

TRIBHUVAN UNIVERSITY  
Institute Of Engineering  
Pulchowk Campus

Minor Project Report

**on**

Gambesi

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## **Abstract**

E-commerce means buying and selling of products and services over an electronic system like the internet. This has had an overwhelming effect on the world's economy. The existing systems are focused mostly on the urban areas and the people of the rural areas have not been able to take benefit from it. It would be really beneficial if these people could grasp the idea of e-commerce and use it for transaction of goods. It would help the community in general and improve the lifestyle of such people.

The primary objective of this project Gambesi is to facilitate the process of e-commerce in the rural areas. It will involve all the components of an e-commerce system but since the end users are people of relatively lower economic and educational background we have tailored the site accordingly. Features like easy navigation, multilingual interface, content and structural help are available.

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# 1. Introduction

## 1.1. Project Introduction

Gambesi literally means village. The Gambesi application is a rural e-commerce web portal that facilitates information exchange between communities, and during this process empowers them. The communities involved are targeted to be both rural and urban groups but the primary focus group are people from rural Nepal.

## 1.2. E-commerce Basics

Electronic Commerce or E-commerce means doing business online. It consists of buying and selling of products over an electronic media like the Internet and other computer networks. It is about using the power of digital information to understand the needs and preferences of each customer and each partner to customize products and services for them, and then to deliver the products and services as quickly as possible.

The Web is one of the best ways for business such as manufacturers to sell their products directly to the public, brick-and-mortar retailers to expand their stores into unlimited geographical locations, and for entrepreneurs to establish a new business inexpensively. Doing business over the Internet has many benefits such as

- Increased sales,
- Decrease in costs like marketing, processing, storing information etc,
- Increase in profits,

- Expands the size of the market from regional to international,
- Expand customer base,
- Allows for innovative business models,
- Increases productivity
- Improves customer service,

### 1.3. Scope of e-commerce

E-commerce application can be categorized into three basic categories,

#### **i. Business-to-Consumer(B2C) e-commerce**

In this form of electronic commerce, businesses must develop attractive electronic marketplaces to entice and sell products and services to customers. They may offer e-commerce websites that provide virtual storefronts and multimedia catalogs, interactive order processing, secure electronic payment systems, online customer support.

#### **ii. Business-to-Business (B2B) e-commerce**

This category of electronic commerce involves both electronic business marketplaces and direct market links between businesses

#### **iii. Consumer-to-Consumer (C2C) e-commerce**

This category of electronic commerce involves businesses between consumers themselves. This is usually done through electronic personal advertising of products or services to buy or

sell electronic newspaper sites, consumer e-commerce portals, or personal websites.

## 1.4. E-commerce Process

The e-commerce process usually consist of the following stages,

- Buyers and sellers find each other. This is usually possible through e-commerce websites or such portals.
- Negotiation. Usually the price, quantity and mode of delivery are negotiated.
- Transaction. A deal or a contract is made and payments are made usually through electronic payment system.
- Order fulfillment. It consists of manufacturing the products and making the delivery.
- Post sale events. This include customer services and help facilities.
- Accounting . This include transaction processing.
- Data analysis or Data mining.

## 1.5. Work Flow

A successful e-commerce system must consist of the following processes:

- Access control and security
- Profiling and personalizing



- Search management
- Content management
- Catalog management
- Payment
- Work flow management
- Event notification
- Collaboration and trading

