

SCHOOL OF ARCHITECTURE, BUILDING & DESIGN

Centre for Modern Architecture Studies in Southeast Asia (MASSA)

Bachelor of Science (Honours) (Architecture)

ENVIRONMENTAL SUSTAINABLE DESIGN (ARC 1413/1412)

Tutor:

Mr. Sivaraman Kuppusamy

Group Members:

Teh Xue Kai	0317021
How Pei Ngoh	0316929
Lucas Wong Kok Hoe	0309421
Yang Ge Shen	0315960
Yeow Yi Chuan	0317576
Yii Hong Gin	0316120
Sumitchai Thamdee	0310892
Wong Kah Voon	0317510
Ibrahim Adnan	0314694
Chia Wei Pink	0316971

Content

Introduction of the organisation	1
• Background	
• Exact needs stated by Mrs. Yoges (owner of Philea’s home)	
Project Statement	1
Project Objectives	2
Proposal	2
Reasoning of selected project	2
Duration of Project	2
Service Site	2
Beneficial Party	2
Task Delegation	3
Schematic drawings and information of sponsors	4
• Furniture 1 : RECYCLED TYRE CHAIR	4
• Furniture 2 : WOOD PALLET BENCH	5
• Furniture 3 : WOODEN ROLL TABLE	6
• Furniture 4 : Tea Table	7
• Furniture 5 : CONTAINER SHELF	8
• Furniture 6 and 7 : SHOE RACK I & II	9
• Additional Programme I (Origami Lesson)	10
• Additional Programme II (Renew old furniture)	11
• Additional Programme III (Baking Cookies)	12
Financial Statement	13
Sustainable and Environmental Strategies Adopted	14
Life Cycle Assessment(LCA)	14
• Cradle-to-grave approach for analysing industrial system	14
• LCA of Wood Pallet	15
• LCA of PolyVinyl Chloride(PVC)	16
Conclusion	17

Environmental Sustainable Design Project 1: Paying it Forward

Proposed Project:

Improve the living conditions of orphans in Philea Home by creating more useful space and multi-functional furniture.

Introduction of the organisation

Organisation name: Philea Home

Contact person: Mrs. Yoges Muthu

Email: philea_04@yahoo.com

Contact number: +603 3290 2830

Fax number: +6012 342 3072 (Yoges)

Address: 6, Jalan Harapan 5C/KU7, Sungai Kapar Indah, 42200 Kapar, Selangor.

Reference: <http://www.hati.my/children/philea-home/>

Background:

Philea Home is an orphanage home organised by Mr. and Mrs. Yoges, it is registered with the State Welfare Department in Klang. Philea Home is a Children's Home that provides suitable environment, support and upbringing for children who have been homeless and abused physically, spiritually and emotionally. Mr. and Mrs. Yoges have been collecting foods, school supplies and daily necessities for orphans for more than 10 years. They receive donations from many sources occasionally. Despite donations, other source of income is sale of homemade cookies. However, cookies business runs on festive seasons only, so thus income is not so reliable.

Exact needs stated by Mrs. Yoges:

1. A cupboard with doors to store cookies.
2. Repair 2 cupboards with dropped partition board and 1 cabinet with broken door.
3. A children playing area with construction toys(not "Lego" but any economic brand)

Project Statement:

1. 14 orphans live in a double-storey terrace house have limited tidy space and furniture, daily activities and personal storage.
2. To safety concern, cupboards with missing partition and cabinet with broken door are dangerous to be used.
3. Children have active imaginations and are constantly exploring, they need a space for them to express and develop. Colours stimulate children's mind and create a vibrant learning atmosphere.
4. By selling cookies and cupcakes made by orphans, we raise students' awareness towards orphanage home. In the process of making pastries, we get to interact with orphans and understand their needs more.

Project Objectives:

Achieved all listed below without spending a single cent

1. Build a cupboard, shoe rack from low cost and recycle materials.
2. Repair broken furniture.
3. Create a children playing area filled with construction toys, some colourful chairs and a table.
4. One-time fund raising by selling packed cookies and cupcakes decorated with icing around campus.

