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APPLY ISO 9126 QUALITY STANDARD IN ECOMMERCE WEBSITE

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Abstract and Keywords

The business in eCommerce is very rapidly growing, attracting the majority of the world with most of the similar facilities provided during Physical shopping. It also involves the payment and transactions online with privacy and security.

Purpose:

This Thesina is an explanation of the Application of the quality management standard ISO 9126 in eCommerce website based on concepts about **Quality Management, Quality Management Systems, Software Quality Management, Software Quality Assurance** method and is primarily targeted young graduates with an interest and to flourish in Quality Assurance as a future professional career.

Findings:

We tried to answer some important questions, which arise during the eCommerce business related to the customer satisfaction with good standard of quality. What is **Software Quality Assurance**? What are **Quality Management Standards** in Information Technology Industry? How to produce the highest quality eCommerce websites satisfy the entire customer requirement? We can understand the main reasons through which we can improve the quality for better use.

Approach:

To answer these queries we need to identify the some general related concepts: **Software Quality Assurance, Quality Management Standard, ISO/ IEC 9126**. After that, the research continues about the eCommerce website and current trend in the world some characteristics each eCommerce website must have. Introduction and application of the ISO 9126 in eCommerce website to make it satisfy Functionality, Reliability, Usability, Efficiency.

Example taken as Case study:

Last but not least, we analyze specific case study: http://wineshop.hunters.co.nz, one of the leading eCommerce websites in Wine Distribution in New Zealand, we detected the negative factors of website leading to lower sales, we found tools and solution in order to improve eCommerce website quality management. Finally, to support the better functioning of the website also took the help of a survey on eCommerce websites with users, developers to evaluate its operations.

Key words:

eCommerce, B2C, B2B, C2C, ISO/ IEC 9126, Quality Management, Quality Management Systems, Software Quality Management, Software Quality Assurance .

Sommario

L'attività di e-commerce è molto rapida crescita attrarre la maggior parte del mondo con la maggior parte delle strutture simili forniti durante lo shopping fisico. Essa comporta anche il pagamento e le transazioni on-line con la privacy e la sicurezza.

Motivo:

Questo thesina è una spiegazione alla applicazione della norma di gestione della qualità ISO 9126 nel sito e-commerce basato su concetti di Gestione della Qualità, Sistemi di Gestione Qualità, Software Quality Management, il metodo Software Quality Assurance ed è principalmente rivolto a giovani laureati, con un interesse e di prosperare in Quality Assurance come una futura carriera Professionale.

Giudizio:

Abbiamo cercato di rispondere ad alcune domande importanti, che sorgono durante l'attività di commercio elettronico relativo alla soddisfazione del cliente con buon livello di qualità. Cos'è il Software Quality Assurance? Quali sono i Principi di Gestione della Qualità nel settore dell'Information Technology Industry? Come per produrre i massimi siti e-commerce di qualità soddisfano l'intero fabbisogno del cliente? Possiamo capire le ragioni principali attraverso il quale possiamo migliorare la qualità per un migliore utilizzo.

Approccio:

Per rispondere a queste domande abbiamo bisogno di identificare i alcuni concetti relativi generale:. Software Quality Assurance, Gestione della Qualità standard, ISO / IEC 9126 Dopo di che, la ricerca continua sul sito e-commerce e la tendenza attuale nel mondo alcune caratteristiche di ogni sito e-commerce deve avere. Introduzione e l'applicazione della ISO 9126-nel sito e-commerce per renderlo soddisfare funzionalità, affidabilità, usabilità, efficienza.

Data:

Per aiutare i dati del nostro thesina abbiamo creato 21 domande, che sono stati suddivisi in base a determinati criteri basati sulla qualità di e-commerce necessario per essere messo a fuoco. Questi dati mostrano la quantità di persone interessate al shopping online e anche una vista della importante gruppo di interesse tra le diverse età. Le questioni diverse: l'età, sesso e il tipo di prodotti che cercano nella shopping online.

Esempio preso come caso di studio:

Ultimo ma non-meno importante, analizziamo studio specifico caso: http://wineshop.hunters.co.nz, uno dei principali siti di eCommerce distribuzione del vino in

Neozelandese, abbiamo rilevato i fattori negativi di sito leader per le vendite più basse, abbiamo trovato strumenti e soluzioni al fine di migliorare la gestione della qualità eCommerce sito web. Infine, per sostenere un migliore funzionamento del sito web anche preso l'aiuto di un sondaggio sui siti web e-commerce con gli utenti, gli sviluppatori di valutare le sue operazioni.

