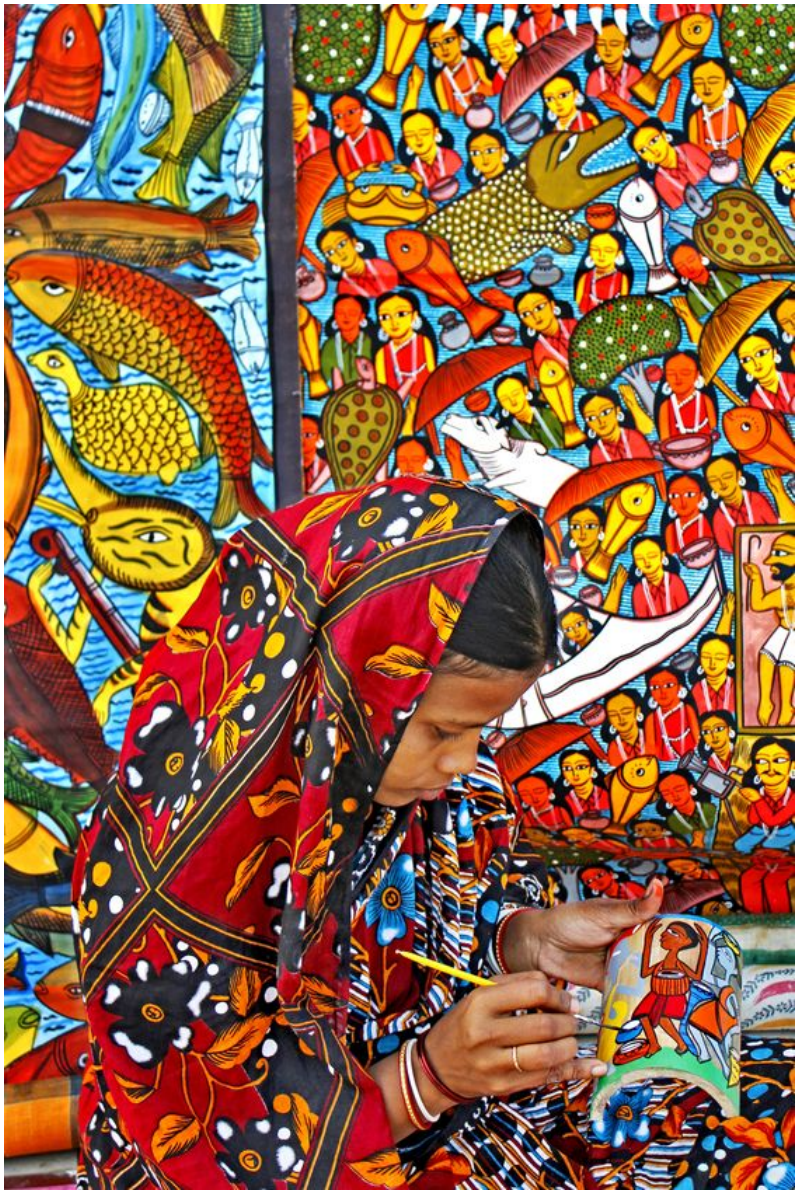

KARIGHOR

ARTS AND CRAFTS ONLINE SHOP FOR RURAL DEVELOPMENT

BRAC UNIVERSITY

Inspiring Excellence

Design and Business Model Development of an Online Shopping Experience Where Traditional Artists Can Showcase Their Talents:

Karighor – Arts and Crafts for Rural Development

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An Internship Report to fulfill the requirements for the award of the degree of Master in Computer Applications

Department of Computer Science and Engineering

BRAC University

December 2016

Abstract

Bangladesh is a country rich in culture and native artistic talent. There are many different arts and crafts that have been part of our culture for generations, such as the Jamdani Shari, Nakshi Kantha blankets, sharis and other items, homemade clay pottery with designs, iron utensils, ethnic paintings, pithas, and many more. Artists have been making things for generations but due to lack of exposure they are unable to make their art their full time source of income. As a result a lot of artists are disappearing and changing professions to other more lucrative items. We aim to bridge this gap between exposure of art with the use of an online portal which will help artists in rural areas to showcase their talent and sell their products. We will work with NGO's and the Government of Bangladesh to provide the services to artists through the local service providers. The Karighor portal categorizes products and helps showcase artists. The fringe benefits is that not only is the profession of arts and native crafts restored, there is also a creation of entrepreneurship for local service providers who want to be part of this system. The objective of this paper is to highlight the problem and provide a solution which can be implemented according to the plan and analysis provided by us.

Acknowledgements

After months of working on the proposal and planning of the Karighor project, we are proud to present you the planning which can help with the rural development of local artists of Bangladesh. It is our plan to help with the Government of Bangladesh's initiative to help bring Bangladesh to the Digital Age and help create a Digital Bangladesh.

As students from non-technical backgrounds, it was unthinkable for us to be able to think of a project like this 2 years ago before starting our MCA program, but now we are happy to be able to plan a project which showcases a true application of what we can do with technology. We are still learning about the world of computers and will continue to do so even when our program is completed.

For this we would like to first and foremost thank Dr Amitabha Chakrabarty sir for encouraging us and being patient with us throughout the last 2 years. We are very thankful to him to guide us and give us very valuable feedback and encouragement when we were working with on this internship report.

We also want to thank all our MCA classmates, teachers from all our MCA Cources, our friends and families, especially our friend Fahim Al Hasnaeen who advised us and encouraged us with the project and was our savior. We also want to thank BRAC University itself for being supportive of us through education, and helping us through both encouragement as well as financial support. We would like to also acknowledge our workplaces Grameen Intel Social Business Ltd. and Right Brain Solutions Ltd. which supported us and encouraged us with our courses during our time in BRAC

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CHAPTER 1: INTRODUCTION

1.1.1 BACKGROUND

Some of the national treasures of Bangladesh are the talented artisans and craftspeople who have dedicated their life to their arts and crafts for generations. Nakshi kantha; jamdani; rural musical instruments like dotara and flutes; pottery paintings; pottery making; muslin garments; and embroidery work are few of the very essential and traditional artwork done by artisans within this country. A lot of these are even exported to other countries because of the employments provided by organizations like BRAC through Aarong, albeit the artisans themselves are not as well paid as the amount of money the products are sold at. However, due to the race for survival for in a country like Bangladesh, many artisans spend more time in creating things that are more lucrative, and sometimes they might have to be confined by demands of the organizations they work for instead of letting their creativity flow and doing something unique. Sometimes people who have been artisans for generations have to leave their vocation in pursuit of entirely different careers in order to pursue economic developments and help their families out. [1]

They say that spending 10000 hours [2] on something makes a person a master of that thing: and the convention is that the more someone practices, the better they get at it. For a lot of these artisans, their artwork gets little to zero exposure in their lifetimes due to reasons like geographical limitations, lack of exposure to the cities, or just the fact that they are unable to spend sufficient amount of time to work on their crafts in order to follow more survival-oriented pursuits. Many traditional crafts, such as the original Moslin, are already going extinct due to many reasons not limited to politics or geography. Substitutes are being created for the Moslin but the original fabric – which was said to be fine enough to pass through a small finger ring – is already gone. Many other crafts will be lost if we do not provide enough exposure and outlet to the crafts people and launch their work to the world and expose the international market to these hidden treasures of the country. If there is a way that these treasures and artists get more

exposure and enough people start buying these items at a fair price where the artisans themselves get the majority of the profit money, it will automatically create an influx of demand for many more artists who can leave their day jobs and work full time on their crafts. As a result, it will not only take the existing artworks to a new level, it will also create a new generation of artisans who will go a step further with their creativity and create new crafts that come from the beautiful rural areas of the country. It can also help with the economic development of Bangladesh and expose the artistic side of the country to the world, which can help increase tourism. Our proposed solution to help alleviate this problem of a depletion of Bangladeshi made unique art pieces is to take the help of technology. We want to create a portal through which artists can directly sell their products and expose their work to the world. Since there is a projected challenge that these artisans might not be very technologically literate, we want to add a caveat that the artists will be involved with registered NGO's and established organizations which will help connect them to the world.

NGO's have many different projects in various regions in the country and they work with many local level entrepreneurs and service providers like bKash agents, InfoLadies, farming recommendation service providers, etc. Usually they are users of smartphone and computing technologies which are sometimes provided by NGOs to assist them with their work. We want to take advantage of existing technologies and resources and help connect marginalized artists to the internet, and help with not only their development, but also in job and entrepreneurship creations for people who provide the service to them through our Karighor portal.

CHAPTER 2: LITERATURE REVIEW

2.1. E-COMMERCE SITES

Over the last few years, online shopping has become a major market place in Bangladesh. While people in cities used to be reluctant to shop online and trust online sellers, the scenario has changed a lot and many ecommerce platforms have popped up within the country and have been operating successfully in major cities of Bangladesh. Some examples are sites like daraz.com, Ekhoni.com, bagdom.com, hungrynaki.com are just a few among many. People sell all kinds of household products and food over the internet now. They even sell old items they no longer use. With the advent of 3G mobile technology this is becoming more common.

The spread of online shopping has connected the people of Bangladesh on a whole another level and it is in line with the Bangladesh Government's goal to move towards a more technologically advanced nation; to create a Digital Bangladesh. [3]

Our project wants to tap into that goal and take the platform of online shopping one step further. We want to take the technology to the rural Bangladesh and help with the economic empowerment of the underprivileged.

2.1.1 Aarong:

Aarong is a platform similar to ours in that the organization helps marginalized women of Bangladesh sell their artistic works and become more economically empowered. Aarong has long been known for its compliance to humane ways of producing their work and creating very high quality products that are internationally renowned. We are big fans of Aarong ourselves because we know that every product we buy from the shop has been lovingly crafted by someone who is dedicated to their craft and is benefiting from our purchase. In recent years, Aarong has also entered the online shopping platform to provide access to people to buy Aarong products. [4]

However, what we could not find in our research of the Aarong website is that there is no showcase of the individual artist themselves. The idea is that all products from Aarong belong to the chain and it is harder to trace where the product is coming from. Additionally, the artists themselves do not get a majority of the profits gained from the sales (even though a lot of it goes back into other BRAC concerns from which the artists are getting benefited from).

2.1.2 A2i (Access to Information)

The Bangladesh Government's A2i lab has tapped into the potential of the large population that is still not using online shopping experiences. There is already a large number of people who use the internet, however there are not enough sites that cater to buying and selling of products for rural people in Bangladesh. There are many local service providers and UDC shops where well known members of rural communities take an entrepreneurial role and help provide technological services to the people in their communities. These services include mobile banking (bKash), m-health services, child and maternal health services, farming recommendation services, etc. As many people are being benefited by the use of technology, the Government is working towards creating a portal through which will act as a platform for various ecommerce sites to provide a safe market place for the rural people of Bangladesh. [3]

Such a service is already in the works and great for the development of Bangladesh. Our Karighor service is different from this service, however, in a few ways. While the ecommerce portal being created by the government can sell ready made products by big companies to the rural people, we are trying to create a platform where handmade artistic products that are made directly by the rural people of Bangladesh and can be sold through the Karighor system to the cities and even Internationally.

CHAPTER 3: Karighor – what is it?

3.1 PROJECT SUMMARY

“Kari Ghor” project is a web based portal for buying and selling purposes. Through our portal, rural, underprivileged and marginalized people who have talent in handicrafts will be able to sell their work. They will be able to do so by registering with NGO’s via Local Service Providers (LSP), who are our primary account holders. So NGO’s can open up accounts for LSP’s and each LSP can open up accounts for each of the artists who are registered with them and they can work as a medium for the artists to sell their products. The artist will also have the record portal where they can view records of all their items being sold.

Based on our research in the field, we have gathered that not a lot of people in villages are tech-savvy. While they are avid users of phones, they are not avid users of computers. So the idea is to find LSP’s who are tech savvy and motivated enough to have this be part of their income source. They will open and maintain accounts for artists. The artist will provide their phone numbers and Bkash account numbers into the system so that they are able to receive important messages whenever they are sent by the Karighor system.

LSP’s will be able to track the reports and earnings of all the different artists are registered through them. Another job of the LSP’s will be to encourage more people to join the portal and advertise the benefits of being part of the artistic community. NGO’s will work to help initiate businesses of the marginalized people in this portal. Profit will be shared where majority of the portion will go to the artists. According to the preferred business model, NGO’s can also take a very small profit later, but there would be a limit to the percentage as NGO’s already get funding from other places.

We will also be working with courier services to provide top class delivery to the customers. Depending on the location of the customer and buyer, the appropriate courier service will be approached and we will make sure that we choose services which provide reasonable rates of services for both national and international deliveries.

For this project, we are aiming to create the documentation and planning of the development of an online e-commerce portal where talented artisans who live in rural areas and/or are marginalized can sell their arts and crafts and get profit for it.