Proposal:

Focusing on the problems the orphans are facing: having limited space for activities, limited storage space, using broken cupboards and lack of entertainment. Solution planned is to create multi-functional furniture that saves space and could store things. Minor repairs on broken cupboards and cabinet will be done. Also, a children playing area with colourful table and chairs will be created. Children playing area is decided to be at a corner and not too big so it doesn't add to the problem of having limited space.

Reasoning of selected project:

In the aspect of environmental sustainability in architecture, we know that architecture is not designing amazing buildings, but creating buildings that don't give burden to our environment and it's what makes buildings more amazing. Relate this to our project, we got an output which is we could use recycle material to create something that is functional yet in aesthetic point of view, nothing is being compromised. We use our architecture knowledge on anthropometry and ideas on environmental sustainability to help the orphans who have limited space to use. Multi-functional furniture are created and it leaves extra space in interior for activities. Through this, we are actually teaching them an adaptation method to the problem, this is something they learn that they could apply in everyday life, but not just for this particular problem. Ergo, our project is not a one-time project but one that teach a skill, its impact lasts.

Duration of Project:

A month and a half, thrice a week, 3 hours each time.

Service Site:

Preparation- Yeow Yi Chuan's house, Puchong.

Assembly- Philea Home, Kapar.

Beneficial Party:

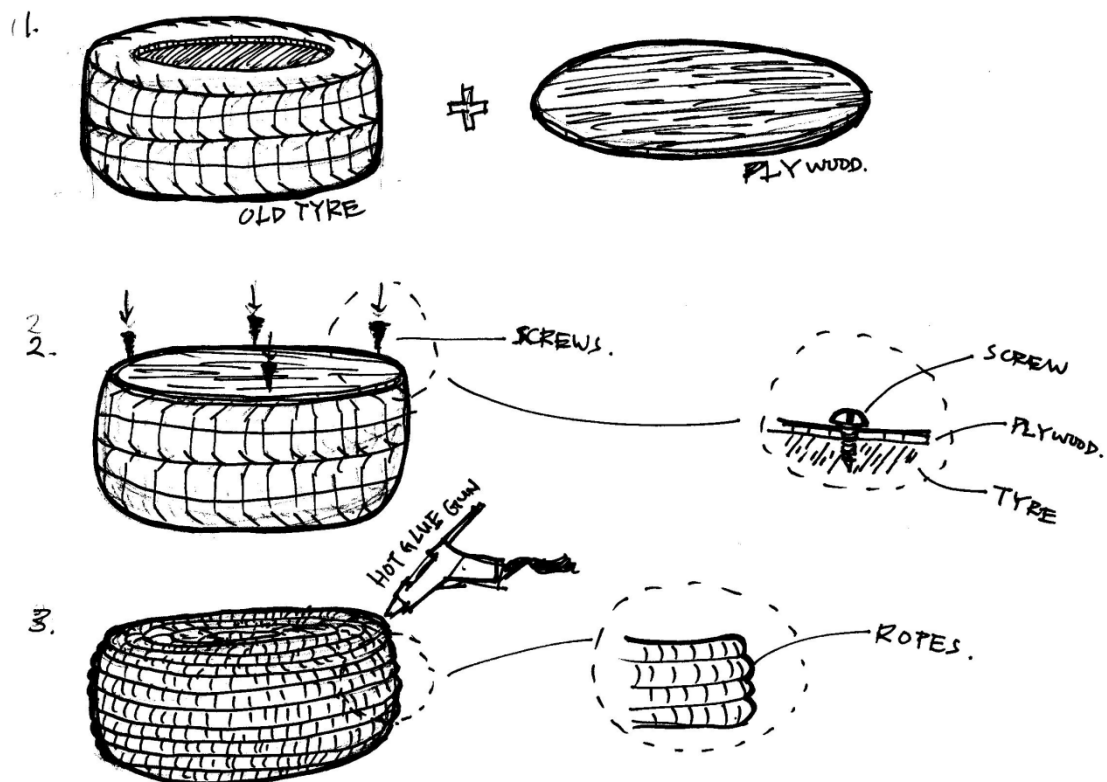
Mr. and Mrs. Yoges and the orphans.