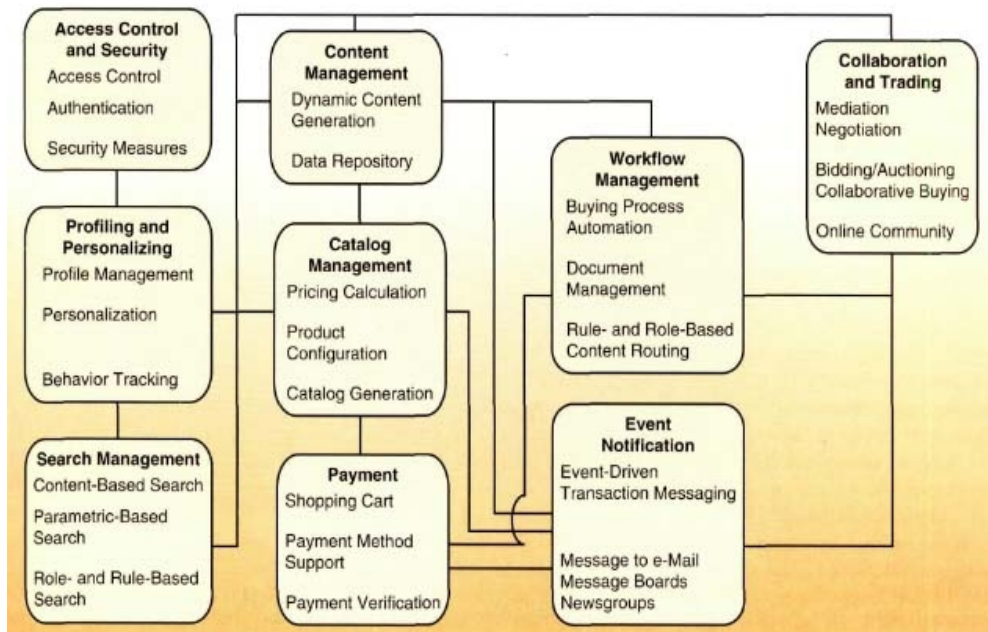


Illustration 1: E-commerce Process

## 2. Methodology

### 2.1. Underlying Technology

#### 2.1.1. Drupal as a base service Provider

Drupal is used to build web sites. It's a highly modular, open source web content management framework with an emphasis on collaboration. It is extensible, standards-compliant, and strives for clean code and a small footprint. Drupal ships with basic core functionality, and additional functionality is gained by the installation of modules. Drupal is designed to be customized, but customization is done by overriding the core or by adding modules, not by modifying the code in the core. It also successfully separates content management from content presentation.

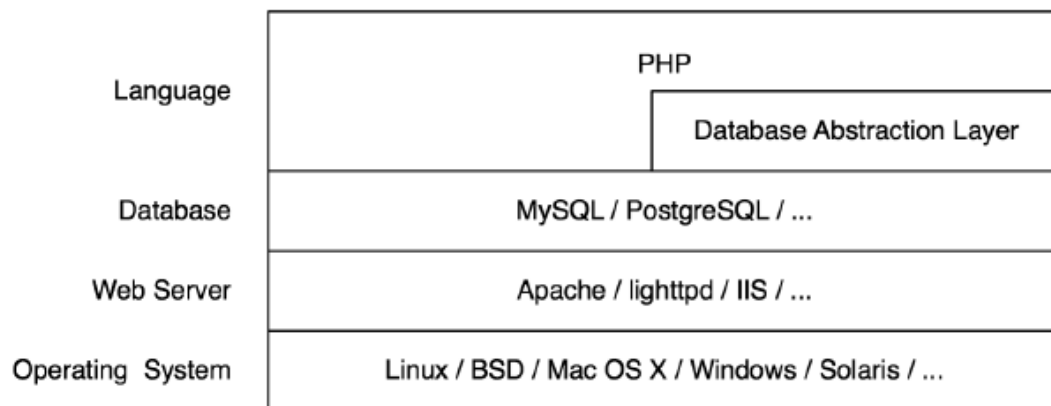


Illustration 2: Technology Stack of Drupal

The core of Drupal is written in PHP. It is a set of PHP files integrated together and written in a strict coding standards.

Drupal interfaces with the next layer of the stack (the database)

through a lightweight database abstraction layer. This layer handles sanitation of SQL queries and makes it possible to use different vendors' databases without refactoring your code. The most widely tested databases are MySQL and PostgreSQL.