3.1.1 Problem Identification

In our country, most of the entrepreneurs of small/medium businesses do not get full profit as they have to conduct business with the help of another third party. Therefore, entrepreneurs are facing a problem that they are not getting their desired amount of money by doing businesses because of indirect connection with customers. Another aspect is that a lot of the talented people in our country are in rural areas and their work is hardly getting exposed to the city markets where there is a lot of demand for handmade arts and crafts as well as authentic delicacies. As a result, many of these artisans lose motivation to continue creating their work. Through our project we hope to encourage a generation of craftspeople to continue their work and pass on their knowledge. [3]

3.1.2 Importance of Project

Our project will be an attempt to solve the following problems:

- Lack of connection between rural/marginalized artisans with mainstream marketplace buyers.
- Prevent nationally treasured delicacies, crafts, and artworks from disappearing because there is not enough profit in them right now
- Economic empowerment of artisans from their homes
- Highlight of amazing talent in our country to a global audience
- Job creation for local level service providers who are not necessarily artists but are providing the service to the artists
- Showcasing the possibilities of technology to the rural population which will encourage them to be more educated in the technology sector

3.2 METHODOLOGY

In this project, we will apply Incremental Model. In this model, the whole requirement is divided into various builds. Various development cycles take place, making the life cycle a “multi-waterfall” cycle. Cycles are divided up into smaller and more easily managed modules. In this module, each module passes through the requirements, design, implementation and testing phases. A working version of software is produced during the first module which is beneficial. Therefore, we will have working software early on during the software life cycle. In this model, each subsequent release of the module adds function to the previous release and the process continues till the complete system is achieved.

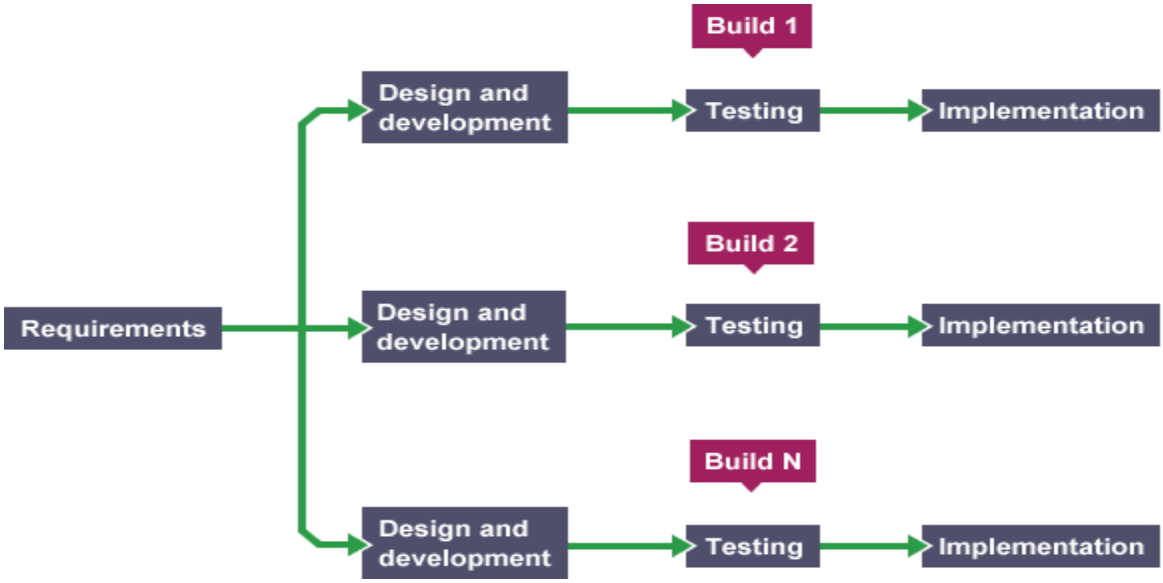

Fig 1: Incremental Model

We have chosen the model as requirements of this complete system is clearly defined before it can be broken down and built incrementally. In addition, this model is flexible and easier to test and debug during a small iteration. [5]

3.3 SYSTEM REQUEST FOR KARIGHOR

Project Name	Kari Ghor
Project Sponsor	Dr. Amitabha Chakrabarty, Nuzhat Arif, Fatema Tuz Zohora
Business Need	Primary motive of this project is selling products of underprivileged small/medium business entrepreneurs under NGO (via LSPs) by connecting with customers directly.
Business Requirements	Specific requirements of the portal include following – 1. Accessibility for 24/7 2. Membership of LSPs, Artists, NGOs and customers through online registering 3. Displaying business pages based on category 4. Viewing products with price (including delivery charge) 5. Selecting preferred products (add to cart) 6. Making an order of product 7. Payment system by card 8. Recording product check out/delivery information 9. Viewing product suggestions while selecting products based on previous buying 10. Displaying profiles of artists, LSPs, and NGOs 11. Displaying ratings of products 12. Displaying important notices (discount/offer/service unavailability) 13. Adding, updating and deleting of products by entrepreneurs 14. Report based on total entrepreneurs and NGOs 15. Report based on monthly sales of NGOs and entrepreneur
Business Values	Values of the portal include following – 1. Centralization of business pages of small/medium business entrepreneurs under NGO 2. Direct connection with customers 3. Making full ownership of business by entrepreneurs 4. Making 100% share of profit by entrepreneurs 5. Reporting on progress of no. of entrepreneurs by NGO 6. Proper decision making by customers based on reviews via ratings
Constrains	1. Shortage of time to complete the project 2. Integration with full payment gateway 3. 360 degree view of product display

Fig 2: System Request for Karighor

CHAPTER 4: System Components, Users and Features

4.1 KARIGHOR SYSTEM COMPONENTS

Karighor system is a large system with various players playing different roles. There will be an Admin panel for the Karighor management, an NGO dashboard, an LSP dashboard, an Artist's dashboard, the Escrow payment service, messaging service and the Customer end online shop.

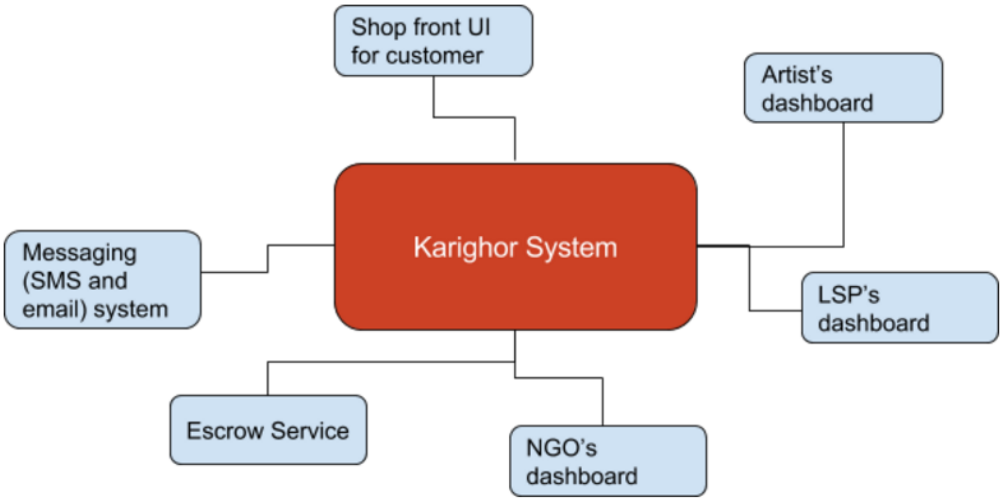

Fig 3: Component Diagram for the Karighor System [6]

The different components of the Karighor system are:

2. Shop front UI for customer – this is the main website with the domain name www.karighor.com. This portal allows customers to browse through categories of items on the website and make purchases.
3. Artist's dashboard – this is the profile of the artist where they can update and upload new products and stock and keep track of all their orders.
4. LSP's dashboard – this is the profile of the LSP who can view the information of all the artists that are registered under the LSP. They can add new artists and browse through their orders but they will not be able

to change anything on the artist's profile through this dashboard. For this they will have to enter the artist's profile.

5. NGO's dashboard – The NGO dashboard contains an overview of all the LSPs and Artists that are working under the NGO. They will be able to view orders and make necessary edits to profiles and also be able to add new artists and LSPs.
6. Admin's Dashboard – the super admin will be able to have a view of the entire operation and control everything in the Karighor system.
7. Escrow System – this is the service that will be used to handle the payment system of Karighor.
8. Messaging system – there are many notifications that are being sent through Karighor to keep track of every operation and to make sure nobody is left out of the latest developments. So we will need to create a separate messaging system to maintain all of this.

4.2 FEATURE LIST

The following is a feature list of Karighor. We explain some of the more exciting features in more detail in later chapters.

1. Accessibility for 24/7
2. Membership of artists/entrepreneurs, NGOs,LSPs and customers through online registering
3. Displaying business pages based on category
4. Viewing products with price (including delivery charge)
5. Selecting preferred products (add to cart)
6. Making an order of product
7. Payment system by bkash, credit card & cash
8. Recording product check out/delivery information
9. Viewing product suggestions while selecting products based on previous buying

10. Displaying profiles of NGOs, LSPs and Entrepreneurs
11. Personalized recommendations based on the customer's tastes
12. Displaying ratings of products
13. Displaying important notices (discount/offer/service unavailability)
14. SMS/email notifications for all parties involved whenever required
15. Verification of artists by NGO
16. Adding, updating and deleting of products by entrepreneurs
17. Report based on total entrepreneurs and NGOs
18. Report based on monthly sales of artists on particular NGO

4.3 USER LIST

The Karighor system is made up of several different portals with 5 different users.

1. Customers: The people who will buy artist's products by online
2. Artists: The people who will sell their work by online
3. LSP: The people who maintain artist accounts and add new artists to the system
4. NGO: The people who will associate to sell artist's products
5. Admin: The Karighor system project and business employees who will use the product to advertise and inform customers and NGO's of the different available products and account options and maintain the system through the portal.

4.3.1 User Dashboards and access

Based on the different users of the Karighor system, there will be multiple dashboards which will have their own functions to make sure the business is running smoothly. The following shows the access of different

4.3.1.1 Online shop dashboard

1. Customer can register.
2. Customer can login.
3. Customer can view multiple category wise products.
4. Customer can search product.
5. Customer can select product to create order (add to cart).
6. Customer can cancel order.
7. Customer can finalize order.
8. Customer can get e-mail about order confirmation.
9. If customer chooses card payment, he/she gets a separate interface to pay. System checks out automatically.
10. Customer can get e-mail about order completion.
11. Customer gets email when an order has been shipped and received to get confirmation on acceptance
12. Customer can view their own order history through the system

4.3.1.2 Artist's Dashboard

1. Artist can login.
2. Artist can add category wise product.
3. Artist can edit, enable/disable and delete product.
4. Artist can view his/her order as a list in descending order.

Order ID	Date	Product	Price	Payment Method	Status	Action
40	12/12/2016	Nakshi, Jamdani	1200	Card	paid	View

Fig 4: Order List at Artist's Screen

5. When Artist clicks view, he/she can view full order. E.g. Artist 1's (himself) product price -800 & Artist 2's product price -400

6. Artist can approve/reject order. Artist can view pending order as a list to confirm order. If artist approves, order is confirmed and if artist rejects, order is cancelled.
7. Artist can check out order when payment is done with bKash.
8. Artist can view report regarding Product wise Monthly and Yearly Sales of his/her individual order.

4.3.1.3 NGO's Dashboard

1. NGO can login.
2. NGO can view all artists' order as a list in descending order.

Order ID	Date	LSP Name	Artist Name	Product	Price	Payment Method	Status

Fig 5: Order List at NGO's Screen

3. NGO can open an artist's page directly through Artist Signup; NGO can also do so for LSP's.
4. NGO can approve/reject artist's membership. NGO receives notification for each artist that is registered into the system by the LSP.
5. NGO automatically receives payment share from sales via the Karighor escrow account
6. NGO can renew membership of an artist.
7. NGO gets notification by e-mail regarding an artist's payment details of particular order.
8. NGO can view report regarding Monthly and Yearly statistics of artists and LSPs.

4.3.1.4 LSP's Dashboard

1. LSP can login.
2. LSP can view all artists that are under that LSP.

Order ID	Date	Artist Name	Product	Price	Payment Method	Status

Fig 6: Order List at LSP's Screen

3. LSP can add and edit a new artist and view all artist records
4. LSP can approve/reject artist's membership. NGO receives notification for each artist that is registered into the system by the LSP.
5. LSP automatically receives payment share from sales via the Karighor escrow account
6. LSP can request the NGO to renew membership of an artist.
7. LSP gets notification by e-mail regarding an artist's payment details of particular order.
8. LSP can view report regarding Monthly and Yearly statistics of artists.

4.3.1.5 Admin's Dashboard

1. Admin can set category of product.
2. Admin can add yearly license fee of product (NGO comes to Admin and gives license fee).
3. Admin can renew license fee of NGO.
4. Admin can do most of the work of all users.
5. Admin can publish advertisement.
6. Admin can view report regarding Monthly and Yearly Sales of Artists under NGO.
7. Admin can view report regarding total number of NGOs, artists and customers.

CHAPTER 5: Business and Operational Model

5.1 BUSINESS PROCESSES OF KARIGHOR

In this section, we describe the Business processes and costing of the Karighor system as well as the operational model. Here is a summary of the Business processes of the system:

1. Customer can buy products of different artists at a time.
2. Customer will pay by card or bKash.
3. Artist will set price of product on his/her own way.
4. Artist will take the responsibility to maintain his/her warehouse.
5. Courier service will be assigned to the Karighor system which will help calculate shipping costs both nationally and internationally.
6. NGO will train LSPs and add LSP's to the system, who will in turn train and add artists into the system. The cost and profit pyramid is influenced by this model (as explained in later sections).
7. All payments will be made to the Karighor system account/bkash account and the Karighor system will act as an escrow until the shipment of delivery is completed, after which payments will be made to all relevant parties.
8. Admin will take subscription and renewal fee of NGO. This fee will be same for all NGOs.
9. Admin will make money through advertisements.

