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Design Thinking Model to Find a Cost Effective Alternative for Regular Paper based Decoration Items

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Abstract: Design thinking is a process for solving problems by prioritizing the consumer's needs above all else. It relies on observing, with empathy, how people interact with their environments and employs an iterative, hands-on approach to creating innovative solutions. This paper presents a brief overview of design thinking methodology, its techniques and how it finds application in reducing waste generated by paper based decoration materials like confetti, ribbons, banners, etc. This study contains a survey of 50 college students whose suggestions were heard out to propose a qualitative solution (alternative) to the paper waste incurred by conventional decoration materials. Design thinking technique and a criteria based decision making tool called Pugh matrix were used to arrive at the solution.

Keywords: Design thinking, visualisation, learn launching, storytelling, prototyping, brainstorming, pugh matrix.

I. INTRODUCTION

Celebrations are an inextricable part of our lives. Paper based decoration materials find utility in bedecking the halls housing festivities and celebrations. These materials have a fair share in the total amount of paper produced and paper waste generated. About 68 million trees are cut down every year to manufacture paper and paper products. Paper waste amounts to a substantial percentage of total waste generated every year.

Hence, to find an effective solution to minimise paper product waste and maximise the usage of other substitutes, a design thinking methodology is adopted. The technique entails 4 wh questions, which when answered would certainly yield a fruitful solution. Design Thinking helps us in the process of questioning: questioning the problem, questioning the assumptions, and questioning the implications. It also helps us to:

A. Better understand the unaddressed needs of the stakeholders (customers, clients, students, users, etc)
B. Reduce the risk associated with launching new ideas, products, and services
C. Generate solutions that are revolutionary, not just incremental
D. Learn and iterate faster from past experiences

II. OBJECTIVES

A. To propose a cost-effective alternative to conventional decoration materials used in college symposium.
B. Extrapolating the results to several other instances where paper waste can be minimised or completely eliminated**.**

III. DEFINITION OF DESIGN THINKING

Design thinking is an iterative process used to understand users, question assumptions, redefine problems and develop novel solutions to prototype and test. It relies on the human capability to be intuitive, to discern patterns, and to build ideas that are emotionally meaningful as well as functional. The elements of design thinking combine to form an iterative approach—one we can try out and adjust to suit our needs. Tim Brown, CEO of IDEO defines it as, "Design thinking is a human-centered approach to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success."The heart of design thinking lies in developing an understanding of the people for whom we're designing the products or services. It helps us develop empathy with the target user. Design Thinking is extremely useful in tackling problems that are indistinct or unknown, by re-shaping the problem in human-centric ways, creating many ideas in brainstorming sessions, and adopting a hands-on approach in prototyping and testing. Design Thinking also involves continuous experimentation: sketching, prototyping, testing, and trying out concepts and ideas.

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IV. GUIDING PRINCIPLES OF DESIGN THINKING

1) *Focus on User Outcomes*: Design Thinking concentrates on what actual people want and need, and then relevantly delivers it to them.

Fig. 1 Working principle of design thinking

2) *Learning and Unlearning*: Everything is a prototype in a Design Thinking approach. Which means everything can be improved and altered based on user feedback and past experiences.
3) *Diverse, Empowered Teams*: Diversity is the trump card to powerful innovation. The ability to get a 360° view of a problem and to incorporate the input of all aspects of the team is a key strength of Design Thinking methodology.

V. PHASES OF DESIGN THINKING

According to Liedtka (2014), the design thinking process needs to answer four simple questions — What is? What if? What wows? and What works? — each representing an independent stage of a design experience.

1) *"What is"* refers to the present. This stage provides us with data we can analyse. The core problems are defined and the needs and wants of the stakeholders are identified.
2) *"What if"* develops on the present to envision a new future. This stage involves ideation and contemplation. This is the stage where brainstorming occurs, to delve into possible opportunities/solutions.
3) *"What wows"* helps teams focus on novel solutions. The concepts that 'wow' will be turned into prototypes and tested with actual users.
4) *"What works"* tests viable solutions with users in the real world. The ideas that have passed the previous three stages will now be turned into small-scale prototypes