Task Delegation:

1.Wong Kah Voon	<ul style="list-style-type: none">• Contact sponsor• Repainting old furniture• Assembling (Tyre chair)• Interview
2. Adnan Ibrahim	<ul style="list-style-type: none">• Repaint old furniture• logistic• Assembling (Wood pallet bench)• Measuring (Wood pallet bench)
3.How Pei Ngoh	<ul style="list-style-type: none">• Look for sponsor• Repainting old furniture• Assembling (Tyre Chair)• Packaging cookies
4.Yeow Yi Chuan	<ul style="list-style-type: none">• Look for sponsor• Collect material• Designing (Container Shelf)• Assembling (Container Shelf)
5.Yii Hong Gin	<ul style="list-style-type: none">• Repainting old furniture• Collecting material• Designing (Tea Table)• Assembling (Tea Table)
6. Teh Xue Kai	<ul style="list-style-type: none">• Logistic• Designing (Wooden Roll Table)• Assembling (Wooden Roll Table)• Baking cookies
7.Lucas Wong Kok Hoe	<ul style="list-style-type: none">• Origami lesson• Collecting material• Designing (Shoe Rack)• Measuring (Shoe Rack)
8.Yang Ge Shen	<ul style="list-style-type: none">• Collecting material• Logistic• Measuring (Container Shelf)• Assembling (Container Shelf)
9.Chia Wei Pink	<ul style="list-style-type: none">• Contact sponsor• Collecting material• Designing (Tyre Chair)• Assembling (Shoe Rack)
10.Sumitchai Thamdee	<ul style="list-style-type: none">• Collect material• Measuring (Tea Table)• Assembling (Wood Pallet Bench)• Packaging cookies

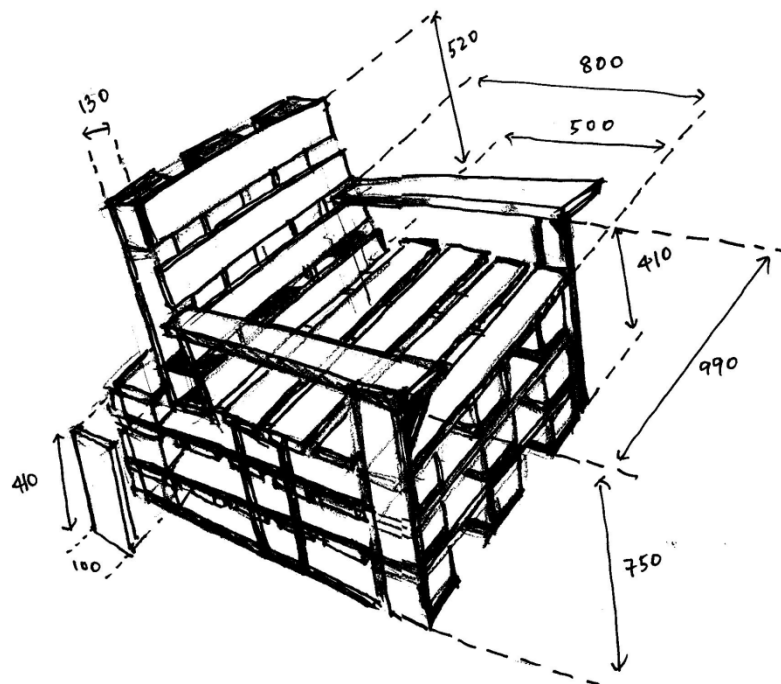
Schematic drawings and information of sponsors