5.2 OPERATIONAL MODEL OF THE KARIGHOR SYSTEM

Karighor will work with different NGO's and the Government of Bangladesh to help bring access to the Karighor portal to the rural people of Bangladesh. The Bangladeshi Government is already aiming to bring more of the Bangladeshi population to the digital age. And so we will be working with the available resources provided by the government to help uphold the native artistry of Bangladesh.

In Karighor's business model, NGO's will register an account with the Karighor portal. They are our primary business partners and account holders. We will be providing our service through the NGO's to the artists in villages. The reason for this is that NGO's already have a large enough working projects in various rural areas in Bangladesh. For

example, organizations like Helvetas, Solidaridad and BRAC have operations all over the country. So they are already familiar with the way the rural people are working and the people they employ are locals who understand the culture.

Our business model is to engage Local Service Providers (LSP) who are moderately well known members of the community who have the know-how to user laptops and have android phones already due to their work with other NGO's. The LSP's know local villagers and craftspeople and artists very well. Their job would be to encourage and engage such artisans to participate and be part of our system. In some cases it may be that the LSP's themselves are artists who practice art as a hobby. Karighor will give the opportunity to take up art professionally and gain money from it.

LSP's will be able to create accounts under the NGO's and they will act as a liaison between the artist and the customers. LSP's are always in touch with the NGO's and there is a report system in Karighor which allows transparency of all work that is done through the site. LSP's will find artists through local meetups and village gatherings and let them know about the service. Once artists are verified (via photographic evidence of their work, as well as interviews and samplings) they will be registered into the Karighor system by the LSP. One LSP may have multiple artists under his account.

Once the artist is registered, the operational structure will be completed and the business can commence.

Artists register under the LSP's and the LSP's help the artist upload their profile and products under specific catagories into the system. When the product description is out into the system, the customer who wishes to purchase the product will not only be able to see the product but they will also be able to see which artist from what location, under which NGO's operations made the product. This will help the customer understand the journey of the product and help them trust the artist/seller more when they see that they are working with established companies.

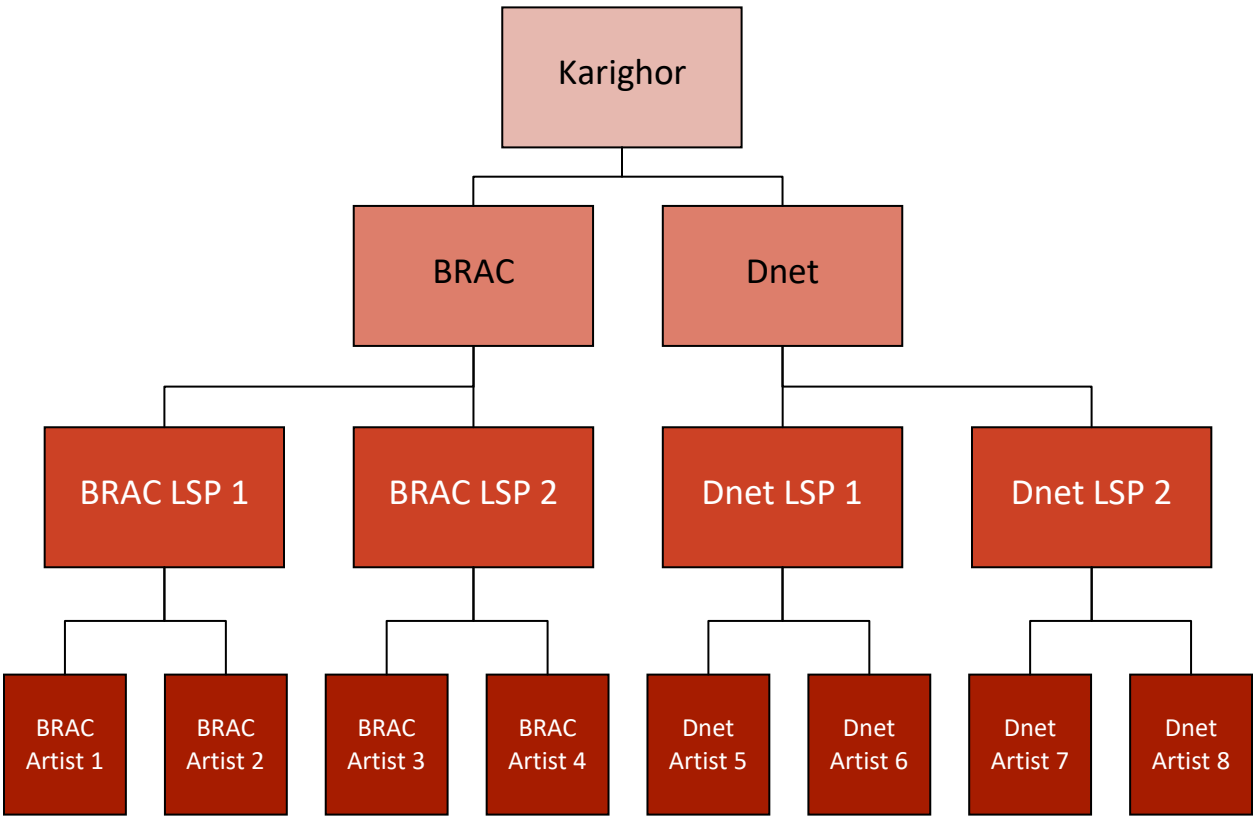

Fig 7: Operational Model Hierarchy for Karighor (an example with BRAC and Dnet)

5.3 Business Policy

Business policy defines all the rules and regulations of the business. In our project, there are several stakeholders- product owner (admin), NGO, artist and LSP. The hierarchy of the stakeholders of the project is given below-

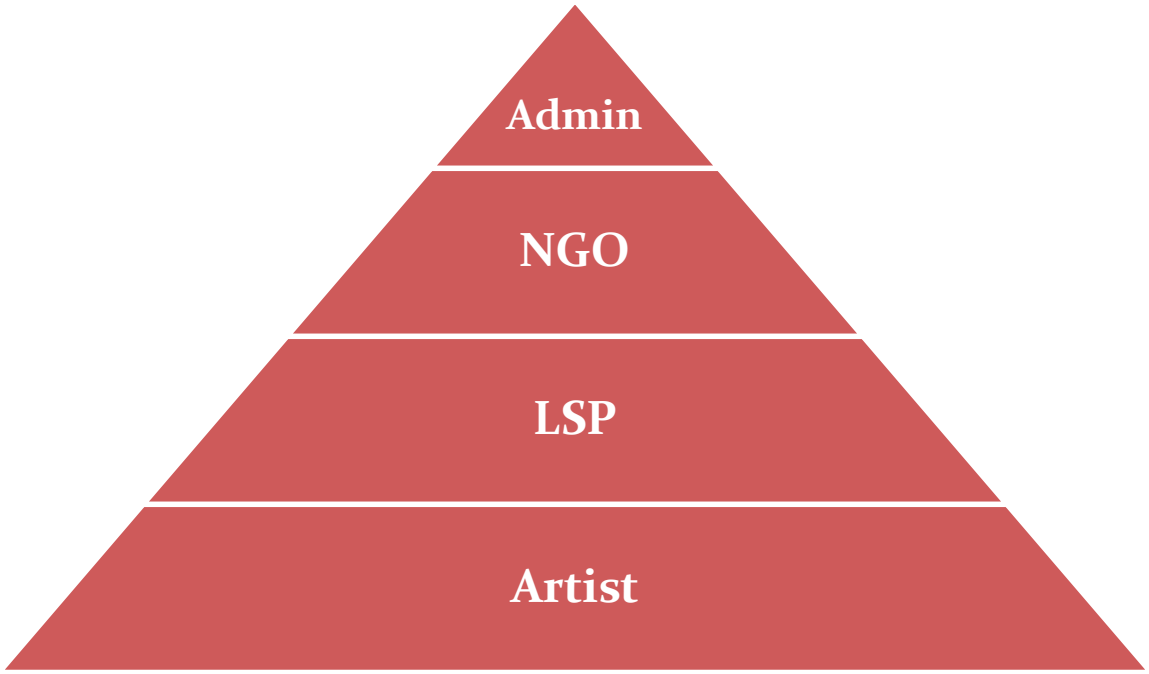

Fig 8: User Hierarchy

Artist- Artists will run their business through sales of their art to multiple customers. They will take the money of sales excluding 10% on each sale.

LSP- LSP is the agent of particular NGOs. They will run their operation through commission on each sale of multiple Artists. LSP will get 10% commission of each sale.

NGO- NGO will run their operation through commission of LSP's share. NGO will get 10% commission of LSP's share.

Admin- Admin is the Karighor owner. It will run the business through subscription fee and renewal fee of multiple NGOs. Admin will take 8,000 subscription fee of NGO at fixed rate. It also will take the benefit of advertisement through the site.

Party	Profit for 1 (% distribution and actual	Profit for 10 (% distribution and actual)
Artist	Total Sales: 15 items each 800 tk Gross earning is: 1 month: 800*15 =12,000, 6 months: 12,000*6 =72,000 10% will be given to LSP so Artist is left with 72000*(10/100) = BDT 64800	When there are 10 artists, their gross earning will be : BDT 72000*10 = BDT 720,000 10% given to LSP so artists' net income is: 72000*(10/100) = BDT 648,000
LSP	10% commission on each sale so gross earning on 15 items each 800 Tk over 6 months is: BDT 7200 Since 10% is given away to NGO the net income is: 90% of 7200 = BDT 6480	If there are 10 artists, 1 LSP gets Gross: BDT 7200*10 = BDT 72,000 over 6 months And Net: BDT 6480 *10 = BDT 64,000 If there are 10 LSPs, with 10 artists each, the total gross income of 10 LSPs is BDT 72000*10 = BDT 720,000 and Net income of 10 LSPs is 90% of 720,000 = 640,000
NGO	10% of commission from LSP is received. So for one LSP with 1 artist who sells 15 items for 800 tk each, the NGO will get: 10% of BDT 7200 = 720	If there are 10 LSPs with 1 artist each, the earning of NGO is 720*10 = BDT 7200. If there are 10 LSPS with 10 artists each, the total earning of NGO is 720*10*10 = BDT 72000

Fig 9: Profit Projection for 6 months

Karighor will negotiate a small amount that it will take from the NGO, but the main source of income will be through ads.

This is a profit projection of all parties for 6 months. The table is created based on some assumptions which are as follows:

- An artist makes sell his/her art at an average price of 800 tk.
- An artist makes on average of 15 sales per month.

Explanation of the table is given based on above assumptions:

An artist's monthly profit will be 12,000 and after 6 months he/she will get 72,000. There is a 10% commission rate of LSP on each sale. Therefore, the actual monthly and 6 months' profit will be 10,800 and 64,800 by excluding 10%.

The rest of the information is explained in the table if there are:

a) 10 artists under 1 LSP
b) 10 LSPs with 10 artists each
c) What the NGO's, LSP,s and the Artists' income would be in this case

CHAPTER 6: System Flow and Special Features

6.1 CUSTOMER TO ARTIST SYSTEM FLOW

There are several parts to the Karighor system flow. The following shows flow charts for how the customer can purchase and item and how it is ultimately delivered to them.

