

# An Innovative Design of a Multifunctional (Package Drafting Bag) and It's Cost Analysis

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**Abstract** – The main focus of this study was to develop a multifunctional bag and to test its functionality, durability, cost-effectiveness, workmanship and aesthetics – to hold various types of drafting materials commonly used in the industry today, and to help drafting students organize their drawing instruments/materials and hassle-free. The study used the descriptive-normative survey, and the respondents were chosen through the total population of the faculty and students' attendance during the conduct of the study. A pre-survey was conducted to randomly selected drafting students and professionals in order to solicit ideas and suggestions for the design of the proposed drafting bag before the final survey questionnaire was given.

The findings revealed that the developed multifunctional bag met the criteria in terms of functionality, durability, cost-effectiveness, workmanship, and aesthetics as the means all fall above 3.51 level. In the overall aspect, the multifunctional bag was rated very acceptable by the respondents. This means that the multifunctional bag could be used conveniently by drafting students as the course requires lots of tools for freehand and mechanical drawings.

Based on the findings, it was recommended that the drafting department should endorse this innovative tool to the University administration to consider the product of a careful research that could very well meet the accreditation requirements in the area of productions of innovative learning or instructional materials. Drafting students as well should be encouraged to patronize the outcome of the said study.

**Keywords**– Drafting, Multifunctional Drafting bag, Branding and Logo.

## I. INTRODUCTION

The art of good product design is to be passionate about helping people while designing products with superior performance and distinct cultural value. According to Carryology (2011), A bag that “does everything” needs to be well rounded. To him belongs the credit of eliminating discomfort and adding pleasure to backpacking.

Moreover, the schools are the replica of the industries where the actual working environment is simulated. Most schools lack the basic tools or instruments to be used in training the students, especially in the field of drawing while they are in school. Some of the common problems of students who are taking up basic drafting and drafting technology subjects are keeping their materials organized, preventing drafting instruments from getting misplaced or broken, and the additional burden and extra time needed to prepare for school.

Likewise, this study gave the user the comfort and convenience in carrying the tools anywhere with less worry that their tools would be destroyed. In addition, it would be easier to keep them and get them when they are needed.

This study focused to develop a multifunctional bag and to test its functionality, durability, cost-effectiveness, workmanship and aesthetics. A multifunctional structure that will hold various types of drafting materials commonly used in industry.

By this innovation, the “Multifunctional Package Drafting Bag” aimed to help the drafting students organize their drawing instruments/materials and facilitate ease when bringing all these with them since everything could be put in one place. In this way, drafting students would find going to school more comfortable and hassle-free.

## II. RESEARCH QUESTIONS

The study sought to answer the following questions:

1. What is the innovative design of the “Multifunctional Drafting Bag”?
2. What are the requirements of NC 2 in terms of materials for drafting?
3. What is the design of the back pack (multifunctional package drafting bag)?
4. What is the expert's evaluation in terms of functionality, durability, cost-effectiveness, workmanship and aesthetics?

5. What is the branding and logo of the innovated product?

### III. RESEARCH METHODS

This study employed a descriptive-normative survey.

#### 1. Scope and Delimitation

The study was conducted at the University of Science and Technology of Southern Philippines. The researcher used the total population of the drafting faculty and students present during the conduct of the study and obtained a total population of 5 faculties, and 46 students.

#### 2. Data Gathering

The researcher used a researcher-made survey questionnaire “Assessment of Drafting Technology Faculty/Teacher on Multifunctional (Package Drafting Bag)” and “Assessment of Drafting Students on Multifunctional (Package Drafting Bag)” with five sub-constructs namely: functionality, durability in terms of load, cost-effectiveness, workmanship and aesthetics. Experts in the field of drafting were validators of the teacher-made questionnaire.

To answer the research questions, the researcher followed ethical standards in data gathering such as following entry protocol and securing an informed consent form. The respondents were also given freedom to decline in the participation of the study. They were also informed of their rights, non-remuneration, and risks as respondents. The researcher also deleted and shredded the responses after encoding to ensure the confidentiality of the identity of the participants.