Furniture 1 : RECYCLED TYRE CHAIR



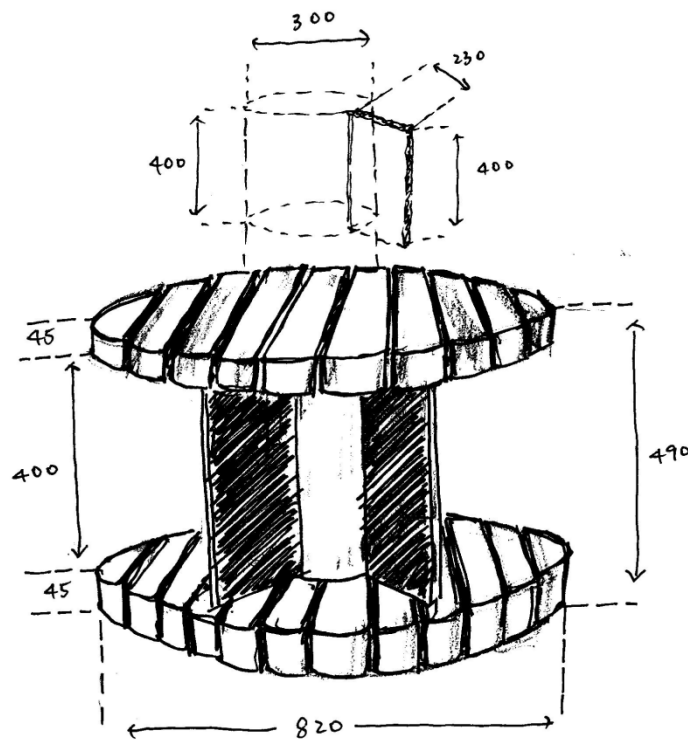
Sponsored material	Material	Quantity
	<ul style="list-style-type: none"> • Old tyres • Rope (200m) 	4 1
Sponsored by	Top Slings Trading SDN.BHD	
Address	LOT 11071 & 11072, Batu 3 1/3 Jalan Kampung Jalan, 41000 Klang, Selangor	
Tel	0351623095/1533/1535	
Total cost + Budgets	RM 0	

Furniture 2 : WOOD PALLET BENCH



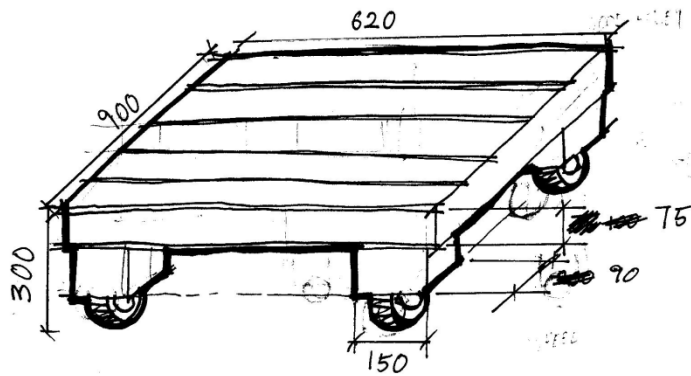
Sponsor material	Material		Quantity
	• Box of nails		1
	• Block of wood		10
	• Imported high quality wood pallets		6
Sponsored by	Guan Joo Hin Hardware SDN.BHD	Kah Ban Trading SDN.BHD	
Address	KM 274, Batu 13 ¾ , Jalan Kelemak, 78000 Alor Gajah, Melaka	No.21, Jalan Songket, Taman Maznah Batu 3 ¾ , Kampung Jawa, 41300 Klang, Selangor	
Tel	06-5561619 / 06-5561669	03-33731390/91	
Total cost + Budgets	RM 0		

Furniture 3 : WOODEN ROLL TABLE

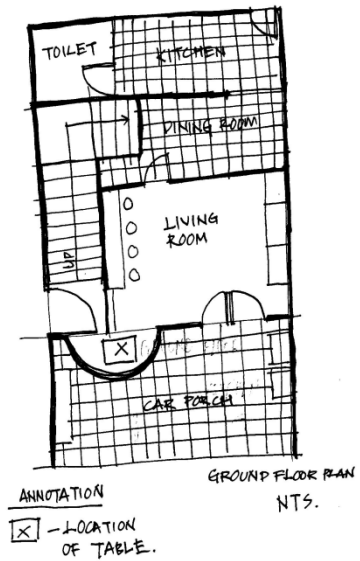


Sponsored material	Material	Quantity
	<ul style="list-style-type: none"> • Wooden roll (20 Ft) • White paint • Sand paper (a range of different roughness), 	1 1 3
Sponsored by	Top Slings Trading SDN.BHD	
Address	LOT 11071 & 11072, Batu 3 1/3 Jalan Kampung Jalan, 41000 Klang, Selangor	
Tel	0351623095/1533/1535	
Total cost + Budgets	RM 0	