Customer buys a product flow:

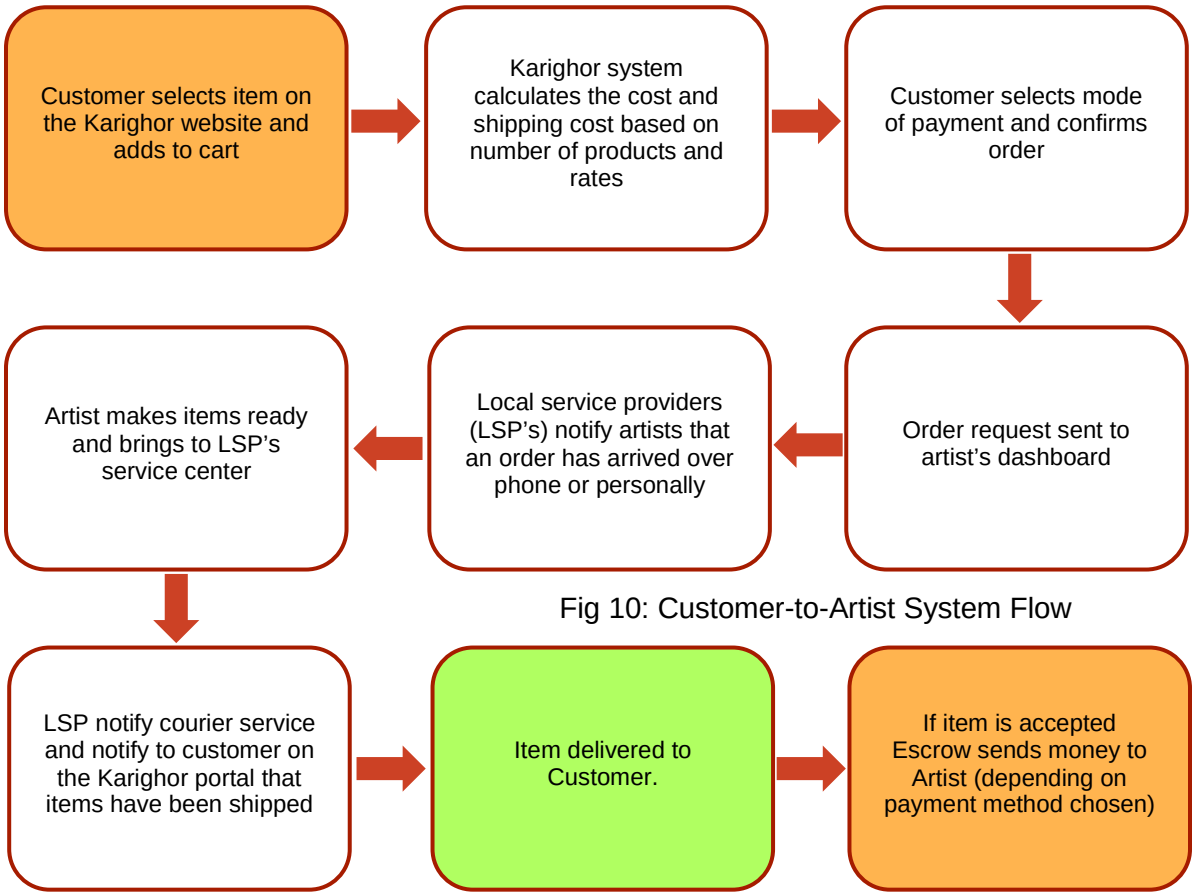

Fig 10: Customer-to-Artist System Flow

Any customer can log into the Kari Ghor website and choose the item of their choice that they want to purchase and add to the cart. For the purpose of this flow chart, we are looking at what happens when one customer is purchasing multiple quantities of the one item from the website. When the customer adds items to the cart, then the system will calculate the total cost including the shipping cost. Once the customer confirms the mode of payment, and confirms the order, the system will send an SMS to the artist that a new order has been placed. They can then check their dashboard to see which item

has been requested. After making the order ready, the artist will bring the item to the service center. The LSP will notify the assigned courier service depending on whether it is an international shipment or a local shipment.

Once the item is collected from the artist, the artist will select “sent” on Karighor dashboard so that the customer can see that the order is being sent to them. It will then be shipped to the customer. The customer will be sent a notification email that the item has been shipped and will be asked if they have received it. If they answer yes, the Karighor escrow system will notify and pay the Artist, LSP and the NGO accordingly.

8.1.1 SPECIAL FEATURES

The Karighor system contains several features as described earlier which helps it be a cohesive function. We are proposing a few special features and proposed methods and algorithms which can be used when the project is being implemented. Some of the discussed features are:

1. The payment system – Karighor as an escrow service and it’s future prospects
2. “You may also like” feature – personalized recommendations and suggested algorithm process
3. Ratings feature of the system which allows for quality assurance of product and services
4. Uploading a new product into the system – done by the LSP for the Artist

8.1.2 Mode of payment (Karighor Escrow Service):

According to Access To Information(a2i) lab of the Bangladesh Government, over 80% of the payments done through e-commerce sites are done through cash-on-delivery. [3]The rest of the 20% is done through mobile banking services like bkash and also through online payment services like credit/debit cards. However, there is a chance of increase of cost due to so much handling of cash, as well as security breach issues. Additionally since Karighor is a system where people from around the world are able to purchase items, the payment must be handled with care. Thus Karighor will operate like

an escrow service to handle payments and make sure that both customers and artisans are protected and their money is handled safely.

In our country, escrow service has been introduced at Janata Bank. Currently, Janata Bank is handling this service for non-residents of our country. According to Access To Information(a2i), Govt. is also working on escrow service for residents of our country. There are two ways how we can avail escrow service for our project. One way is – we can work with Govt. as their work will be introduced soon. The other is – we can work with it individually associating with particular bank. [7]

In the first phase, as we are not introducing escrow service but we will handle the payment manually as escrow service will do. To implement this, now customers will have to pay to system's bank account. Then, we actually transfers shared money to LSP by bKash and to NGO by bank. Artists will collect his/her share from LSP's center. [8]

There are three different modes of payment options on the Karighor payment gateway portal that the customer can choose from:

i. bKash
ii. Bank account transfer – Credit/debit card
iii. Cash on delivery

The system keeps track of all transactions. An Escrow Service will be engaged with the Karighor system which will allow safe transactions. This means that regardless of which mode of payment is chosen by the customer, they will make their payment and the money will then be transferred to the Karighor Corporate bank account. The customer and the artist will be notified via email and SMS and there will be safe legal documentation to ensure trust and safety.

Once the product has been delivered, the customer will receive an email of confirmation by Karighor system which they will have to reply "yes" to, thus ensuring closing of transaction from the customer side. If the customer neglects to reply "yes" the money will be held in the Escrow account for 7 days before an automatic "yes" is chosen and the account will no longer withhold the money and make arrangements to transfer the money to the artist. This allows for the customer to be able to return an item if they

receive something damaged or if they receive the wrong product and can have a money back guaranteed. And it also ensures that the artist gets their payment.

Regardless if artist is availing a service from a local LSP who is handling all this, the system will send an SMS through the Karighor Admin portal to all parties (Astist as well as the LSP handling the account) that a payment has been made/confirmed. So that when the artist gets this confirmation, they can go to the LSP's service center and collect their payment.

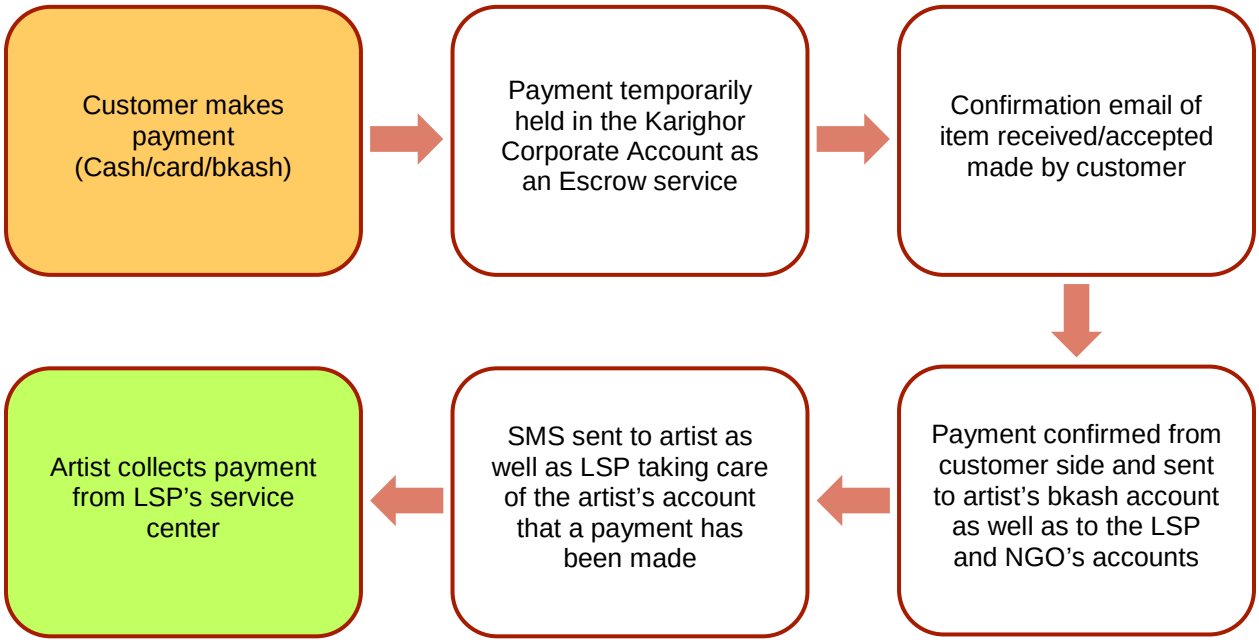

Fig 11: Karighor Payment System Flow

One important aspect of the payment system is that when a payment is made, the system automatically calculates the shares of the NGO, LSP and also the Artist. The escrow system sends the appropriate amount of money to the respective accounts and notifies each level of players.

For example, if a product is BDT 1000, the system automatically calculates that the artist will receive BDT 900. The rest of the amount is divided among the LSP and the NGO.

The LSP receives 10% of the product's share, and the NGO receives 10% of the LSP's income.

Thus the LSP gets BDT 90 and the NGO gets BDT 10.

Product value = x

Artist gets = (90/100)*x

LSP gets = (9/100)*x

NGO gets = (1/100)*x

The feature also takes into account the automatic cost calculation that is done when a customer is making a purchase through the website.

The system calculates the total cost in the following manner:

Cost of one item X = costOfX

Number of items = quantityOfX

Weight of specific item X = weightOfX

Shipping cost per KG = shippingCostPerKg_local OR shippingCostPerKg_International

Therefore,

Total cost = costOfX * numberOfItems + weightOfX * quantityOfX * shippingCostPerKg(local or International)

Fig 12: Pricing

The shipping cost per Kg is provided by the courier service that is partnered with Karighor.

After the total cost is calculated the customer chooses the mode of payment.

6.2.2 "You may also like" feature:

The Karighor system will help customers have a customized experience through the system. So when they are making purchases through this system they will be shown what other complementary or similar items they may be interested in. This is also important to do in order to make Karighor competitive in comparison to other e-commerce sites since more and more websites are implementing personalized recommendation features.

For Karighor, we looked at three types of algorithms [9]:

1) Collaborative Filtering – this system would collect and analyse a large amount of information on users' behaviors, activities, or preferences and predicting what the users like based on their similarity to other users. This is a good system to predict what the users would want, however since Karighor is a relatively small project initially with a niche market of art lovers, we are likely to face difficulties in the beginning due to data sparsity.
2) Content Based Filtering – this system compares the description of the item and the user's preferences. Key words are used to describe items and also the users and the words are matched. This system is great for users who are interested in only a limited type of products, however, we don't want to limit Karighor's customers and show them the wide variety of products that are available in the site.

The system we propose be used for the Karighor users:

3) Hybrid Recommender System [10] – In this system, a mix of collaborative filtering and content based filtering are combined and a new result is presented which is more accurate and creates a synergy between choices. So we will recommend a use of the Hybrid Recommender System for Karighor so that we can show our users how many different types of items are available, but also make sure they are shown based on their own habits and preferences.

A system like this is necessary to increase exposure for the artisans so that some of the more unknown artists and their works can be highlighted. Again the aim is to always that we expose the rural talent of Bangladesh to the rest of the world as much as possible, and also encourage more artists to become part of this community and become serious about their craft. So we are trying to have Karighor be a system which will help achieve that.

6.2.3 Quality assurance of goods and services

Since Karighor is essentially an e-commerce site at the end of the day with an added touch to aid in Bangladeshi rural development, we must ensure that the products being sold are of good quality. It is important to think about the quality of the products being sold for the following reasons:

i. To ensure the customer is getting good quality product
ii. To help artists understand the market and make products that are more likely to sell
iii. To help artisans understand global expectations of the quality of the products as well as motivate them to make better quality products

As such the KariGhor system gives customers the opportunity to rate the products and provide feedback on them. Emails will be sent out to the customer once a product has been received to ask them to rate the product and provide feedback on it. Based on the reviews and feedbacks the system will automatically bring items sold by that particular artist to the top, and feature them on the website. This will act as a huge motivation for others to make good quality products.

We will be using a 5 star rating system which will allow Customers and Artists to be able to give and receive meaningful feedback on products.

Fig 13: Rating system UI for Karighor

When the product thumbnail is shown, the rating will represent the average of the star ratings and show the best score. Following is an algorithm for this:

Rating = (noOfFiveStars 5 + noOfFourFiveStars 4.5 + ……noOfOneStar *1)/ totalNoOfRaters

To ensure 0.5 denominations i, we can simply specify:

ratingToShow = ceil(rating, 0.5);

6.2.4 Uploading a new product into artist's profile for selling

In order to upload a product, the user (artist or LSP) must log into the artist's dashboard and upload a product. When the artist is uploading a new product into the Karighor system they must ensure that they provide the following information:

1) Category of the product – this can be multiple categories. For example: A "Nakshi Kantha blanket" would fall under the category of both "Nakshi kantha" as well as "blanket".

Fig 14: Category Selection against an Order

2) Photo of the product – Almost all LSP's have android smartphones nowadays because of the advent of cheaper phones like from companies like Symphony. This will help artisans to upload a photo of the product and upload into the system. It is very important to upload the photo and it is a mandatory step because without the photo the customer will not be able to view the product before purchasing it and thus there will diminish almost

all chances of the product to be sold. Thus we will not let the upload process be completed until a photo is provided.

Training will be provided on how to upload the photo and all the ways it can be made to look more presentable.