Below is the detailed presentation of the procedure in making the “Multifunctional Package Drafting Bag” as well as its cost.

#### 3. Procedure

##### Step 1: Creating Your Design

In creating your design, you need to consider some questions, the answers of which, would guide you in designing your backpack. Designers find this part of the procedure fun. The design should include everything that you want for your backpack. What do you like about other backpacks? (It is acceptable to base your backpack off something you have already seen and then modify it.) What do you not like about other backpacks? (If you hate using zippers, do not design one into your bag.) Do you have a long torso? Do you like a small backpack for essentials, or a big backpack to fit everything?

Personally, it is better to keep the bag simple but gives a specific place for objects that are used daily. For a better picture, empty out your current backpack and examine what you carry and how you might like to accommodate those items. The design of my bag included an internal laptop pocket to hold my laptop and sketch book, with a small zippered pocket for smaller items that need easy

accessibility, like my cellphone and wallet. So, I made sure I would have a secure pocket located on the inside of the top of my bag. This is to facilitate ease in retrieving things without having to dig through my bag, at the same time, keeping them safe from thieves.

Having answered the questions about your ideal backpack, it is time to draw it. You do not have to be an artist to conceptualize the design. The drawing does not need to be perfect, since this drawing is just for you. It is meant to help you understand your design, and work out any potential problems before you start facilitating the transition into pattern making. You might have all sorts of plans about including enough pockets. Drawing would help you realize if you could fit all these components and how they would go together.

##### Step 2: Creating a Pattern

Now that the design is carefully Fig.d out and given ample thought on how it would go together, it is time to translate the drawings into a paper pattern.

This part of the step, as with the rest of the steps, was taken care of by the bag maker since the researcher has no sewing skills. The bag maker first gathered pattern making supplies using the following materials:

- large roll of paper with grid;
- scissors/cutter;
- several markers and pencils of different colors;
- triangle;
- large ruler;
- ruled cutting mat; and
- the sketches.

Then, he started enlarging the flat view drawings he made for each part into patterns. The bag would only be as good as the finished pattern, so he needed to spend time in making a great pattern and saved himself the frustration of mismatching edges and seams later.

##### Step 3: Cutting Fabric

The design and pattern are laid out, and the materials are ready. It is time to start making the bag.

The bag maker spread out the fabric on a large flat surface wrong side up and made sure it was not double layered. He laid the pattern pieces out on the fabric to find the most efficient use of materials and traced around the edges with fabric chalk or something similar.

When you feel you can make the bag yourself, some of these tips could be of help. If you are comfortable with cutting fabric, you can line straight edges up end to end to conserve time cutting, marking and materials. Be careful that you do not cut exactly along the line, or you might mess up one of the pieces on either side. Using a straight edge when cutting with a rotary cutter can help avoid this situation. But a straight edge would not help you when cutting your fabric with scissors. Cut out all the necessary pieces. After the foam is cut out, if you have not considered it already, it is time to design your back pad details.

##### Step 4: Sewing

The bag maker started sewing the backpack by preparing the cutting fabric. This included a basting stitch

(a loose stitch used to tack pieces of fabric together that is not structural that knotting the ends is not needed) to hold together the lining and outer fabric. He then added darts to give the pouches dimension, and binding tape to finish the edges and increase durability. Finally, he attached the velcro for closures.

#### Materials and Cost

Description	Unit & Quantity	Price
Total		
Monteflex (blue)	¾ m 170/meter	127.50
Polyfine (blue)	¾m 62/meter	46.50
N.D Strap (blue)	2m	1122
Magic Tape (black)	½ m- 1”	2020
Adjuster (black)	6 pcs- 1 ½ “	4 24
Slider#8 Nickel (black)	4 pcs- # 85	20
Styrofill Bare	1/2m	4020
Labor and Other Expenses		370
Total Cost		650

## IV. PRESENTATION OF FINDINGS

Problem 1: What is the innovative design of the “Multifunctional Drafting Bag”?