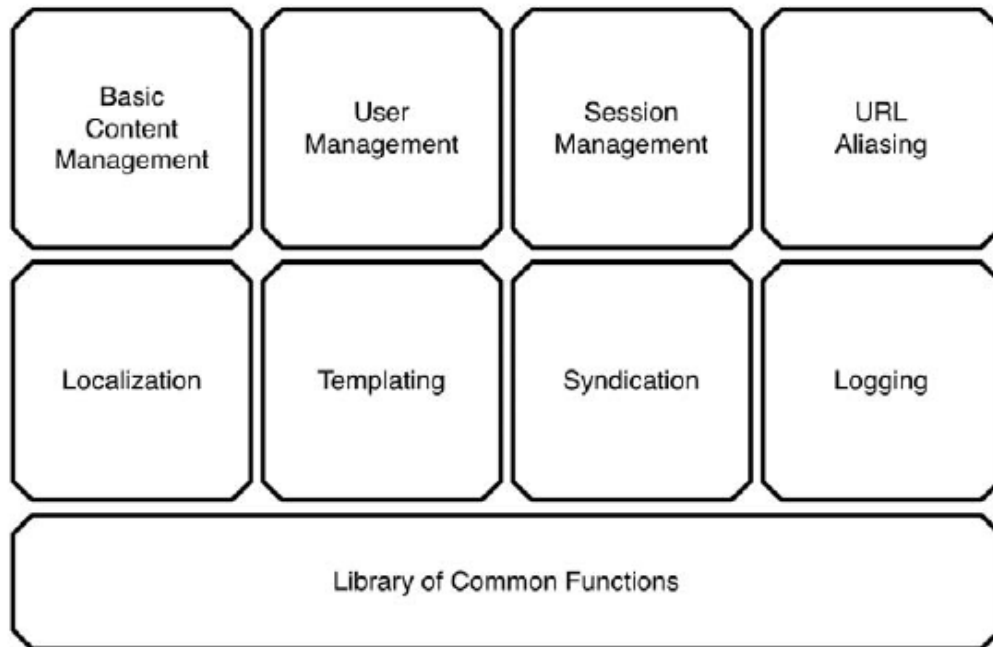


Illustration 3: Overview of services provided by drupal core

Drupal is a truly modular framework. Functionality is included in modules, which can be enabled or disabled (some required modules cannot be disabled). Features are added to a Drupal web site by enabling existing modules, installing modules written by members of the Drupal community, or writing new modules. In this way, web sites that do not need certain features can run lean and mean, while those that need more can add as much functionality as desired.