3) Price – a standard price must be provided. It is important to provide training to artist when pricing products so that they are able to overcome costs and make a decent enough profit while at the same time make sure that the prices are not so extravagant that they cannot be sold at all.
4) Weight – Weight of one unit of the product needs to be provided in Kg so that it is easy for the system to calculate the shipping cost of the product.
5) Tags (optional) and story – After the mandatory items are provided, the user may add some tags to the product which will help the system when searching for the product. Not only that, it will help form a story of the product. Additionally they may provide information on what the inspiration for creating the product was. For example a potter can add tags like “pottery”, “handmade”, “red soil” , “enamel paint”, “traditional”, “flower vase”, etc.
6) Stock – number of items that have been created, so that the system can automatically subtract from the stock when the item has been purchased and shipped.
7) An indication if the artist is willing to make a product for order, and what the maximum quantity that s/he can make provided that there is no advanced payment system in the Karighor system yet. (This is a future system and will not be immediately available in the site itself in terms of the automation part of it, however there may be manual ordering if the artist becomes known to the buyer, at the discretion of both parties).

Note: The activity model of the feature of uploading a new item into the system is shown in the next chapter.

CHAPTER 7: UML Diagrams for Karighor

7.1 UML DIAGRAMS FOR THE KARIGHOR SYSTEM

There are a few use cases that we are examining here for the purposes of this report for the Karighor system. We have created the following UML diagrams for some of the use cases: [6]

- Use case diagrams
- Activity Models
- Class Diagram
- Database model diagram
- Sequence Diagrams
- Prototypical Wireframes of a few screens

The UML diagrams will provide the implementation team with a guideline on how the system can be designed. [11] We have only included a few of the use case diagrams (Login/logut boundary, NGO task boundary, Order process boundary, payment boundary and registration boundary).

In the Activity model section, we show the activity flow of three types of actions: the process by which a new item is uploaded into the artist's profile by the LSP; the system by which a new artist is registered into the system; and the activity model for how the customer makes an order and purchases and item.

For the Class Diagram section we show how the users all communicate with each other and how a purchase can be made.

For Database model diagrams, we show how all the databases will be seamlessly connected to each other and whenever a database is called upon it can be easily accessible.

Sequence diagram: we show how an item is purchased and how the system notifies the LSPs , Artists, and the NGOs.

For the Prototypical diagram, we are trying to show a rough wireframe of the customer side of the system.