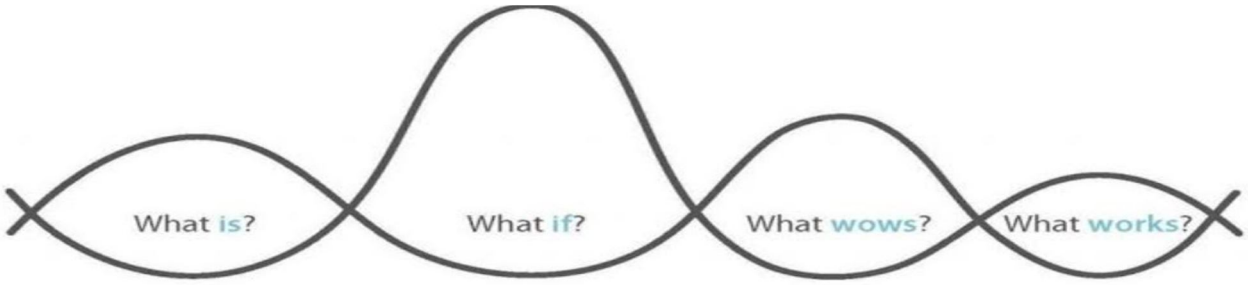

Fig. 2 Four phases of design thinking

VI. DESIGN THINKING TOOLS

A. Visualization is about using images and visual thinking. It impels us beyond using words or language alone. It is a way of unbolting a different part of our brains that permits us to think nonverbally which is often pigeonholed as offbeat.

B. Learning launches are designed to test the prime underlying value-generating assumptions of a possible new-growth initiative in the market space. Opposing a full new-product rollout, a learning launch is a learning experiment conducted swiftly and inexpensively to garner market-driven data.

C. Storytelling is exactly like what it sounds: knitting together a story rather than just making a series of points. It is closely related to visualization, another way to create new ideas, feel original and compelling. Visual storytelling is actually the most intuitive and engaging type of story. All good presentations, whether analytical or design-oriented, narrate a persuasive story.

D. Mind mapping is used to represent how ideas or other items are connected to each other and a central idea. Mind maps are used to generate, structure, visualize and categorise ideas to look for patterns and insights that provide important design criteria. It is done by displaying the data and asking people to group them in ways that would allow themes and patterns to emerge. It must be kept in mind that mind mapping is a team sport.

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VII. BENEFITS OF DESIGN THINKING

A. Offers an opportunity to view a problem from a different perspective
B. Helps in identifying the root cause of the problem
C. Encourages creative thinking and innovative problem solving.
D. Ensures that the final outcome satisfies the objectives and client requirements
E. Provides an effective, informative and enriching learning experience to all those involved in the design experience.
F. Enables the user of the tool to continually expand his/her knowledge.

VIII. APPLICATIONS OF DESIGN THINKING

Design thinking has diverse applications. From sports, education and research to business, management and marketing, design thinking is rampantly used by professionals around the world. Few of the popular applications are:

1) *Business*: Design thinking helps in businesses by enhancing the process of product development, marketing, and renewal of contracts. All these processes need a companywide focus on the customer and hence, design thinking helps in these processes tremendously. Design thinking helps the design thinkers to develop deep empathy for their customers and to provide solutions that match their actual requirements. The solutions are not delivered just for the sake of technology.
2) *Information Technology:* The IT industry makes several products that require trials and proof of concepts. The industry has to empathize with its users and not merely deploy technologies. IT is not only about technology or services, but also the associated processes. The developers, consultants, analysts and managers have to brainstorm on possible ideas for solving the problems of their clients. This is where design thinking comes in handy.
3) *Education:* The education sector can benefit from the design thinking by taking feedback from students on their requirements, goals, impediments and challenges they are facing in the classroom. By working on their feedback, the tutors or instructors can come up with solutions to address their challenges.
4) *Healthcare:* The expenditure on healthcare by the government and the cost of healthcare facilities is soaring day by day. Design thinking can help this sector as well. Experts worldwide are worried about how to deliver quality healthcare to people at affordable cost. When the right set of design thinking tools are deployed, betterment of existing quality is very certain.

IX. DESIGN THINKING METHODOLOGY TO FIND A COST EFFECTIVE SUBSTITUTE FOR REGULAR PAPER BASED DECORATION MATERIALS

1) *Challenge:* Prohibition to use thermocol products, card boards and glittery decorative items in our college's technical symposiums.

Thermocols, card boards, paper charts and fancy decoration items were disallowed due to the following reasons:

a) Redundant rubbish (paper waste)
b) Uneconomical (occupies a portion of budget)
c) Defacement of wall surface (paints and enamel) due to adhesives and sellotapes used for sticking purpose

.

2) *Selection of Appropriate design Thinking Tool*

a) Tool used: visualisation, storytelling and learn launching
b) Why using these tools?

- Visualization and storytelling are used to deliver an intuitive and convincing pitch of the novel idea to the audience (stakeholders).
- Learn launching helps us to infer prospects of further enhancement from experimentation and real time customer centric analysis .