What is new about this Multifunctional Drafting Bag is that it had different compartments allocated for specific drafting materials that are used by drafting students at school. Not only that, this bag could also be useful to keep all the school materials. The ideal bag has pockets for organizing the smaller items like pens and easy access to a camera or other things needed on the go. These features were incorporated in the innovative bag in addition to a square shape pocket or compartment which is perfect for A3 and A4 documents, and preferably a strap or other mechanism to carry rolled drawings, too. Likewise, this bag would give the user the comfort and convenience in carrying the tools anywhere with less worry that their tools would be destroyed. In addition, it would be easier to keep them and get them when they are needed.

Problem 2: What are the requirements of NC 2 in terms of materials for drafting?

Most architectural drafting works generally consist of freehand and mechanical drawings. As such, the learner must know how to plan and prepare carefully all drafting tools, materials, and equipment needed for the required work or job. These tools include drawing pencil, mechanical pencil, erasing shield, protractor, triangular scale, French curve, T-square parallel rule, triangle drawing paper, tracing paper, masking tape, eraser, sandpaper block. With the use of this multifunctional bag, learners would find it convenient since the bag provided ample compartments designed for the above-mentioned materials.

Problem 3. What is the design of the back pack bag (multifunctional package drafting)?

Generally, the design of back packs is often made of canvas or nylon to be carried on one’s back, and is sometimes supported on a lightweight frame strapped to the body, but this multifunctional package drafting bag used polyfine fabric as it was coated waterproof poly cotton fabric that prevented the materials inside this bag from getting easily damaged.

The following are the features and description of the proposed “Multifunctional Package Drafting Bag”:

1. Pocket for T-square. This pocket will hold the T-square securely. It is of dimension which will fit the 24-inch T-square.
2. Pocket for A3 paper. This pocket is provided to secure the A3 paper in the bag for convenience to the user.
3. Pocket for Triangles. This is intended to secure the triangles in the bag to prevent from being broken.
4. Compartment for Bond Papers. This is intended to secure the bond papers so that they will not be damaged against unnecessary folding.
5. Laptop Compartment. The bag will be provided with a sleeve for the laptop to prevent it from coming in contact with dust or debris and minor knocks and bumps.
6. Pencils/ Technical Pens Compartment. This compartment is to secure the pens used for drawing.

#### Design of the Multifunctional Package Drafting Bag 3D Design of the Bag

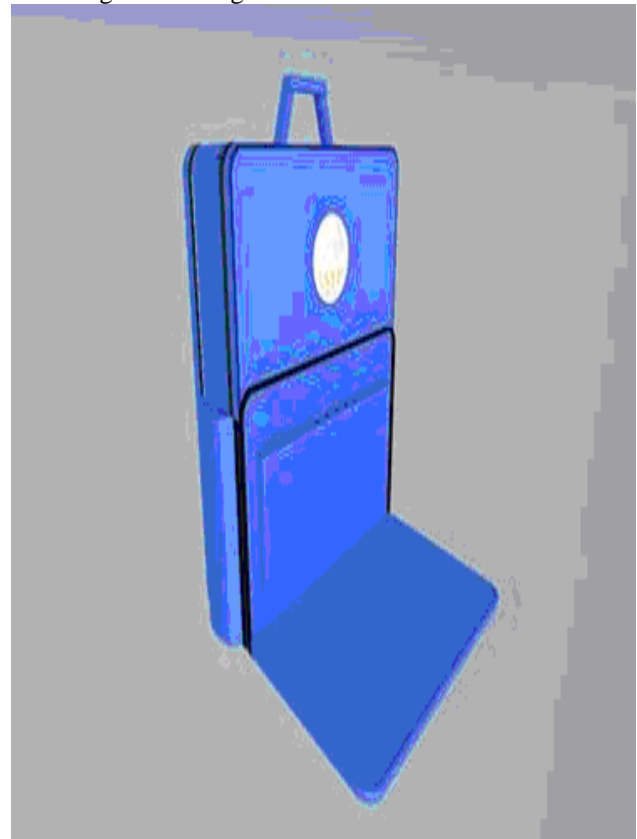


Fig.1. The inner front view of the bag.



Fig.2. The front and side view of the bag.