7.1.1 USE CASE DIAGRAMS for Karighor

1) Log in and out Boundary

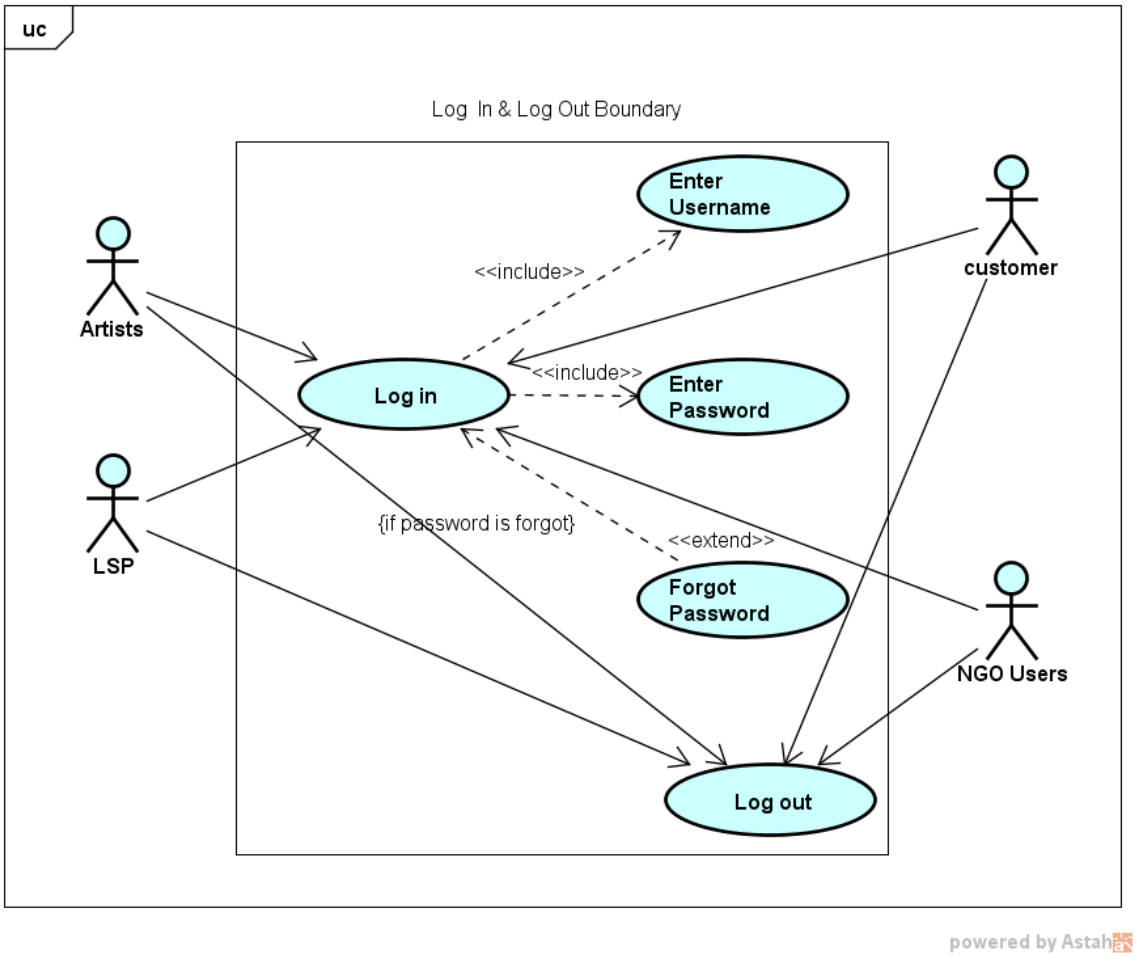

Fig 15: Log in-Out

2) NGO task boundary

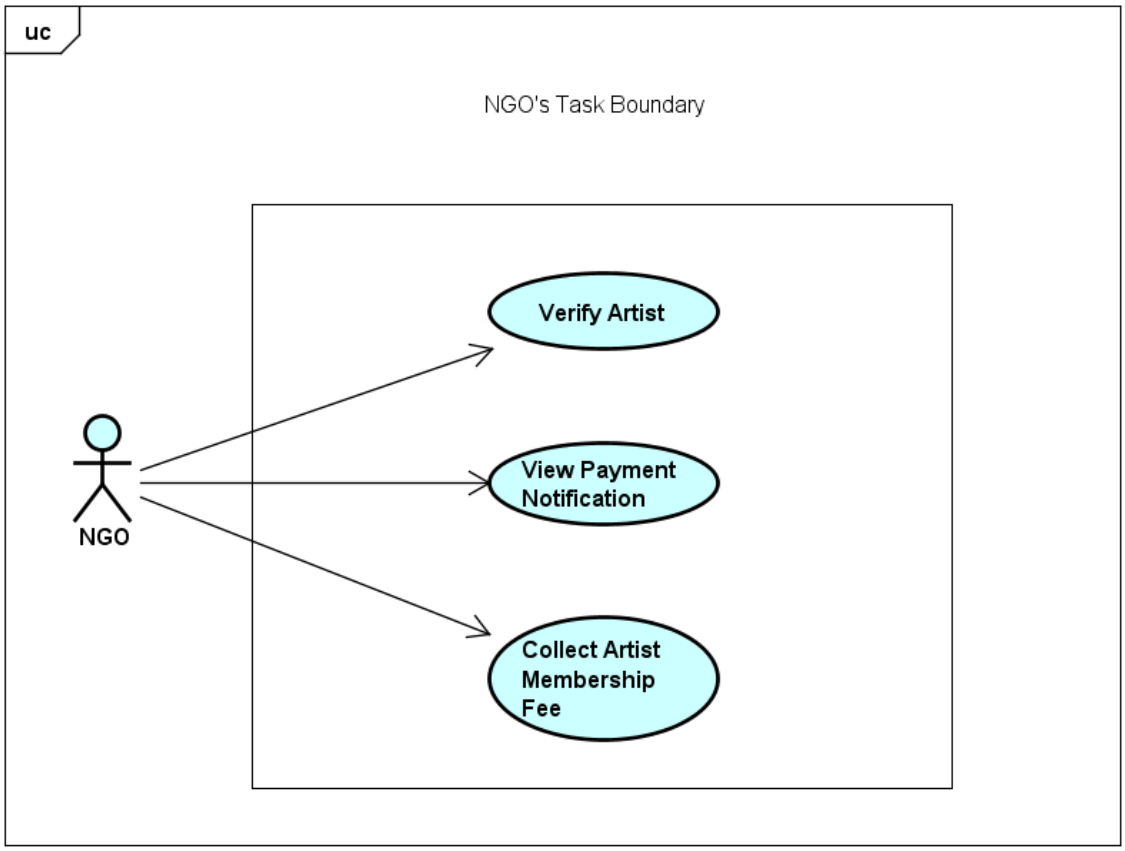

Fig 16: NGO task

3) Order Process Boundary

Fig 17: Order Process

4) Payment boundary

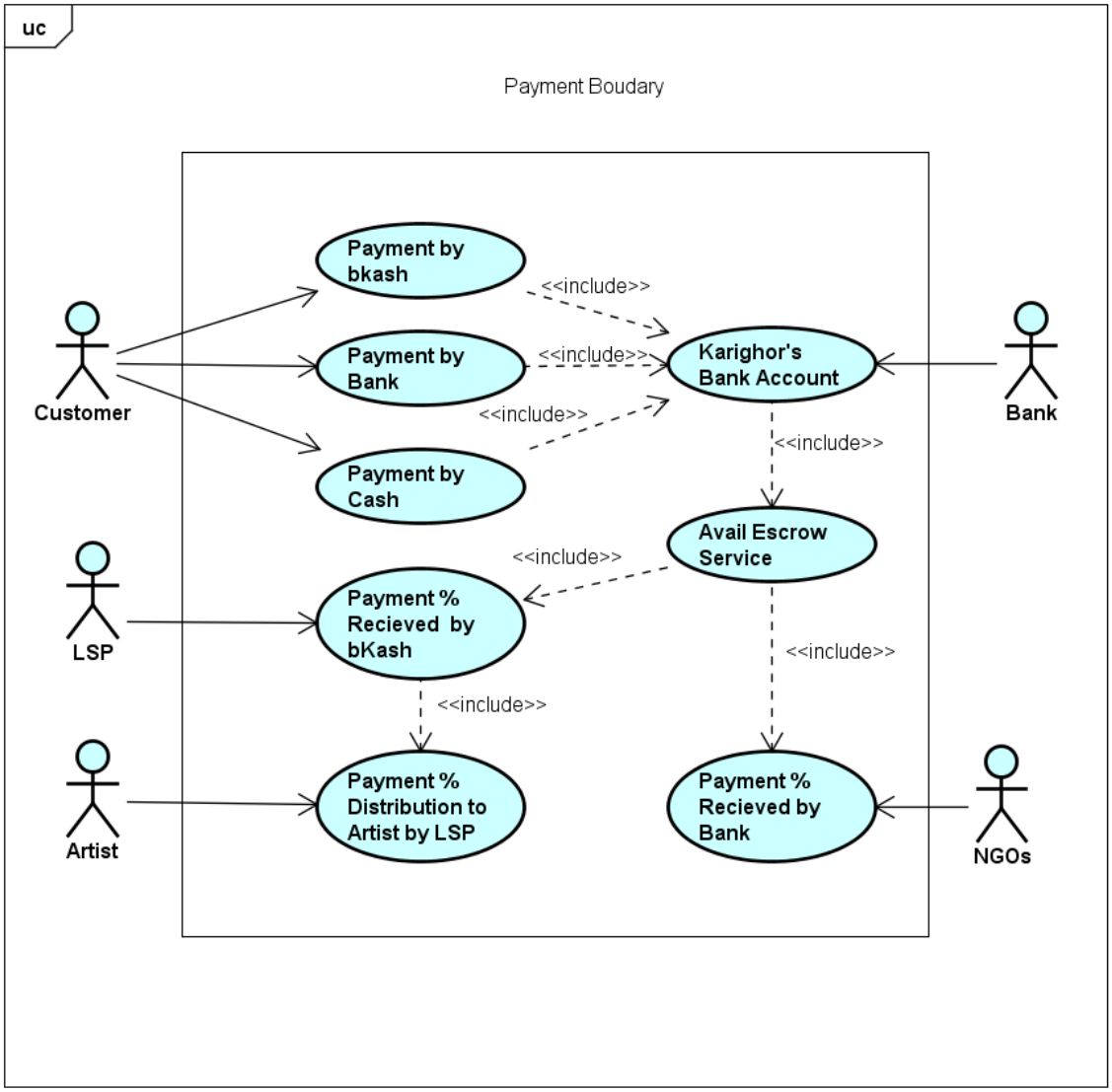

Fig 18: Payment

5) Registration boundary

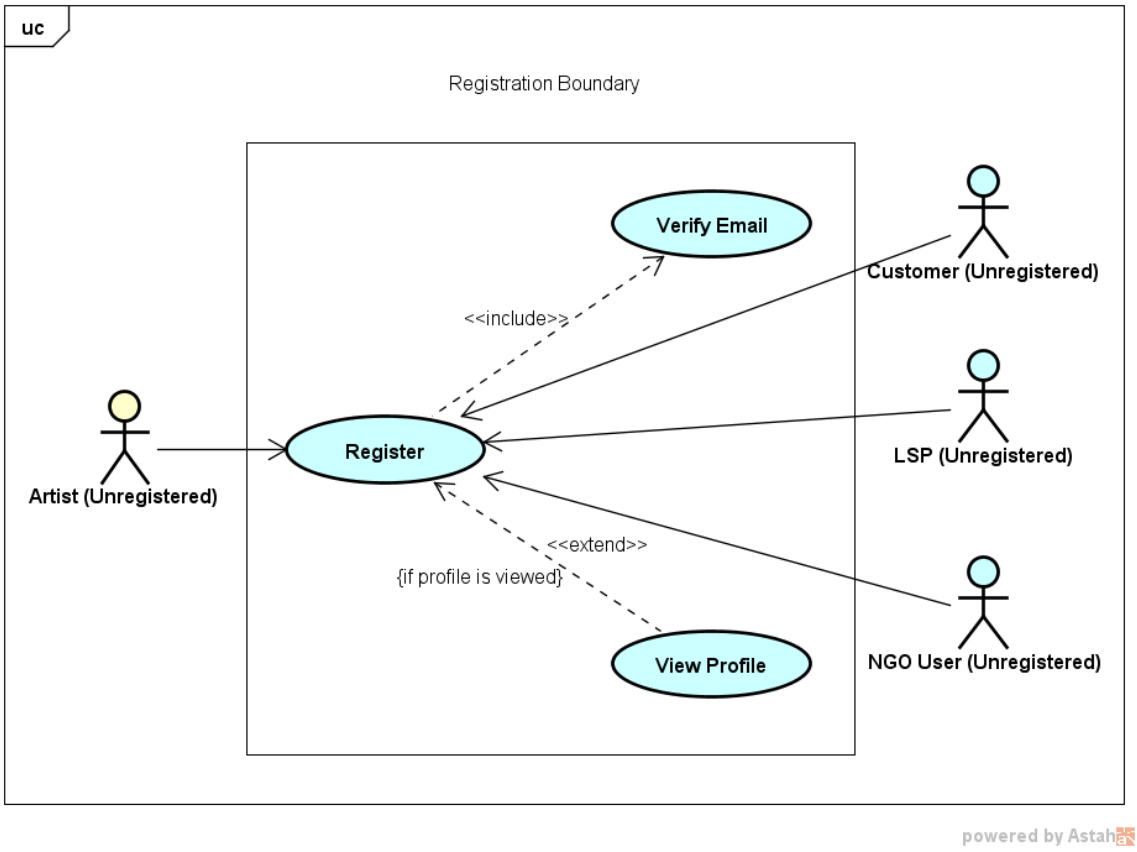

Fig 19: Registration

7.1.2 ACTIVITY MODELS FOR KARIGHOR

1) Customer ordering product/art

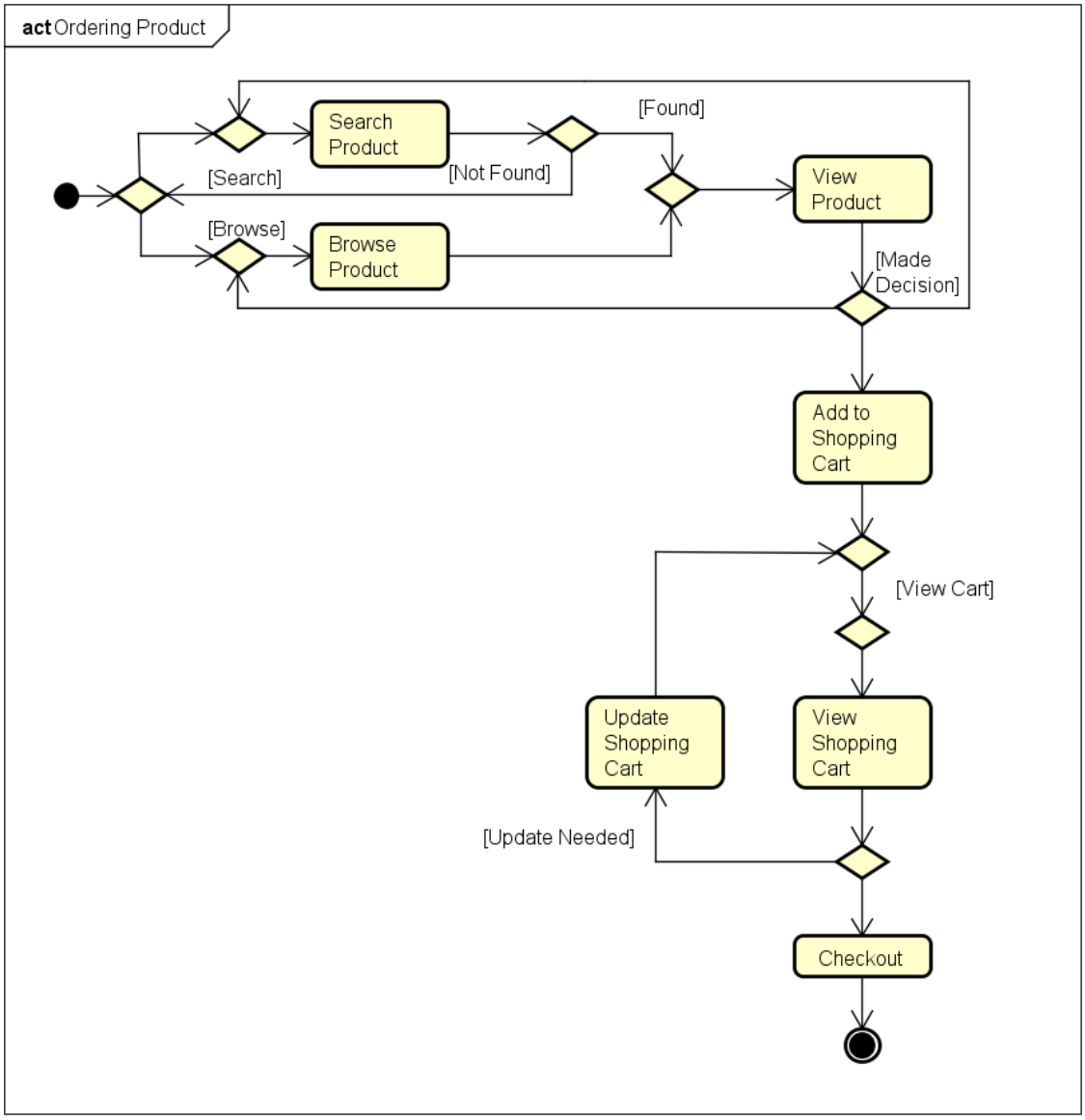

Fig 20: Ordering Product

2) Artist registering via LSP

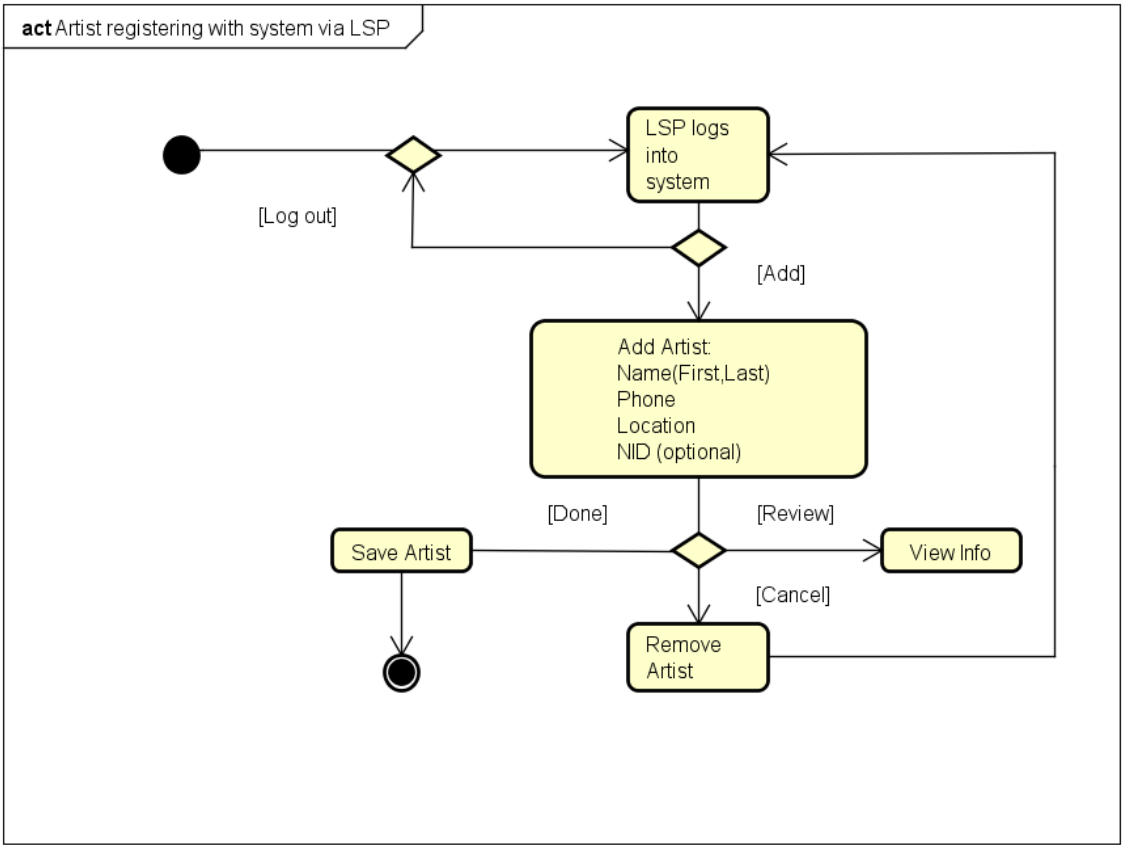

Fig 21: Artist Registration via LSP

3) Adding product in the system via LSP

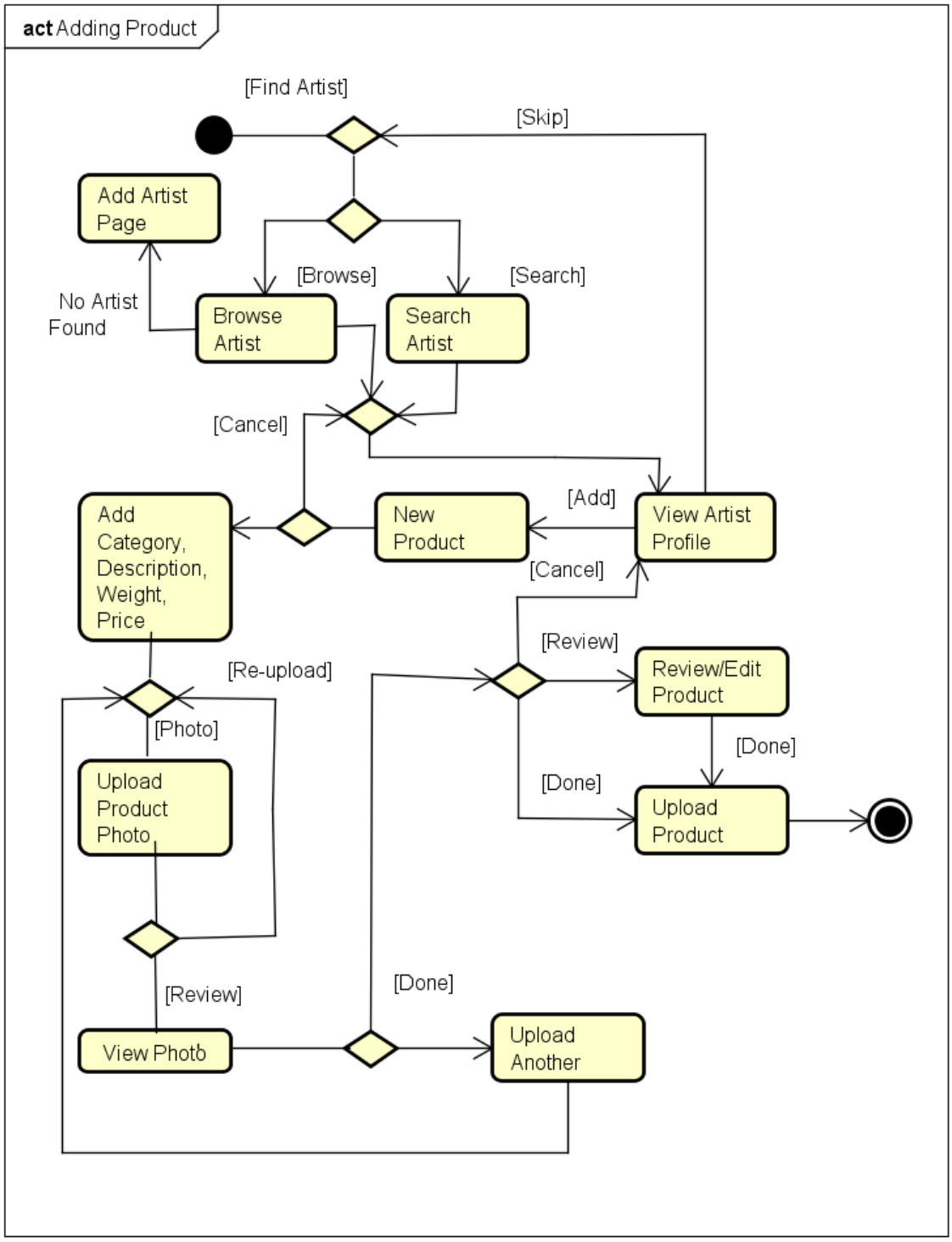

Fig 22: Adding Product via LSP

7.1.3 CLASS DIAGRAM:

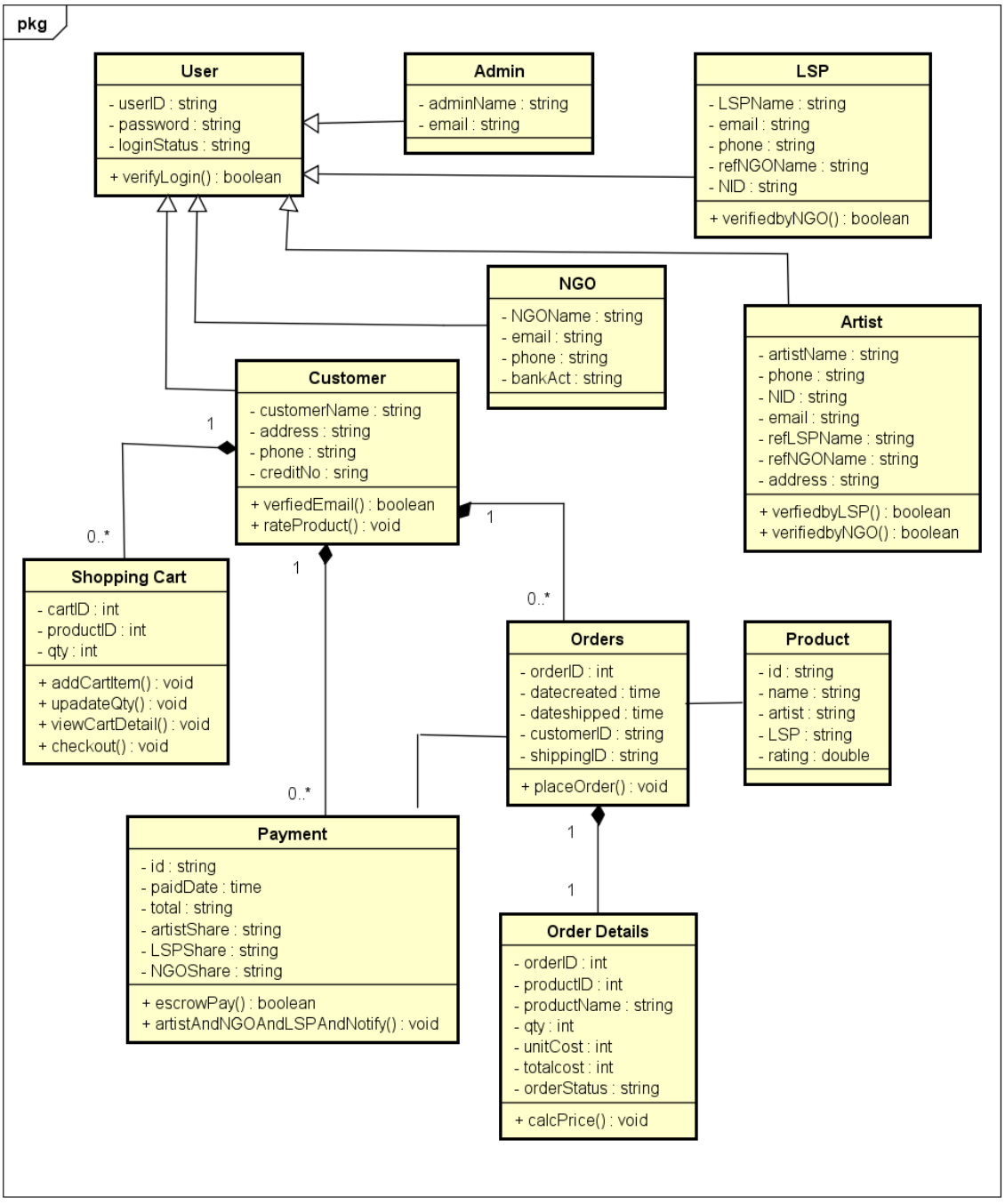

Fig 23: Class Diagram

7.1.4 DATABASE MODEL:

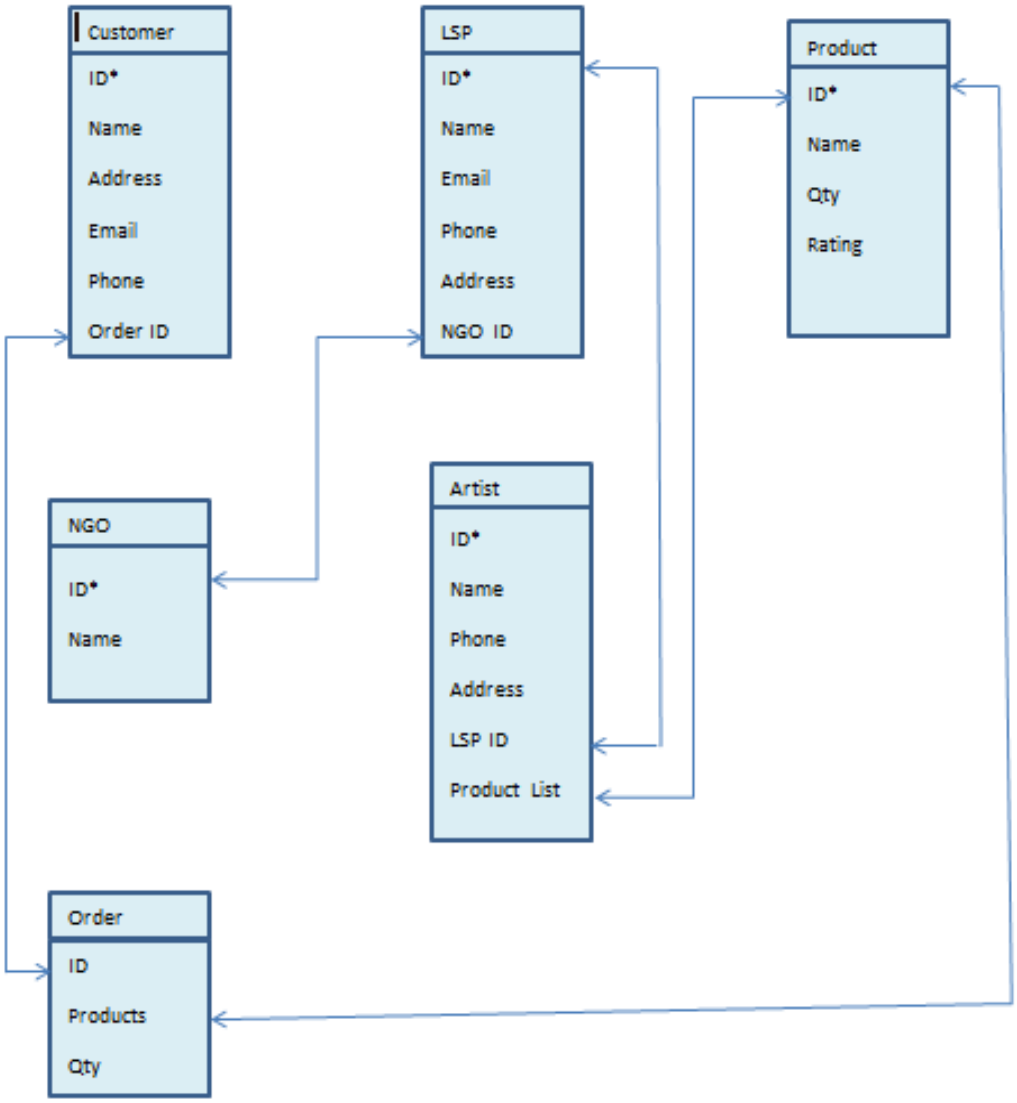

Fig 24: ERD Diagram

7.1.5 SEQUENCE DIAGRAM

1) Confirming order

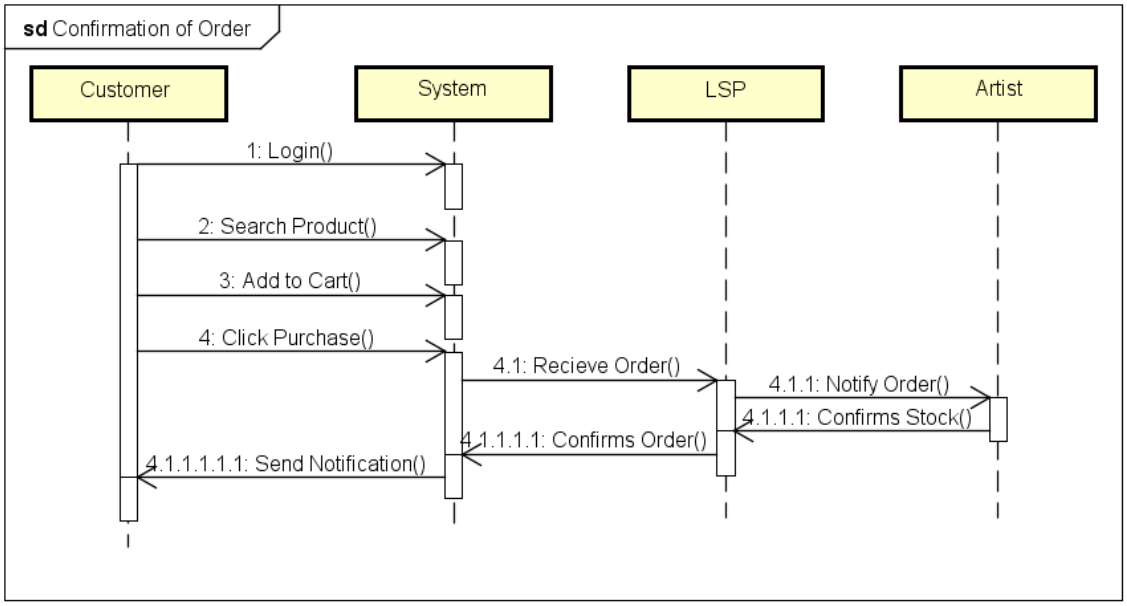

Fig 25: Sequence Diagram

7.1.6 PROTOTYPICAL WIREFRAME

1) **Home Screen**

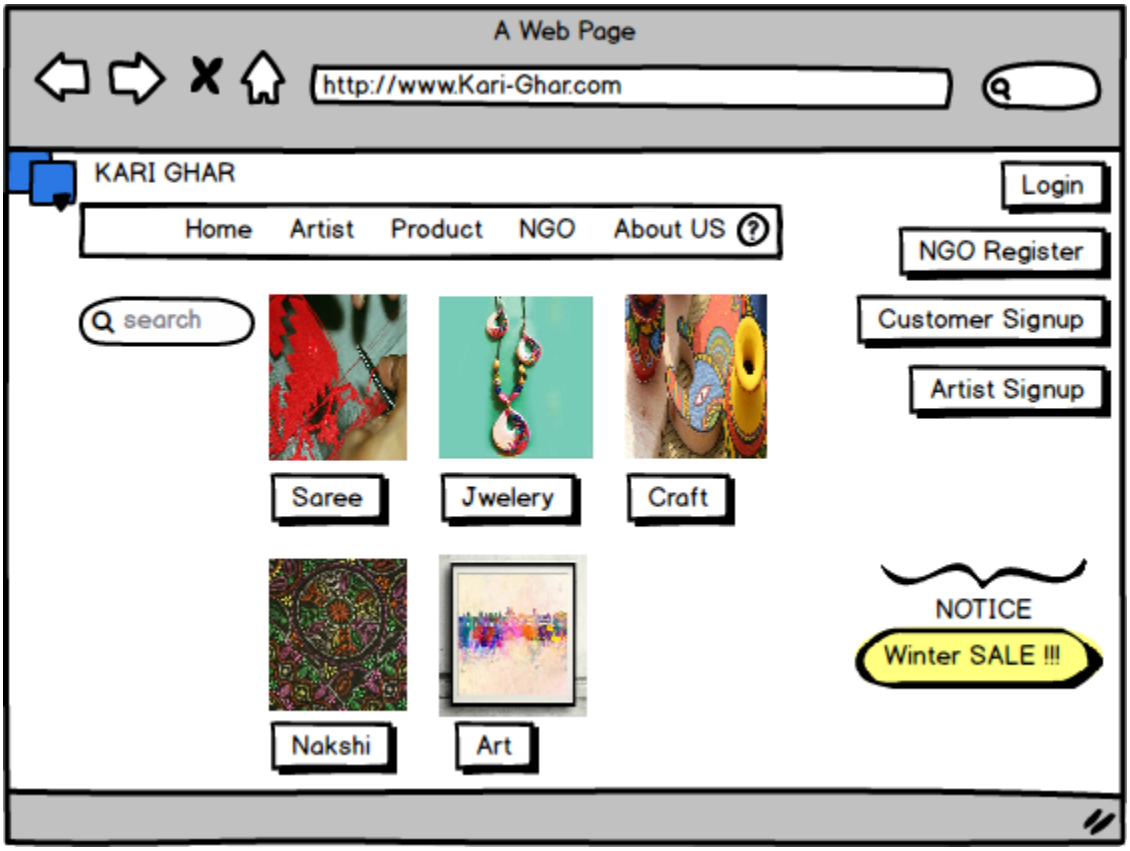

Fig 26: Home Screen

2) Product page based on category

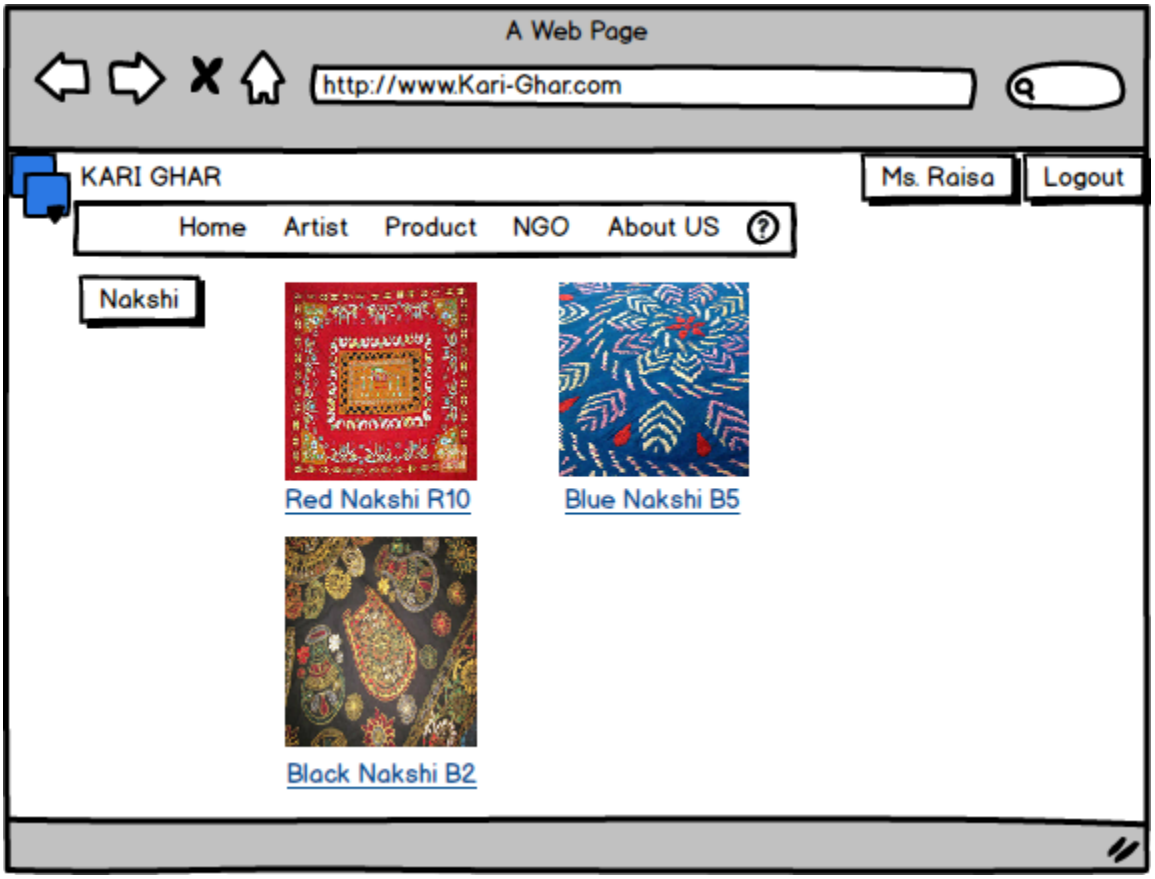

Fig 27: Product Page based on Category

3) Individual product page

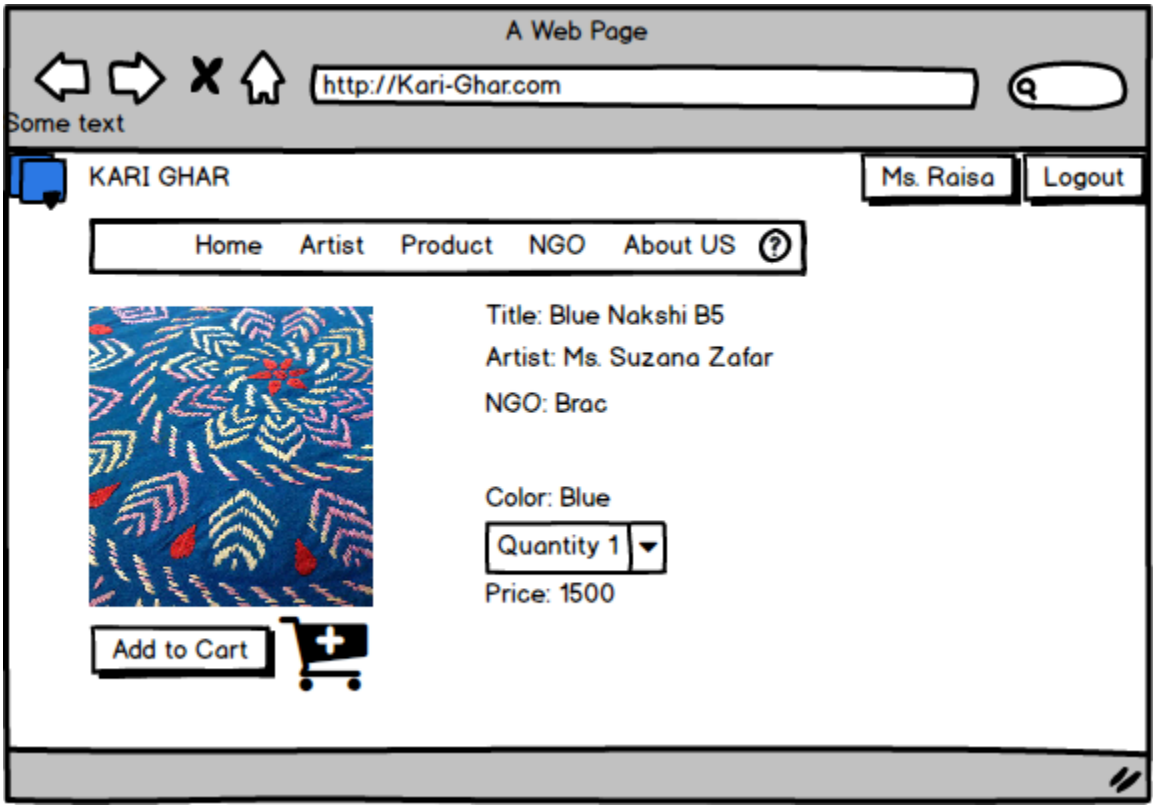

Fig 28: Individual Product Page

CHAPTER 8: Timeline, Implementation, Requirement Specifications & Testing

8.1 TIMELINE

If we can implement the system, there should be a plan before it. We have prepared a basic timeline for full SDLC model. We have kept several sections- planning, design, coding and testing. By using MS-Project, an approximate timeline has been set. Based on this timeline, our project can be finished within approximately 124 days. It will vary based on several conditions.

	Task Mode	Task Name	Duration
1	**Manual**	**Planning**	**13 days**
2	Manual	Requirement gathering	4 days
3	Manual	Requirement analysis	3 days
4	Manual	Feasibility analysis	4 days
5	Manual	Documentation	2 days
6	**Manual**	**Design**	**12 days**
7	Manual	Prototype	2 days
8	Manual	Database design	2 days
9	Manual	UX design	4 days
10	Manual	SQA	1 day
11	Manual	Documentation	2 days
12	Manual	Milestone 1-Design Approval	1 day
13	**Manual**	**Coding**	**59 days**
14	Manual	Work analysis	2 days
15	Manual	Unit testing - mod 1	3 days
16	Manual	Module 1	7 days
17	Manual	Unit testing - mod 2	2 days
18	Manual	Module 2	8 days
19	Manual	Unit testing - mod 3	3 days
20	Manual	Module 3	12 days
21	Manual	Milestone 2	0 days
22	Manual	Unit testing - mod 4	5 days
23	Manual	Module 4	15 days
24	Manual	Deployment	1 day
25	**Manual**	**Testing**	**47 days**
26	Manual	Test case writing	7 days
27	Manual	Functional testing	22 days
28	Manual	Bug reporting	5 days
29	Manual	Bug fixing	17 days
30	Manual	Accectance testing	3 days

Fig 29: Timeline

8.2 IMPLEMENTATION

The implementation of a new computerized system will include:

- Server Setup, with associated costs of rewriting.