Furniture 4 : Tea Table



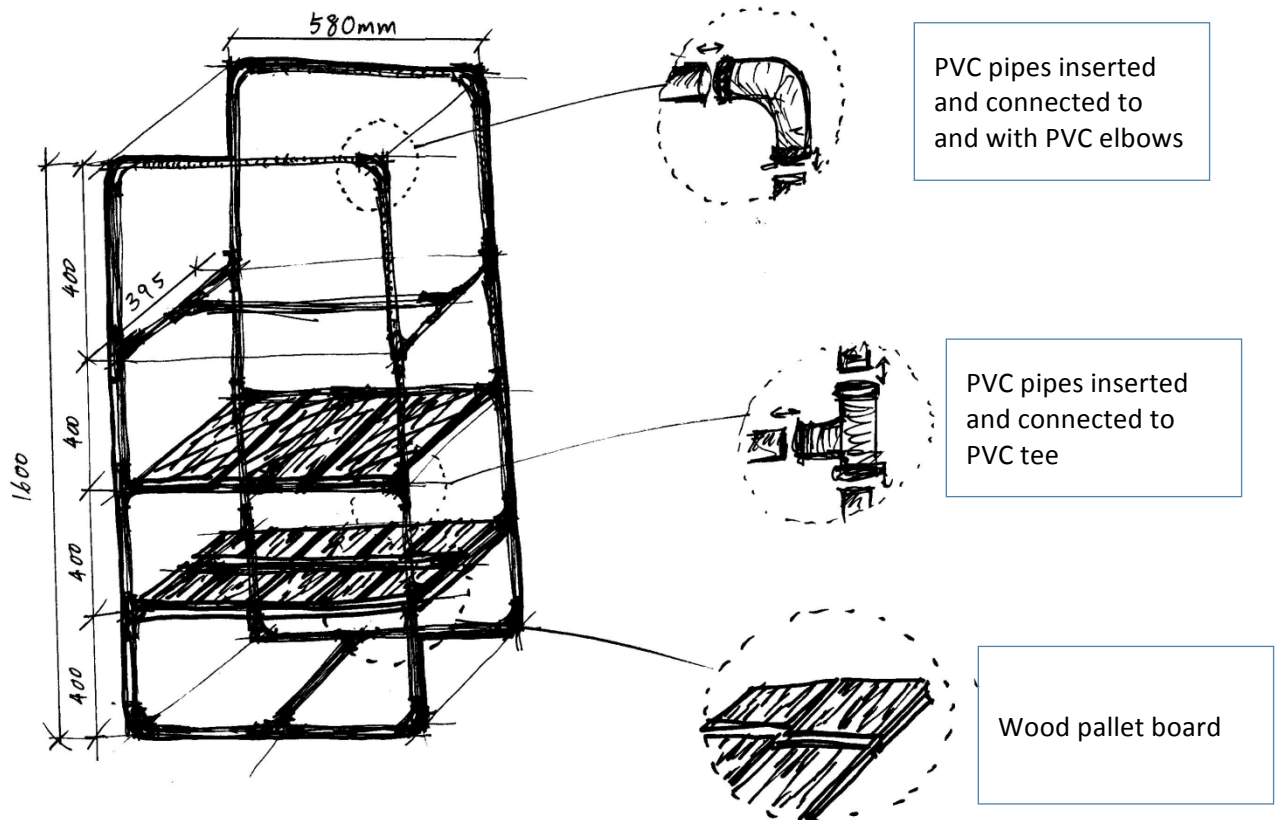
Sketch of children's table



Location of Children's table

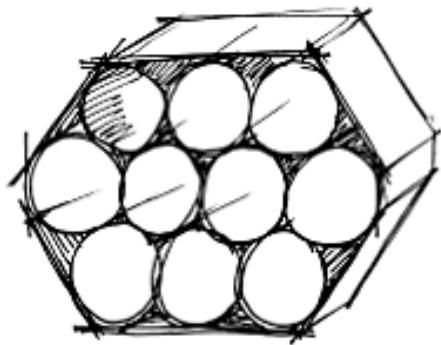
Sponsored material	Material	Quantity
	<ul style="list-style-type: none"> • Wood Pallet • Wheels • Undercoat • White paint • Box of nails 	1 4 1 1 1
Sponsored by	Guan Joo Hin Hardware SDN.BHD	
Address	KM 274, Batu 13 ¾, Jalan Kelemak, 78000 Alor Gajah, Melaka	
Tel	06-5561619 / 06-5561669	
Total cost + Budgets	RM 0	

Furniture 5 : CONTAINER SHELF

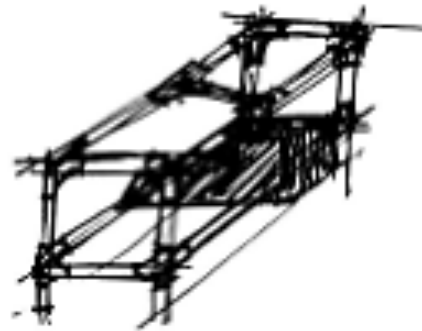


Sponsored material	Material	Quantity
	<ul style="list-style-type: none"> PVC pipes PVC elbow PVC T PVC glue Pallet board 	4 8 12 1 4
Sponsored by	Yong Hardware Trading SDN.BHD	
Address	Lot 1402E, Batu 6 ½ , Jalan Puchong, 58200 Kuala Lumpur.	
Tel	603-77830122/77830120	
Total cost + Budgets	RM 0	

Furniture 6 and 7 : SHOE RACK I & II



Shoe Rack I



Shoe Rack II

Sponsored material	Material	Quantity
	<ul style="list-style-type: none"> • PVC pipes • PVC elbow • PVC T • PVC glue 	2 4 8 1
Sponsored by	Yong Hardware Trading SDN.BHD	
Address	Lot 1402E, Batu 6 ½ , Jalan Puchong, 58200 Kuala Lumpur.	
Tel	603-77830122/77830120	
Total cost + Budgets	RM 0	

Additional Programme I (Origami Lesson)



Person in charge	: Lucas Wong Kok Hoe
Need	: Philea's home owner request a program that can help the children there to generate ideas and creativity