Fig. 3. The finished product of the multifunctional bag.

#### 2D Design Of The Bag

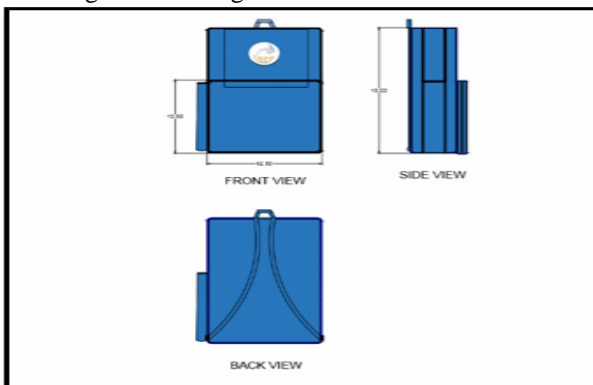


Fig. 4. The views of the bag and its dimensions.

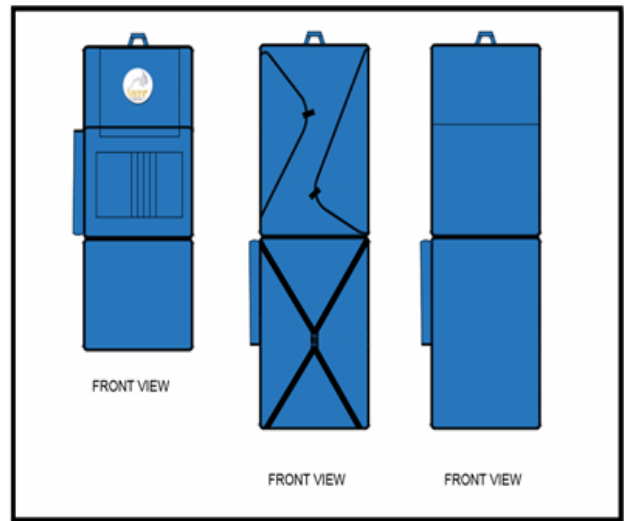


Fig.5. The views of the bag.  
(Front, Inner and Back view)

#### Materials Used in Fabrication



Fig.6.Polyfine to support the cloth needed to make it more durable.



Fig.7. Slider # 8 for the opening and closing of the bag.



Fig.8. Adjuster Buckle for single lock adjustment and for fastening.



Fig.11. Magic tape use to attached things.



Fig. 9. Styrofill to support the cloth needed for the laptop case.

### The Process of Making the Multifunctional Drafting Bag



Fig.10. Monteflex cloth used in the making of the innovative bag.



Fig.12. The bag maker sewing the bag.

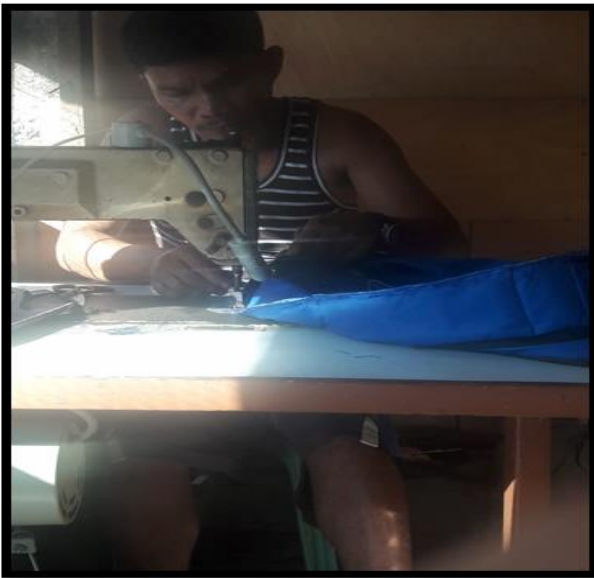


Fig.13. The bag maker sewing the inner side of the bag to make it more durable.

Problem 4. What is the expert's evaluation in terms of functionality, durability, cost effectiveness, workmanship and aesthetics?