3) *Application of the Tools and Techniques*

Answering the four vital questions of design thinking paradigm:

a) *What is?*

- The problem statement was studied carefully
- The reasons for the ban on the decorative items were appreciated.
- Analysis on the allocated budget for decoration over the years was also made.

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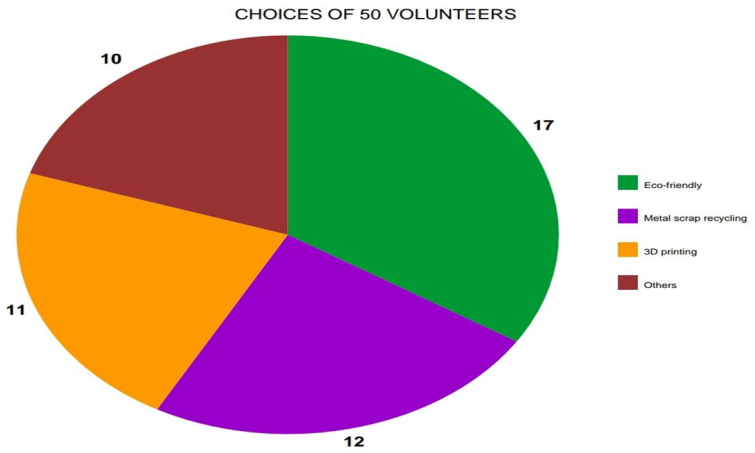
b) What if?

Several alternatives to the showy and glittery paper waste were brainstormed. A online survey form was circulated among 50 volunteers of the symposium and a free wheeling session was conducted to discuss the merits and demerits of the alternatives suggested by the individuals.The top three alternatives suggested were:

- Metal scrap utilisation
- Craft using plant/cloth products
- 3D printed decorative items



Graph 1 Response chart depicting top three choices suggested by volunteers

c) What wows?

To discern the best alternative out of the top 3, a decision making tool called Pugh matrix was used.

The Pugh Matrix or decision matrix is a qualitative technique, which uses criteria scoring to determine which of various potential solutions or alternatives should be chosen.

The following are the steps to create a Pugh matrix:

- Identify the requirement of the user (criteria).
- Develop weights for each of the requirements.
- Generate several viable alternatives for a solution.
- Select one of the alternatives as a baseline.
- Evaluate each alternative against the baseline by ranking it against the criteria.
- Add the values from each alternative, multiplying each value by its weightage.
- The one with the highest score is the desirable alternative or choice in consideration of all criteria.

In our case, the following criteria were chosen to filter out the best solution:

- Cost friendliness
- Eco friendliness
- Available resources and skills required to make the product

Weightage of 50%, 30% and 20% was assigned to eco friendliness, cost friendliness and resource availability respectively.

Matrix diagram (Pugh matrix) was constructed with the aforementioned top three alternatives with 3 as the best rank and 1 as the lowest.

Weightage of criterias:	
Cost	50%
Eco-friendliness	30%
Resources	20%

Fig. 3 Weightage of each criteria

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	CRITERIAS			
Alternatives to paper waste	**Cost**	**Eco-friendliness**	**Resources**	**Total**
Metal crap utilisation	2	2	3	2.2
Biodegradable (plants/fabric)	3	3	2	2.8 ✓
3D printed items	1	1	1	1

Fig. 4 Pugh matrix using top three criteria

Result: Crafting plant and cloth products turned out to be the best alternative with a score of 2.8 and metal scrap utilisation (2.2) immediately followed.

d) What works?

- Visualisation tool was used to prepare a convincing and intuitive presentation to convey the idea to the symposium head and members of the organizing committee.
- The Presentation was made attractive with eye candys and was used to explain the benefits of the new alternative.
- Storytelling tool was used to lure the attention of the decision makers while pitching the idea.

Finally, the idea got approved for a learning launch.
Following the approval, Few small scale plant based decorative items were made and used for many intra-college events and technical workshops (Prototyping)

Fig 5 Tractor using watermelon, strawberries and orranges

Response: The idea was appreciated and acclaimed by the on-lookers and beholders for its the novelty and noble cause, which was to reduce or eliminate paper waste and consequently "save trees"
The pilot initiative was successful and large scale models were made for the following year's symposium for display and decoration.

Fig. 6 Bike using chillies and lemon

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X. CONCLUSION

A. *Insights*

Tangible and intangible benefits of Design thinking model observed and experienced:

1) Brainstorming helps individual team members to ideate and pool their ideas to other members of the team for recommendations and suggestions for improvement.
2) Application of the design thinking tools namely visualization and storytelling were used to elegantly communicate the idea to the control tower.
3) Design thinking on the whole, paved a platform to work synergistically while learning and improving iteratively.
4) The learnings and lessons from one design thinking project can be easily transferred to another.
5) It makes one wear his or her thinking cap. It enables the mind to approach challenging projects with innovation and creativity.