Acknowledgements

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List of Abbreviations

EDI: Electronic Data Interchange

SCM: Supply Chain Management

B2B: Business to Business

B2C: Business to Customer

C2C: Customer to Customer

ISO/IEC: International Organization for Standardization/ International Electro technical Commission

Chapter 1 : Introduction

The new shopping trend is more of captured electronically, hence the name eCommerce. It refers to doing business online where companies from various fields have invested to grab the fruit of eCommerce. Through this all kinds of transactions are possible, except the physical delivery, which is again ordered through the Internet.

It has provided great privilege to retailers:

➢ It allows being open to global market and understanding the current business changes/trends of customers.

➢ Time and turnover are always maintained to correct profitable level.

➢ It reduces the cost of labor, rent and also unwanted inventory.

The eCommerce does have some advantages, which has made the shopping experience more innovative, and also customer involvement.

• Availability of different products and brands to choose from

• Enough information providing customers the freedom to compare different products depending on price, quality, design etc.

• Irrespective of time and place to shop, requiring only Internet facility.

The eCommerce retailers not only need to attract more customers from the traditional brick-and-mortar marketplace, but they also need to compete with other eCommerce retailers for e-market share. The researches have shown that more than 85% of people using internet have made at least one online purchase. The researches by eMarketer (Internet Retailer, 2011) more than 90% of people will start making online purchases by 2015.

There are many researches conducted on the ecommerce industry, which lead to many unanswered queries. Some of the reasons could be the advancement in technology or the amount of attention paid by the merchant during the website creation. Over the years many new websites have developed different unique formats to be effective for the customers. Since many researches have shown the quality on service provided to the customers there have been missing data as to how should the merchant manage to create an effective idea on the clients mind to be the most sustainable and reliable in the market. The quality of eCommerce websites is measured by instruments which mainly focuses on the quality of service and the website quality. Furthermore, the quality factors (characteristics) extremely focus on usability features of websites while neglecting other necessary quality factors such as quality of information, performance and functionality. There are additional factors like:

- Development of a comprehensive instrument to measure how online customers perceive the quality of the shopping channel, website, transaction and recovery based on the customer decision making process;

- Identification of the determinants of customer satisfaction and the key dimensions of customer behavioral intentions in e-commerce;

- Examination of the relationships among perceived quality, customer satisfaction and Loyalty intention using empirical data;

- Application of different statistical packages (LISREL and PLS-Graph) for data analysis and comparison of how these methods impact the results and

- Examination of the moderating effects of control variables.

The wine being a integral drink on the meal table of most families, the wine is a huge part of everyday life of families, the wine companies have also ventured into this electronic medium to promote and communicate with potential buyers, and to understand the changing requirements. The customer places an order to the retailer, winery, which then fills the request using a delivery service, the payment being done by the credit card. The other way can be a physical shopping, but in the eCommerce websites the customer cannot access the storefront where the wine can be physically seen. However, it provides the list of wines, expert advice, vintage information and likes. The http://wineshop.hunters.co.nz is a wine selling website by Hunter's Marlborough Company, which is an award winning company in New Zealand. The website provides the required information, and it also goes by the saying of Quality and not quantity of wine. To compare the quality of the website, its very important to understand the reasons of the current sections in the website.

1.1   Problem Statements

The website needs to be evaluated for the reason to check if it's providing the intended service its designed for. Its not only a reference to the case of Wine Hunters shop but to all the ecommerce businesses. The website has the information regarding the specific wines, but the presentation is not eye capturing. It also does need a makeover to be the choice for all age groups and not only focusing on certain areas. The major competitor to this is Wine.com, which is the most famous in the USA; others are wine searcher.com and winebid.com. All these are successful for the B2C and B2B business. To instill confidence in the Internet shopper to part with their money, the Hunter's wine shop web design has to look high quality with a professional feel. **Search engine optimization** is a long-term strategy and shouldn't be taken lightly. **Payment Gateway** needs to consider the fraud screening tools and risk management services. They offer in order to protect your online business, for example, does the payment gateway

support the **3D Secure Scheme**. Devising a web and **internet marketing** strategy early on is essential.

We try to answer the questions:

- " Is it worth ordering a wine online from Hunters or better to visit other websites(eg: amazon, club W)"

- " Will this product add to the taste of my family, can I be secure while shopping online"

1.2 Research Objectives

The general idea of this thesis is to design a quality evaluation framework for ecommerce websites with the standard ISO 9126. The standard has criterias on which the ecommerce websites have to meet to be the successful business.

✓ To what extent the ecommerce will be successful for already established business.

✓ To what extent Electronic Commerce has the Impact on Business Values on all the sectors of service organisations

✓ To what extent Electronic Commerce has the maximum Impact on Business Values with reference to percentage of Electronic Commerce spending in an organisation

In this thesis we try to search all the prospects needed in the ecommerce sites:

A good e-commerce site should present the following factors to the customers for better usability

✓ Knowing when an item was saved or not saved in the shopping cart.