Table –I:

Mean Level of Experts Evaluation in Terms of Functionality of an Innovative Design of a Multifunctional Package Drafting Bag

Indicators	Mean	SD	Descriptive Level
1. The multi-purpose bag is good to be used daily.	3.62	0.530	Very Acceptable
2. The bag straps are proportional and balanced.	3.67	0.474	Very Acceptable
3. Items such as laptop, /netbook, pencils, pens, eraser, triangles and other drawing materials can be kept orderly inside each compartment of the bag.	3.79	0.412	Very Acceptable
4. The multi-purpose bag compartments provide safety	3.79	0.458	Very Acceptable

and comfort to drawing materials and laptop.			
<b>Overall</b>	<b>3.72</b>	<b>0.469</b>	<b>VERY ACCEPTABLE</b>

Legend: Mean Level Descriptive Level

3.51– 4.00 Very Acceptable

2.51 – 3.50 Acceptable

1.51 – 2.50 Fairly Acceptable

0.00 – 1.50 Not Acceptable

Table 1 shows the mean level of expert's evaluation in terms of functionality of an innovative design of a multifunctional package drafting bag. Overall, the functionality of the innovative design of a multifunctional package drafting bag was very acceptable as indicated by the overall mean of 3.72 and standard deviation of 0.469.

In particular, they strongly agreed that the multi-purpose bag was good for daily use; the bag straps were proportional and balanced; the items such as laptop, /netbook, pencils, pens, eraser, triangles and other drawing materials could be kept orderly inside each compartment of the bag, and the multi-purpose bag compartments kept the drawing materials safe, and the laptop secured. This means that the multipurpose bag was very functional in all aspects.

Table –II:

Mean Level of Experts Evaluation in Terms of Durability in Terms of Load of an Innovative Design of a Multifunctional Package Drafting Bag

Indicators	Mean	SD	Descriptive Level
1. The multi-purpose bag can carry drawing tools such as pencil, Technical and Mechanical pens, eraser, drawing paper, triangles, drawing Board, T-square and laptop.	3.62	0.566	Very Acceptable
2. The multi-purpose bag drawing board has a strong and lightweight material that cannot easily be damaged.	3.62	0.631	Very Acceptable
3. The multi-	3.67	0.585	Very Acceptable

purpose bag have fixed compartment for drawing materials safety.			
4. The multi-purpose bag shoulder strap are well-threaded and strong that can carry all the drawing materials.	3.62	0.631	Very Acceptable
<b>Overall</b>	<b>3.72</b>	<b>0.603</b>	<b>VERY ACCEPTABLE</b>

Legend: **Mean Level**    **Descriptive Level**  
 3.51– 4.00    Very Acceptable  
 2.51 – 3.50    Acceptable  
 1.51 – 2.50    Fairly Acceptable  
 0.00 – 1.50    Not Acceptable

Table 2 shows the mean level of experts' evaluation in terms of durability in terms of load of an innovative design of a multifunctional package drafting bag. Overall, the durability in terms of load of an innovative design of a multifunctional package drafting bag was rated as very acceptable by the respondents as indicated by the overall mean of 3.72 and standard deviation of 0.603. In particular, they strongly agreed that the multi-purpose bag could carry drawing tools such as pencil, Technical and Mechanical pens, eraser, drawing paper, triangles, drawing Board, T-square and laptop; it has a strong and lightweight material that could not easily be damaged; it had fixed compartment for safety of drawing materials, and the multi-purpose bag shoulder strap were well-threaded and strong that could carry all the drawing materials. This means that the multi-purpose bag was very durable.

Table –III:  
 Mean Level of Experts Evaluation in Terms of Cost-effectiveness of an Innovative Design of a Multifunctional Package Drafting Bag

Indicators	Mean	SD	Descriptive Level
1. The multi-purpose bag is cheaper than the other bags.	2.94	0.802	Acceptable
2. The multi-purpose bag fits within our budget.	2.98	0.828	Acceptable
3. As a multi-purpose bag user I am satisfied of its cost.	3.08	0.763	Acceptable
4. As a multi-purpose bag user	3.58	0.637	Very Acceptable