B. *Scope for Extending the Project*

1) More criteria could be introduced which paves path for added creativity
2) Other design thinking tools like mind mapping and learn launching could also be used to leverage the ultimate efficacy of the model.

Design thinking is a powerful process which finds application in a gamut of domains. Problem solving becomes much easier when approached using design thinking principles.

On deliberation, it was decided that, the design thinking approach can possibly be used for the following in-campus challenges in the near future:

- Metal scrap recycling
- Creating a user friendly mobile application for college related feeds
- Increase student participation in inter-college events.

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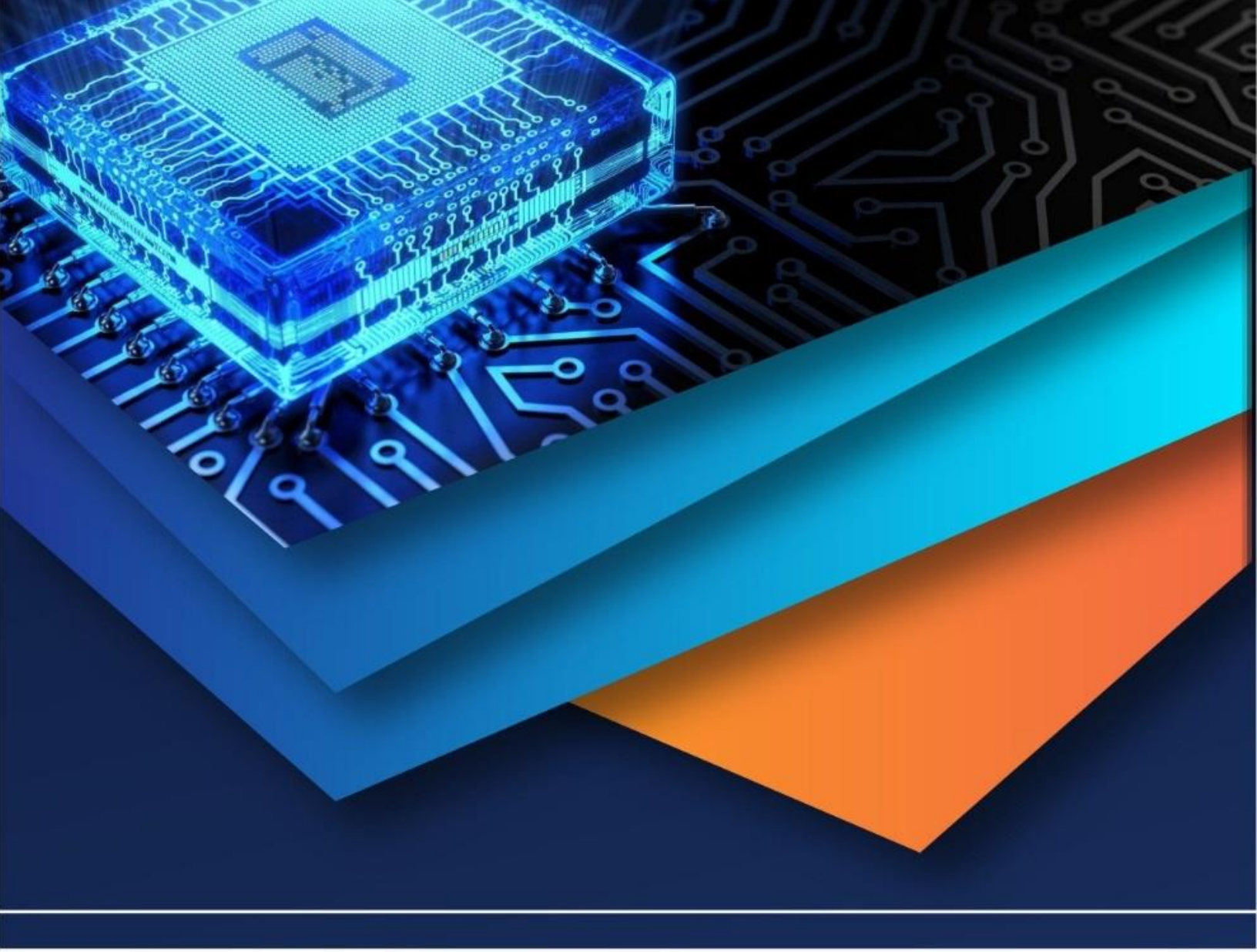

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