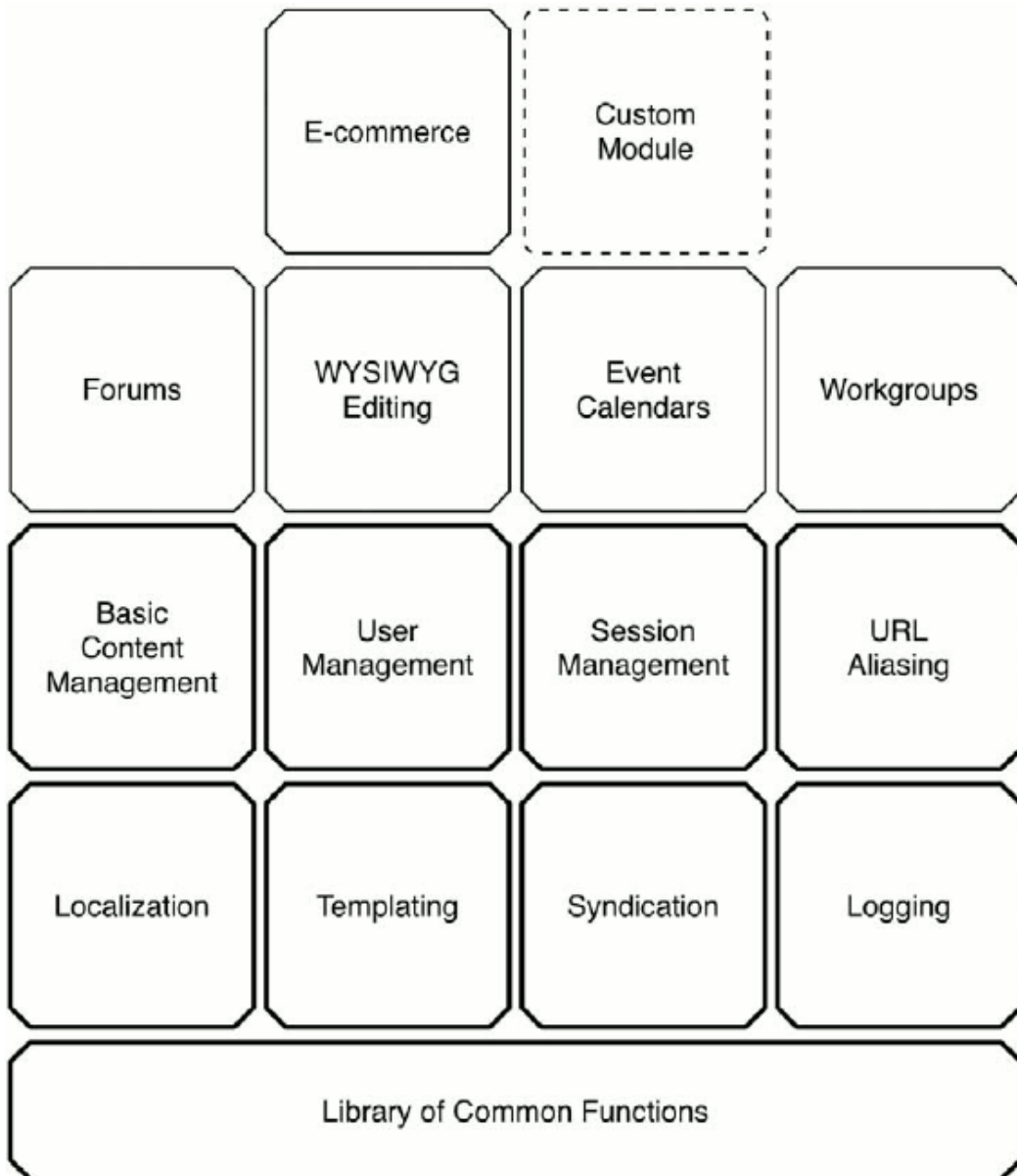


Illustration 4: Enabling Additional modules gives extra functionality

## 2.1.2. Drupal as a framework

Drupal is an extensible framework as such custom modules can be built on top of it to extend its functionality. It provides the concept of **hooks**, which are specific Drupal events. **Hooks** provide modules a way to *hook into* what is happening in rest of Drupal.

The Drupal's framework is built in Inversion of Control (IoC) pattern, where the IoC Container allows external modules to perform actions over a central object called **node**. Modules can change the **node** as they wish, and finally the theming function displays the **node** as output, which is the final web page.

Functions Name ▲	Location
<a href="#">custom_url_rewrite</a>	<a href="#">developer/hooks/core.php</a>
<a href="#">hook_access</a>	<a href="#">developer/hooks/node.php</a>
<a href="#">hook_auth</a>	<a href="#">developer/hooks/authentication.php</a>
<a href="#">hook_block</a>	<a href="#">developer/hooks/core.php</a>
<a href="#">hook_comment</a>	<a href="#">developer/hooks/core.php</a>
<a href="#">hook_cron</a>	<a href="#">developer/hooks/core.php</a>
<a href="#">hook_db_rewrite_sql</a>	<a href="#">developer/hooks/core.php</a>
<a href="#">hook_delete</a>	<a href="#">developer/hooks/node.php</a>
<a href="#">hook_disable</a>	<a href="#">developer/hooks/install.php</a>

Illustration 5: Some Drupal Hooks



## 2.2. E-commerce Modules for Drupal

Our project mainly focuses on developing e-commerce modules for Drupal. In our project we utilize the hooks featured provided by Drupal and have made our own modules to implement e-commerce.