✓ Returning to different parts of the site after adding an item to the shopping cart.

✓ Easy scanning and selecting items in a list.

✓ Effective categorical organization of products.

✓ Simple navigation from home page to information and order links for specific products.

✓ Obvious shopping links or buttons.

✓ Minimal and effective security notifications or messages.

✓ Consistent layout of product information.

In this thesis we will discuss deeply the entire software development process, which includes processes such as requirements definition, software design, change management, configuration management, testing, release management based on eCommerce websites. Designing the solution, focused on planning test process e.g. what type of tests will be performed, how they will be performed in context of test environments and test data.

The other factor in the design of an e-commerce site is feedback. The interactive cycle between a user and a web site is not complete until the web site responds to a command entered by the user. According to Norman "feedback--sending back to the user information about what action has actually been done, what result has been accomplished"--is a well known concept in the science of control and information theory.

1.3   Report structure

The following summarizes the chapters of our thesis:

Chapter 1 Introduction

It will give the general overview of our thesis.

Chapter 2eCommerce

This chapter discovers the eCommerce definition, eCommerce model and the current development trend of eCommerce in the world.

Chapter 3 Introduction about quality Management

In this chapter we introduce some general concepts about Quality Software Management, ISO 9126 standard and identify challenges faced during eCommerce website quality .

Chapter 4 eCommerce website quality management

This chapter gives some characteristics each eCommerce website should have and apply ISO 9126 in eCommerce quality evaluation.

Chapter 5 Research and Methodology

This chapter introduces the method to collect response and evaluate the current quality performance of this website http://wineshop.hunters.co.nz/, one of the leading eCommerce website in wine distribution.

Chapter 6 Finding and Analysis data follow Juran trilogy

This chapter analyze specific case study data follow Juran trilogy, and identify some pros and cons from the current system; we also suggest some possible solutions to improve the website quality.

Chapter 2 : Literature Review about ECommerce

This chapter explains the eCommerce industry, the different categories in this industry and the different ways they function. This industry has positive impacts on the new ways of shopping but also followed by few negative impacts. The different departments in their value chain and their interconnection to provide the consequences to be good customer satisfaction with best of industry service. The process of shopping at the comfort of customer's residence with added benefits like free shipping, payment on delivery, and also refundable if product not appropriate, has not only captured the western world but also Asia, Africa etc. Its development in world is rapidly growing with more facilities for customers to choose from different merchants. The competition is transparent which provides great deals for customers, for merchants its better way of selling products with least investments on marketing and space, and also employees. This also explains what the customers expect from the websites and also the new requirements of customers contrary with the older ones.

2.1   What is eCommerce

ECommerce usually refers to the trade in global business activities, the Internet environment based on browser/server application mode, achieving consumer on-line shopping, on-line transactions between merchants and on-line electronic payment and a variety of business activities. (Marshall Brain. How eCommerce works, 2000)

Over the past years eCommerce has grown fast. In order to keep successful, an eCommerce website need to attract new customers and keep existing ones, as extended customer relationships will lead to direct rising profits. (M. Arlitt, D. Krishnamurthy, and J. Rolia. Characterizing the scalability of a large web-based shopping system. ACM Transactions on Internet Technology,2001)

ECommerce website is one type of web applications, most web systems have to provide transaction service, state maintenance, and reliable storage functions (G. Gama, W. Meira Jr., M. Carvalho, D. Guedes, and V. Almeida. Resource placement in distributed eCommerce servers. The Evolving Global Communications Network, 2001), so these rules also apply to eCommerce applications. A transaction activity is involved to plenty of database operations and some third party interactions, such as shipping and payment service (U. Vallamsetty, K. Kant, and P. Mohapatra. Characterization of eCommerce traffic Fourth IEEE International Workshop on Advanced Issues of eCommerce and Web-Based Information Systems, 2003).

2.2   Ecommerce Category

Most eCommerce activities can be divided into one of the following categories:

Business-to-Business (B2B), Business-to-Customer (B2C) and Customer-to-Customer (C2C).

2.2.1 Business-to-Customer (B2C)

Businesses selling to the general public typically through catalogs utilizing shopping cart software.

This method often is chosen by business when implementing eCommerce system, especially with small and medium enterprises serve customers.

We have some conclusion:

The main successful factor of eCommerce website is the attractive ability and customer relationship maintenance.

The success of B2C eCommerce companies is based on the advantages in purchasing which they provide for customer. Some companies like Amazon.com… attract online users mainly due to satisfy perfectly clients demand.