I am satisfied with the features and benefits of the (product) bag.			
<b>Overall</b>	<b>3.14</b>	<b>0.756</b>	<b>ACCEPTABLE</b>

Legend: **Mean Level**    **Descriptive Level**  
 3.51– 4.00    Very Acceptable  
 2.51 – 3.50    Acceptable  
 1.51 – 2.50    Fairly Acceptable  
 0.00 – 1.50    Not Acceptable

Table 3 shows the mean level of experts' evaluation in terms of cost-effectiveness of an innovative design of a multifunctional package drafting bag. Overall, the cost-effectiveness of the multifunctional package drafting bag was acceptable for the respondents as indicated by the overall mean of 3.14 and standard deviation of 0.756. In particular, they strongly agreed that as a user of the bag they were satisfied with the features and benefits of the (product) bag and agreed that the multi-purpose bag is cheaper than the other bags, fit within their budget and was satisfied with its cost. This means that the multifunctional package drafting bag was cost-effective.

Table –IV:

Mean Level of Experts Evaluation in Terms of Workmanship of an Innovative Design of a Multifunctional Package Drafting Bag

Indicators	Mean	SD	Descriptive Level
1. The multi-purpose bag accomplishes all the things needed for school.	3.62	0.530	Very Acceptable
2. The multi-purpose bag helps us in organizing our drawing materials.	3.75	0.480	Very Acceptable
3. The bag is very useful and it can carry all the things needed in school.	3.81	0.398	Very Acceptable
4. As a multi-purpose bag user I am comfortable using it every time I have to bring all my drafting materials	3.71	0.536	Very Acceptable
<b>Overall</b>	<b>3.72</b>	<b>0.486</b>	<b>VERY ACCEPTABLE</b>

Legend: Mean Level Descriptive Level

3.51– 4.00 Very Acceptable

2.51 – 3.50 Acceptable

1.51 – 2.50 Fairly Acceptable

0.00 – 1.50 Not Acceptable

Table 4 shows the mean level of experts' evaluation in terms of workmanship of an innovative design of a multifunctional package drafting bag. Overall, the workmanship aspect of the multifunctional package drafting bag was rated very acceptable as indicated by the overall mean of 3.72 and standard deviation of 0.486. In particular, they strongly agreed that the multi-purpose bag accomplishes all the things needed for school, help in organizing drawing materials, very useful and it can carry all the things needed in school and the users are very comfortable using it every time they have to bring all their drafting materials. This means that the workmanship of the multi-purpose bag was indeed highly acceptable to the taste of the raters.

Table –V:

Mean Level of Experts Evaluation in Terms of Aesthetics of an Innovative Design of a Multifunctional Package Drafting Bag

Indicators	Mean	SD	Descriptive Level
1. The multi-purpose bag has a perfect size and weight for everyday use.	3.60	0.603	Very Acceptable
2. The multi-purpose bag reduces difficulties in carrying our things.	3.69	0.544	Very Acceptable
3. Equipped with a large inside compartment it easily fits all the everyday items along with a laptop.	3.77	0.469	Very Acceptable
4. As a multi-purpose bag user I will recommend this bag to other drafting students.	3.73	0.528	Very Acceptable
<b>Overall</b>	<b>3.70</b>	<b>0.536</b>	<b>VERY ACCEPTABLE</b>

Legend: Mean Level Descriptive Level

3.51– 4.00 Very Acceptable

2.51 – 3.50 Acceptable

1.51 – 2.50 Fairly Acceptable

0.00 – 1.50 Not Acceptable

Table 5 shows the mean level of experts' evaluation in terms of aesthetics of an innovative design of a multifunctional package drafting bag. Overall, the aesthetic value of the multifunctional package drafting bag was very acceptable as indicated by the overall mean of 3.70 and standard deviation of 0.536. In particular, the experts strongly agreed that the multi-purpose bag had a perfect size and weight for everyday use; reduced difficulties in carrying the things; was equipped with a large inside compartment that it could easily fit all everyday items along with a laptop, and users would definitely recommend this bag to other drafting students.

Problem 5: What is the branding and logo of the innovated product?