### 6.2.1. Concerned Modules

The modules are categorized to two separate groups.

#### **e-commerce modules**

These provide basic e-commerce features like Product description and additions, cart features.

#### **village e-commerce modules**

These provide our main application specific features and listed below.

1. **Buying Leads**

Handles buying leads (content type which users post stating they want to buy the product from other sellers).

2. **Selling Leads**

Handles selling leads (content type which users post stating they want to sell the product to buyers).

3. **Category**

Handles categories related to product types.

4. **Custom Cart**

Overrides default e-commerce cart to provide emailing features.

## 5. **Product Types**

Different product type are handled by respective modules. A generic product type module provides base features, other modules use the features of generic product type with addition to their own extra functionality.

## 6. **Product Expiry Options**

Handles product expiry based on user submitted product period.

## 7. **Shipping Options**

Allow users to post the shipping methods available, i.e, state whether they are willing to ship the products themselves or want the buyers to ship the product.

## 8. **Transaction Record**

Stores record of all transactions made.

## 9. **Custom Pages**

Allows pages with multiple type of content.

## 10. **Taxonomy Product Type Mapper**

Maps the relationship, i.e, stores which category term is mapped to which product type.

Eg, Wheat, Barley, Rice are category terms, but they all are handled by agriculture product type. Similarly, Stone crafts, Wood Crafts are category terms and handled by handicraft product type.

## 11. **Other modules**

Other modules are related to tweak necessary features in the application.

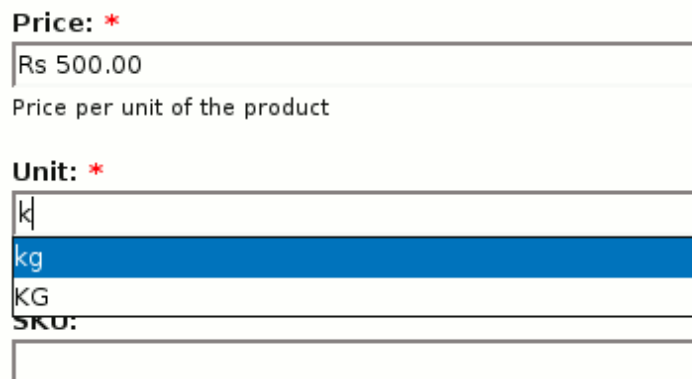


## 2.3. User Interface

Gambesi application's user interface is based on a separate theming system known as phpTemplate. The design and layout is separated from the logic of the application. Few of the features of our user interface is as follows.

### 2.3.1. Ajax

Asynchronous Javascript and XML is used at various places in the application to give it a dynamic look.



The image shows a form with three fields. The first field is labeled "Price: \*" and contains the text "Rs 500.00". Below it is the text "Price per unit of the product". The second field is labeled "Unit: \*" and contains a dropdown menu with three options: "k", "kg", and "KG". The "kg" option is currently selected and highlighted in blue. The third field is labeled "SKU:" and is currently empty.

Illustration 6: Dynamic Drop Down  
(Autocomplete) in product entry page

### 2.3.2. CSS and Custom Theme

The website design is based completely on CSS, i.e., modifying a simple style.css file can completely change the look and feel of the website.

The theme files include

**page.tpl.php** - controls the outer layout of the application

**node.tpl.php** - controls the inner node display

**node-product.tpl.php** - controls the inner display of product types

other **.tpl.php** files are responsible for formatting the output of various aspects of the application.