Aim	: We offer origami lesson to help develop children's mind and at the same time also improve their cookies business by offering more attracting boxes, which made during origami lesson.
Material used	: Old magazine
Total Cost	: Free

Additional Programme II (Renew old furniture)



Renewed and repainted wardrobe



Renewed and repainted bookshelf

Person in charge	: Yii Hong Gin Ibrahim Adnan Wong Kah Voon How Pei Ngoh
Need	: To repair and repaint all the broken furniture
Aim	: we understand that we are not capable of repairing broken furniture by using only recycled materials, so we decided to paint something on the door of cupboard, which in order to make the orphanage home looks livelier. Hoping by doing this, the orphanage may gain some happiness.
Material used	: Paints and brushes (sponsored by Yong Hardware Trading SDN.BHD)
Total cost	: RM 0

Additional Programme III (Baking Cookies session)



**Baking session*




PHILEA HOME

6, Jln Harapan 5C/KU7, Sungai Kapar Indah, 42200 Kapar, Selangor.
Tel : 03 - 32902830 Fax : 03 - 32902150
E-mail: phileahome_04@yahoo.com

Official Receipt

Nº 0170

Date : 25/05/2014

Received From : TAYLOR'S UNIVERSITY	
The Sum Of Ringgit : FIVE HUNDRED AND EIGHTY FOUR ONLY.	
In Payment Of : DONATION -	
RM 584/-	Rumah Anak Yatim Kristian, Selangor Philea Home
Cash / Cheque No.	Issued / Received By :  Signatories