Branding and logo is promoting a product or service by identifying it with a particular brand. The brand perceives emotional corporate image as a whole and the logo identifies its simplest form via the use of a mark or an icon. People can instantly connect the brand when they see the logo; that is why the logo is there so that people can easily identify what particular school the students come from. To conclude, a logo by itself is a graphic element that represents the brand, while a brand is a combination of all tangible and intangible aspects that represent the organization.

Shown below is the finished multifunctional package drafting bag.



Fig. 14. The inner side of the bag with compartment intended for flat drafting instruments.

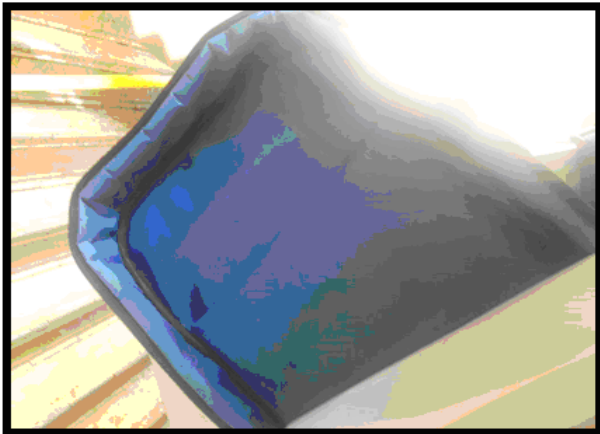


Fig. 14. The inner side of the bag with compartment intended for laptop.



Fig. 15. The final product. (The multifunctional Package Drafting Bag.

## V. CONCLUSION

This study observed the process of developing a multifunctional drafting bag to test its functionality, durability, cost-effectiveness, workmanship and aesthetics to hold various types of drafting materials commonly used in industry.

The research aimed to help the drafting students organize their drawing instruments/materials and to facilitate ease when bringing all these with them since everything could fit into the “Multifunctional Package Drafting Bag.”

The data obtained concluded that experts’ evaluation of a multifunctional package drafting bag was very acceptable in terms of functionality, durability, cost-effectiveness, workmanship, and aesthetics due to its unique features which included safety of drawing materials, laptop and the like as well as providing comfort to the user.

## APPENDIX

## VI. ACKNOWLEDGMENT

This thesis would not have been fulfilled if not for the kind support and help of many individuals.

First and foremost, I would like to thank God Almighty for giving me the strength, knowledge, ability and opportunity to undertake this research study and to persevere and complete it satisfactorily. Without his blessing and rocky road of challenges that really make me strong this achievement would not have been possible.

In my journey towards this degree, I have found a friend, a teacher, inspiration a motivation and a pillar of support: I would like to express my sincere gratitude to my adviser Prof. Hazel G. Castro for the continuous support, for her patience, motivation, enthusiasm, and immense knowledge. Her guidance helped me in all the time of research and writing of this thesis.

Besides my adviser, I would like to thank the rest of my panel members: Prof. Ronald T. Avelino, Dr. Oliva Canencia, Dr. Alenogines San Diego and Prof. Nivea Louwah D. Sermona, for their time, genuine advice as well as constructive comments, suggestions and recommendations, this contributed much to the fulfillment of this research.

My sincere thanks also goes to Dr. Gibson Jun Valenzona, Dr. Jan Vincent Saracanlao and Dr. Sofia Naelga for their insights, motivation, and encouragement and for enlightening me in the first glance of my research. To Dr. Dennis Roble, whose statistical expertise was invaluable during the analysis and interpretation of the data that has been collected.

To Maam Anabelle Dumaog for her valuable time as well as her contributions regarding the improvement of the study.

To sir Nestor and family for the support and encouragement.

To my MTTE friends and classmates for always being there when I need help most especially to my best friend Sarah.

To the respondents of the study, for their willingness and cooperation in answering the questionnaire despite of their tight schedules; and

Last but not the least, I would like to thank my family Mama Eling and Papa Gerry (in heaven for always guiding me) my sister Adis and my brother in law Kuya Valking for all the support, encouragement and your prayers for me to finish.

May the Almighty God richly bless all of you.

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