Drupal provides easy mechanism of switching between themes, i.e we can provide users with option to select a theme from list of themes such that they can use a theme they like.

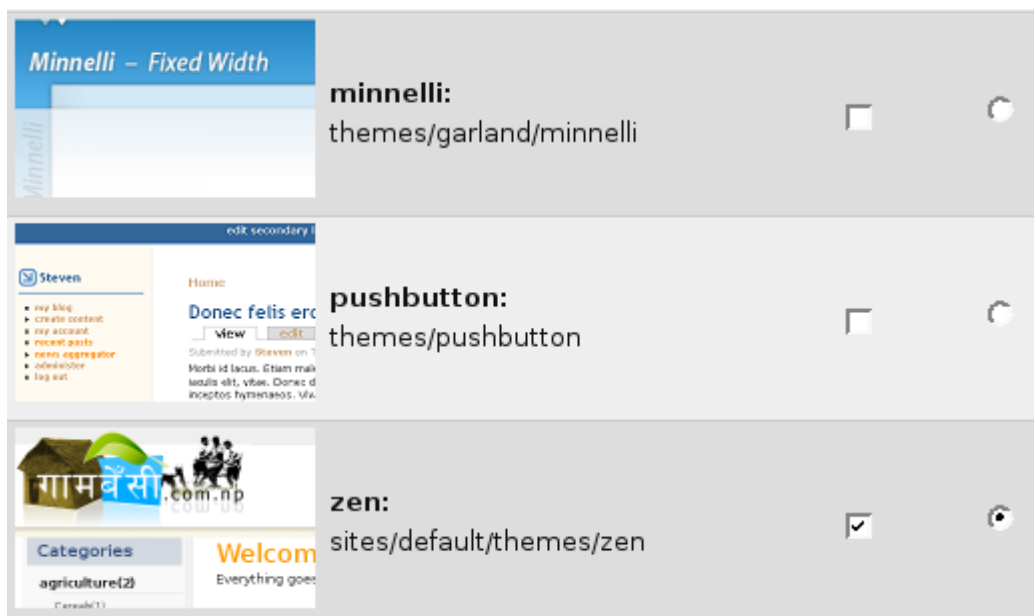


Illustration 7: Themes can be changed easily

### 2.3.3. Multilingual Interface

Language switch is done by click of a link.

Translation is a done by passing every string that is displayed through a translate function t().

Drupal detects the current language preference and extracts language specific strings from **.po** files.

<b>कृषी(2)</b>	<b>agriculture(2)</b>
गेडागुडी(1)	Cereals(1)
पीठो(0)	Flour(0)
फलफूल(0)	Fruits(0)
मह(0)	Honey(0)
सिमी(0)	Legumes(0)
तेल(0)	Oils(0)

Illustration 8: Categories in English and Nepali Language




### 2.3.4. Validation and Message Display

Input validation is important part of the application. It helps to maintain the integrity of the whole application. Gambesi has a flexible style of displaying validation errors and messages to the users.

Whenever a validation error occurs, a message is displayed at the top and also the error field is highlighted.

**Barley**



- ◆ Name field is required.
- ◆ Unit field is required.
- ◆ Shipping options should be defined

**Name: \***

**Description: \***

Description field is not empty  
while name field when empty gives error

Illustration 9: Error message is displayed along with highlighted error field

## 2.4. Documentation

Gambesi modules are properly documented in dOxygen format. Each function of a module is explained as properly as possible.

```
/**
 * This function displays the categories at the root level
 * for HTML themed output calls themed functionc
 */
function sellingleads_add_categorytree_show() {
    // initial thought on function display
    // load an array and pass that array to theme function
    // right now everything done in theme function, needs to be changed
    /**
     * TODO.
     * load values here and pass the value to theme function
     */
    return theme('sellingleads_add_categorytree_show');
}
```

Illustration 10: dOxygen format documentation

The dOxygen styled comments are converted to documentation using dOxygen program itself, which generates HTML output.