**Receipt from Philea Home*

Person in charge	: all members
Need	: To bake cookies with orphans of Philea's home and sell it at Taylor's University for charity
Aim	: As Philea Home still unable to get a stable sponsorship, so we decided to host a fundraising by selling cookies, which in order to improve the economic situation even though that is only a little help. During the baking session, we hope that we could be more understand the orphans and also let them know that they are not alone.
Material used	: baking tools and ingredients (provided by Philea Home)
Total cost	: RM 0
Profit	: RM 584

Financial Statement:

Fund Raising:			
Types	Price per pack/ RM	Sales/ packs	Revenue/ RM
Almond	5	40	200
Chocolate Chips	4	50	200
Cornflakes	3	50	150
Subtotal			550
Donation			34
Total			584
Statement of Sponsor of Materials:			
Company Name	Sponsored Materials	Quantity/ units	
Yong Hardware Trading SDN. BHD.	PVC Pipe	4	
	PVC elbow	8	
	PVC T	12	
	PVC glue	1	
	Pallet board	4	
	Brush	6	
	Wooden roll	1	
	Paint	3	
Kah Ban Trading SDN. BHD.	Wooden Block	4	
	Imported high quality wood pallet	6	
Top Slings Trading SDN. BHD.	Old tyre	4	
	Rope (200metres)	1	
Guan Joo Llin Hardware SDN. BHD.	Box of nails	2	
	Wheel	4	
	Undercoat	1	
	White paint	1	

** Income from fund raising and donation, which is RM 587 are donated to Philea Home. All materials are sponsored, so no expenditure is incurred.

Sustainable and Environmental Strategies Adopted:

1. 3R (Reduce, Reuse and Recycle), eg. turn used thick cardboard rolls/ PVC pipe/ extra MDF board collected into new shoe racks.
2. By reduce, reuse and recycle, we reduce the carbon emission during manufacturing.
3. Raise the awareness of the mass by suggesting the idea that by using recycle materials, we could help improve living conditions of the needy.

Life Cycle Assessment(LCA)

- Cradle-to-grave approach for analysing industrial system.



**Source: http://en.wikipedia.org/wiki/Life_Cycle_Thinking*

LCA of Wood Pallet:

Hardwood Lumber



Manufacturing

- cutting lumber
- nailing



Phytosanitary treatment

- improve durability
- heat treatment/ methyl bromide fumigation/ RF heating



Disposal/ Recycling



**Furniture we made for this project by using recycled pallet woods*

LCA of Polyvinyl Chloride(PVC):

Raw Materials
crude oil / natural gas and Rock Salt



PVC Polymerisation



Processing: Stabiliser, plasticiser, filler



PVC shipping



Disposal, recycling



**Furniture we made by using unwanted PVC pipes*

Approximate Environment Footprint of 1m³ of Material:

*eq.= equivalent

No.	Environmental Impact	Unit	Indicator value in manufacturing	
			Wood pallet	PVC
1	Consumption of energy			
	Renewable energy	MJ	13000	148
	Non-renewable energy	MJ	5297	1237
2	Total water consumption	m ³	-	249
3	Global warming	kg eq. CO ₂	7456	336
4	Ozone depletion	kg eq. CFC-11	195	269
5	Acidification	kg eq. SO ₂	123	682
6	Eutrophication	kg eq. PO ₄	232	613
7	Photochemical oxidant formation	kg eq. C ₂ H ₄	105	455

Conclusion:

Producing recycle product is creative in the way that people would not think that wood pallets and PVC can be reused and turned into a shoe rack, a bench, and a table that really function and are durable. In order to make furniture functions, we applied principles we learned from anthropometry that is we take measurements like suitable depth of seat and hand rest of chair before designing furniture.

Via social media, simple example: like and share the Facebook page of Philea Home and post video of what we were doing for it, we are showing people a way to care about the needs and help them.

Although we are doing a small scale project, but imagine when everyone does it, the amount of energy saved will times.

Our creativity in applying sustainable ideas we learned in architecture classes, to help the needs, will influence the society to continue what we started. Thus, our project is meaningful and the impact lasts.