line at the cashier trying to find my checkbook while balancing my bag on my knee, I feel like a stork."*
> 3- *"This bag is my life; if I lose it I'm in big trouble."*
> 4- *"There's nothing worse than a banana that's been squished by the edge of a textbook."*
> 5- *"I never use both straps on my knapsack; I just sling it over one shoulder."*

2- *Translate the following list of customer statements about a ballpoin pen into customer needs. Organize the needs into hierarchy needs and establish the relative importance using Kano Approach.*

> 1- *I need a pen to be used without interruption while writing*
> 2- *I would like to be able to write in various colors*
> 3- *It need to write different line size*
> 4- *It is nice to use it for long time*
> 5- *I do not want pen ink to smear while writing*
> 6- *I would like to hold pen in pocket*
> 7- *I don't like my pocket smeared while pen is held in my pocket*
> 8- *I would like to hold the pen comfortably*
> 9- *I expect to buy the pen cheaply*
> 10- *It is expected to provide smooth writing*

3- *Using a camera, document user frustration with an everyday task of your own choice. Identify frustrations and difficulties encountered by these people. Identify latent customer needs.*

4- *Choose a product that continually annoys you. Identify the needs the developers of this product missed. Why do you think these needs were not met? Do you think the developers deliberately ignored these needs?*

Product Specifications

5- *Devise a metric and a corresponding test for the need that a roofing material last many years.*

6- *List a set of metrics corresponding to the need that a pen writes smoothly,* [Assuming that smooth writing can be characterized by (1) good line quality, (2) preservation of line quality in the face of changes in the user's writing technique, and (3) ease of use]

7- *Develop the needs- metrics matrix for problems (1 & 2)*

Assignments

Question 1

For the house of quality given the following table:
1. The priority of the engineering characteristics (metrics)
2. Discuss the effect of each metric on the needs

Legend:
△ Weak =1	● Medium =3	O Strong= 9

What's		Degree of Imp. →A	Relative of imp. →A/TA*100	Meet standards	Harness weight	Webbing strength	No. of colors	No. of sizes	Padding thickness	No. of buckles	No. of gear loops	Our Product →B	Product A	Product B	Target new model →C	improved ratio →D=C/B	Strength →E	Absolute Weight →F=A*D*E	Relative Weight →G=F*100
Easy to put on		2						●		O		2	5	4					
Comfortable when hanging		5					●	O	●			4	1	2					
Fits over different clothes		1					●	●	O			5	2	3					
Accessible gear loops		3									O	4	1	3					
Does not restrict movement		5			●			●	O	●		3	4	5					
Light weight		3			O	●			●	△	△	3	5	4					
Safe		5		O	●	O						4	5	4					
Attractive		2			△		O		△	△		2	4	5					

Direction of improvements: (-) (+) (+) (+) (+)

Total, TA

	U1	U2	U3	U4	U5	U6	U7	U8
Organization difficulty (5 difficult- 1 easy)	2	4	3	3	6	2	3	1

Technical Importance →ΣA*r — TT
Relative Importance →Σr/TT*100
Absolute Weight → ΣG*r — TW
Relative Weight →ΣG*r/TW*100

units	U1	U2	U3	U4	U5	U6	U7	U8
Target Value								
Objective Measures Product A	15	18	30	7	18	8	21	30
Objective Measures Product B	12	20	25	9	15	2	22	38

Question 2

For the house of quality given the following table:
1. The priority of the engineering characteristics (metrics)
2. Discuss the effect of each metric on the needs

	Rel. Imp.	Metric 1	Metric 2	Metric 3	Metric 4	Our Product	Product A	Product B	Product C
Need 1	9	●			O	2	3	5	1
Need 2	9		●			3	5	1	4
Need 3	5			O		2	5	3	4
Need 4	3		●			3	3	4	2
Need 5	3	△	O		●	2	2	3	5
Unit		u1	u2	u3	u4				
Target Value									
Objective Meaures Product A		18	8	21	30				
Objective Meaures Product B		13	5	26	32				
Objective Meaures Product C		15	2	22	38				

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Question 3
When QFD is required to be developed for pocketknife, the data in table (3) are considered. Find:
1. The relation between customer needs and engineering metrics.
2. The priority of the engineering characteristics (metrics)
3. Discuss the effect of each metric on the needs

Table (3) QFD Data for pocketknife

Customer data		Competitors data w. r. t. needs		Engineering metrics data
Needs	importance	C1	C2	
Last long time	3	3	2	Number of blades
Has multi function blades	7	5	4	Blade opening force, (gram)
Easy opening of blades	9	4	2	Blade edge thickness (mm)
Has sharp cutting edge	9	2	2	Volume (mm^3)
Compact size	5	1	5	Weight (gram)
Light weight	5	3	3	Center mass location (mm)
Balanced when held	5	2	2	Strength (N/mm^2)
Low cost	3	1	3	Cost (SR)
				Reliability

Question 4
Figure (1) shows a single use camera that can be used by a specific customer base, those who want an inexpensive camera to take pictures at certain occasions that might otherwise be missed. The following are a list of customer statements that were obtained through interviews.
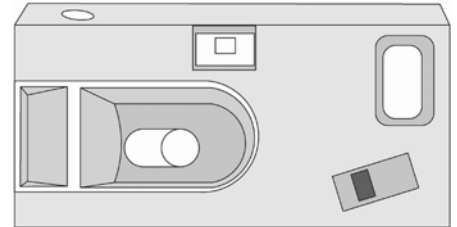

Figure (1): Single-use Camera

Customer Statements
1. I need a camera to take anywhere
2. Sometimes I take picture indoors / outdoors
3. I don't like the edges of the camera
4. It would be nice if the camera would fit in my pocket
5. I need the camera to be light and thin
6. I need to be able to shoot almost anything without adjusting the focus
7. I don't like waiting too long for the flash to recharge
8. I don't like to load/unload films
9. It would be nice if the camera had a strap
10. I expect the camera to be low cost

Requirements
I. Translate customer statements into needs and prioritize these needs.
II. Translate the customer needs into engineering characteristics (metrics).
III. Search for two competitors and find level of satisfying the needs
IV. Develop QFD and discuss the effect of each metrics.

Question 5
For battery operated power screwdriver, develop QFD data. What will be the chosen engineering metrics?