## 3. Features

### 3.1. Shopping Cart

Shopping cart is a standard feature of any e-commerce website. An anonymous visitor or a logged in user can search for a product and add it to his shopping cart.

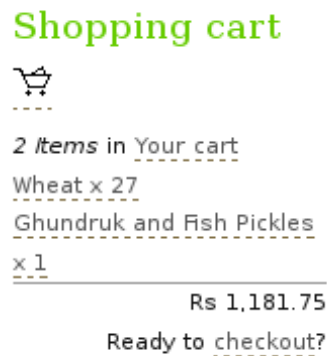


Illustration 11: Layout of Shopping Cart

Anonymous user's cart is stored in a temporary session that ends as soon as cache is cleared.

As for logged in users, cart is stored in database and retrieved during next login session.

### 3.2. Flexible payment system

Current payment system is limited to emails only. A user when try to buy a product or checkout his cart, email is sent to the product owner as a query.

The payment system is flexible enough to make multiple payment

methods available for the users. Say tomorrow a payment gateway is available for Nepali market, then a new pluggable module can be built to interface between core payment module and the payment gateway.

### 3.3. Google Maps Integration

Google Maps provide an intuitive API for third party developers. Gambesi utilizes the API to specify the location of any product. When users try to view a product, its location is displayed Google Maps.