- File conversion, which can be a major part of the implementation. If often means converting old manual records into medium usable by the computer, and this may involve hiring extra help to key in and verify data.
- Staff training, which may be done by sending staff on special courses, bringing in an expert to teach small groups of staff, or allowing staff time for computer aided training at their own disks.
- In order to ensure safe trasactions, we will purchace an Https certificate for the website.

8.3 REQUIREMENT SPECIFICATION

Requirement specification is a complete statement of what the new system required to do. After analysis of the current system it is clearly specified the requirement of the proposed system.

Non Functional Requirements:

SOFTWARE / HARDWARE SPECIFICATION REQUIREMENTS

Hardware Requirement:

Lenux Dedicated Server with:

- Quad core, 2.5 GHz Intel® Xeon Processor
- 8 MB cache
- 8 GB RAM
- 1000 GB (RAID 1) - file system for server
- 10 TB/month

Software Requirement:

- PHP Version: 5

- Apache Version: Apache/2.4.4- runs the code in apache
- MySQL version: 5.5.3

8.4 TESTING

Testing phase is essential for any software system. Testing not only ensures meeting technical requirements but also it is used as a means of determining quality and providing that software is fit for its purpose. [12]

Before testing the system, a dedicated tester will perform several tasks.Various methodologies of testing must be maintained for ensuring quality.They are -Functional Testing, Regression Testing, UI Testing and Load Testing. Automation testing can also be introduced for saving time and more perfection.

Test planning must be set to proceed to test the system through testing strategy. Test cases must be described fully before they are carried out. Separate test cases of various modules of our system- customer,admin, LSP, artist, payment, order process must be documented. Bug tracking is essential as it hinders usual flow of system. We will use JIRA tool to report bug and track bug solving cycle.

Major testing types for our project are described as follows:

Functional Testing:

The testing includes all kind of validations. In our system, there are several forms e.g. customer registration which must be validated. All calculation of pricing and rating must be checked using different test data.

Regression Testing:

After major builds in the system, regression test is essential to ensure full system works fine. It is very usual case that if there is any medium or major change in the system, it will affect other module too. For example, rating feature implementation may affect order module or any other module.

Integration Testing:

Integration testing is extremely important since different programmers may write code of different modules. This testing is used to identify situation such as:

- Data may be lost between modules.
- One module may create a fault in another module.

- Combining several modules may create unexpected condition

Load Testing:

When our system's user will increase, there may of risk of running system by multiple users at a time. Therefore, to handle incremented user's operation, load testing is needed.

Cross-Browser Compatibility Testing:

This is done for ensuring that the website works and looks similar on a variety of different browsers. The testing is done on the most popular browsers which are - Mozilla Firefox, Google Chrome and Opera.The functioning of the website is exactly the same since all of the programming is dealt with at the server. However, there may be differences as how the browsers interpret and render the HTML and CSS sent to them.

CHAPTER 9: Future Plans and Conclusion

9.1 FUTURE PLANS AND CONCLUSION

Karighor is a diverse system with many different players that need to be coordinated. It is imperative that we make sure that the system is running smoothly since many things are at stake: such as the reputation of Bangladeshi rural artisans as well as their artwork to a global and national audience, a lot of money transactions are also at stake which is very sensitive. There are many key players such as the NGO/Government we are working with, the local level service providers (who need to be provided training), the artisans themselves who also need to be provided training on how to ensure quality products are made and the importance of timely delivery; the customers; and finally the Karighor employees themselves who need to be very actively a part of this whole system to ensure a smooth running of operations.

Because this is such a huge operation, we will start off small and not try to reach too many NGO's and artists at the same time. We will start with one NGO such as BRAC, and look for a possibility to maybe even collaborate with BRAC's other e-commerce operations. We will work in one rural location with one NGO and train a limited number of LSP's, and try to see how many artisans we are able to attract. We will start small and once we have perfected the system on a small scale, we will start to expand to more and more locations.

In terms of feature development, in the future we will be improving upon the system and adding new features such as:

- Adding videos of the artist describing the product and showcase their workstations
- Mass production - there will be a component of training involved in this
- Artists will be able to provide reviews of their experience in selling to buyers so that other sellers are able to see which buyers are good to sell to
- Language implementation - we will aim to have a Bangla version of the site so that users are able to upload items and provide descriptions in Bangla as well as in English.
- Pre-order system will eventually be implemented into the system so that once an artist/product becomes fairly well know, customers can pre order the items by making advanced payments.

The eventual goal is job creations for local LSP's as well as artisans and overall economic development of every rural community of the country. [13]

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