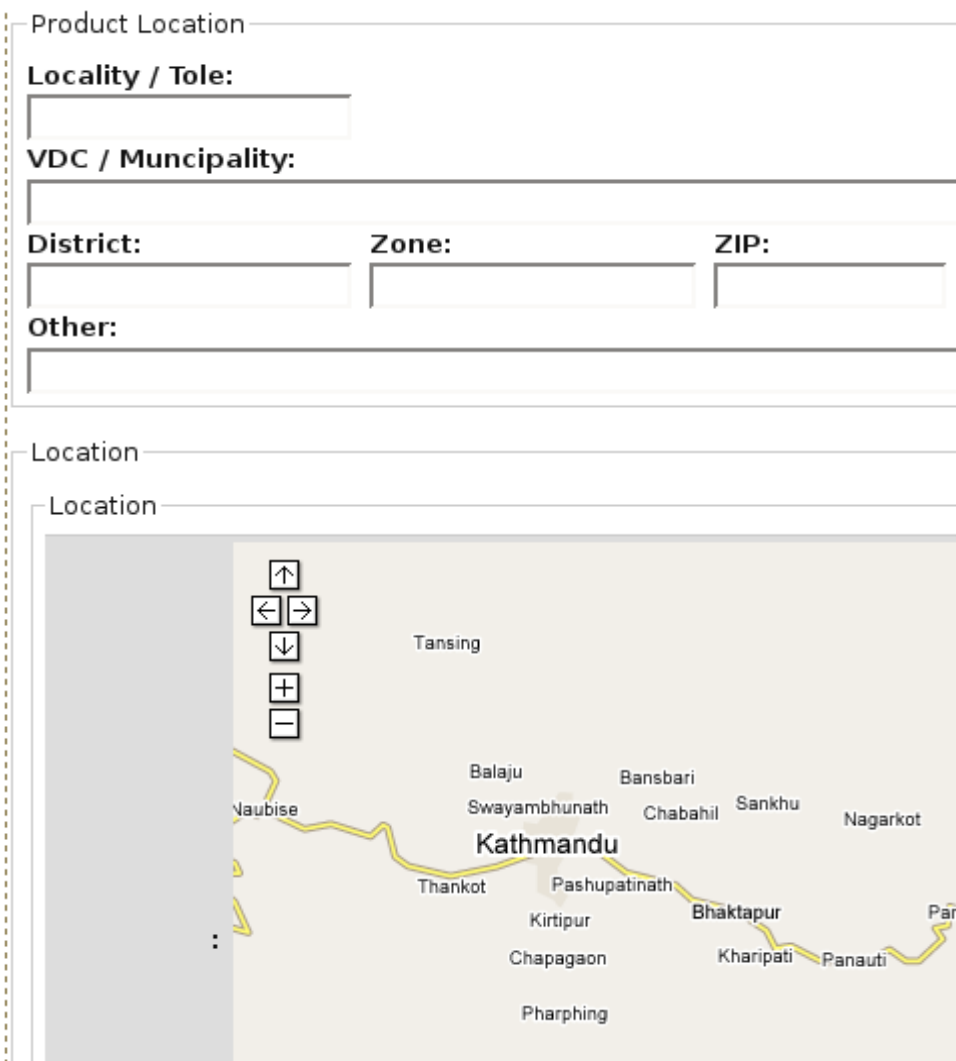


Illustration 12: Google Maps Integration.

## **4. Applications**

The application is to be launched as a web application. The proposed domain name is [gambesi.com.np](http://gambesi.com.np) accessible via the internet.

The primary deployment targets are five tele-centers located across the country. Tele-centers act as mediators between the web application and local people.

Products like handicrafts and agriculture will be given primary focus initially. The website administrator has a big responsibility of over viewing transaction status.

With time other features will be slowly integrated in it. The user registration will be available to general users then.



## 5. Limitations and Future Enhancements

Certain limitations exist in Gambesi. Most of them are due to time constrain and some are due to lack of proper infrastructure in our country.

### i. **Product Quality Verification**

Quality assurance is difficult in a distributed medium like internet. Since transactions occur between seller and buyer without any knowledge of Gambesi, we cannot assure or guarantee on quality. The current model can be changed later on providing buyer protection or seller protection, but that is possible only after online payment gateway has been established.

### ii. **User and Product rating**

Product rating system is a simple extension. It can be implemented using stars and allowing authenticated users to rate the product.

### iii. **Comments and Reviews**

Comments are standard features in Drupal. In Gambesi, they are not well tested, hence hidden from front user. After testing, these can be enabled.

### iv. **Electronic payment system**

Although electronic payment is standard in a lot of countries, Nepal still lacks the basic infrastructure for it. We do have credit cards system, but it is not possible for the general public. One solution is to tie up with local banks and allow users to use their debit cards for purchase. However, this is very difficult and corporate process.

## 6. Conclusion

Working on this project, we've learned a lot of concepts. The primary concept we learned is the internal structure and functional separation of Drupal itself. This didn't just teach us how to use Drupal, it gave us a strong concept on how to separate an application in different logical layouts. The separation of Database Access Layer, IoC Container, Pluggable Architecture and a separate theming structure is extremely flexible for a project like ours where more than few people are working at a single time.

Secondly, we learned the process of e-commerce itself. E-commerce is big, if not huge. Businesses are based on e-commerce process. Its the new medium of doing transactions. Although few ventures have been started locally in Nepal, one that caters the needs of rural participants is lacking. Gambesi was developed to solve the problem.

Our original goal is far from complete. Gambesi is just a tool. Our success will be measured when it will be deployed in real time.

## 7. References

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Apress. ISBN 1-59059-755-9.
2. Miller, Roger (2002).  
**The Legal and E-Commerce Environment Today.**  
Thomson Learning. ISBN 0-324-06188-9.

### 7.2. Website links

1. Drupal official website  
<http://drupal.org>
2. Drupal Zen theme  
<http://drupal.org/project/zen>
3. Gambesi Official Website  
<http://villageecommerce.googlecode.com>
4. Google Maps  
<http://maps.google.com>  
<http://code.google.com/apis/maps>
5. Wikipedia e-commerce page  
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<http://mpp.org>

7. IRC at [#drupal-support](https://irc.freenode.net)