2.2.2 Business-to-Business (B2B)

Companies doing business with each other such as manufacturers selling to distributors and wholesalers selling to retailers. ECommerce is used to exchange data, purchase and pay products and services. About technology; B2B use EDI (Exchange Data Interoperability).

2.2.3 Customer-to-Customer (C2C)

There are many sites offering free classifieds, auctions, and forums where individuals can buy and sell thanks to online payment. It happens between individuals, some one provides product information on the websites and the others view it, purchase online.

C2C model depends on the level of users; it requires each individuals take part in transactions must have knowledge about eCommerce. This is some websites about products or services sell or buy with some utilizations such as search, consulting, etc.

This model includes transactions between customers and each customer do transaction with another customer. www.ebay.com and www.bazee.com is typical C2C model but users must register with service providers on eCommerce websites to join the transactions.

The sellers also need to pay fees while the buyers don't have to pay anything.

2.3 Advantages

•   Lower relative cost as well as operation cost.

- Better customer service

- Convenient market search

- Higher overall interactivity between consumers and businesses.

- 24/7 operations possible with minimum physical interactions.

2.4   Disadvantages

- Security against viruses, hackers and attackers.

- Small businesses still have to compete with the reputation of market leaders.

- Business may grow rapidly and the infrastructure may not be able scale with the growth.

- Customer relations problems

– E-business requires customer loyalty to survive.

- Products people will not buy online.

– For some products people like to "road-test" the product before making a purchase.

- Corporate vulnerability.

– Corporations do web-farming to extract business intelligence from online marketing information of their competitors.

- Lack of blueprint for handling eCommerce.

– Traditional corporate structures and procedures inhibit progress in eCommerce.

– Most corporations have significant shortage of e-literate executives.

2.5   Value chains in ECommerce
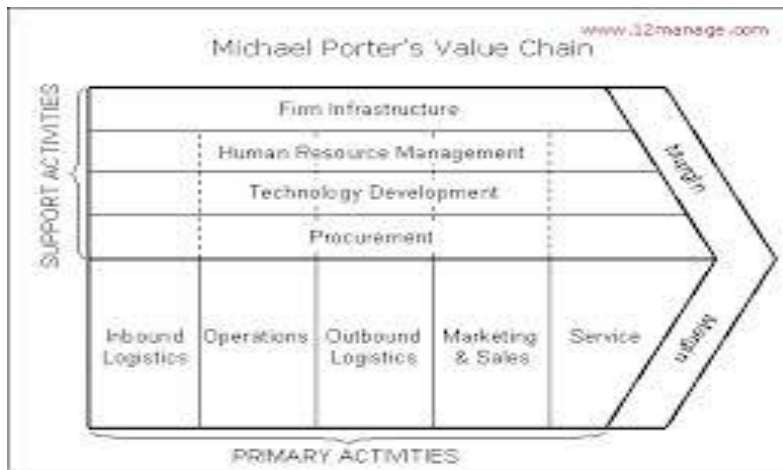
Figure 1 Value chains in eCommerce

2.5.1   Primary Activities of a Business

2.5.1.1 Inbound Logistics
–   Vendor selection.

–   Comparative shopping.

–   Negotiation of supply contracts.

2.5.1.2 Operations
–   Assembling.

–   Testing.

–   Packaging.

2.5.1.3 Outbound Logistics
–   Storage, distribution and shipping of the merchandise.

2.5.1.4 Marketing and Sales
–   Advertising.

–   Product promotion.

–   Sales management.

2.5.1.5 Service
–   Testing.

– Maintenance.

– Repairs.

– Warranty work.

2.5.2 Support Activities of a Business

2.5.2.1 Firm Infrastructure

– General management.

– Finance.

– Planning.

– Legal services.

– An organization chart.

– A communication network.

– Authority structure.

2.5.2.2 Human Resources

– Recruitment and retention.

– Training and career path development.

– Compensation and benefits administration.

2.5.2.3 Technology Development

– Focuses on improving the product and business processes in the primary activities.

2.5.2.4 Procurement

– Focuses on the purchasing function.

(Ittihad University at Ras Al Khaimah, UAE in fall 2003)

2.6   ECommerce Development in The World

Percentage of People who have shopped online by area

North America: 83%
South America: 81%
Africa: 55%
Europe: 85%
Asia Pacific: 87%

Figure 2 Percentage of People who have shopped online by area

(Source: Global trends in Online Shopping, A Nielsen Global Consumer report, June 2010)

Top 5 things people intend to buy in the near future

Book: 44%
Clothing: 36%
Airline Tickets: 32%
Electronic equipment: 27%
Hotel Reservation: 26%
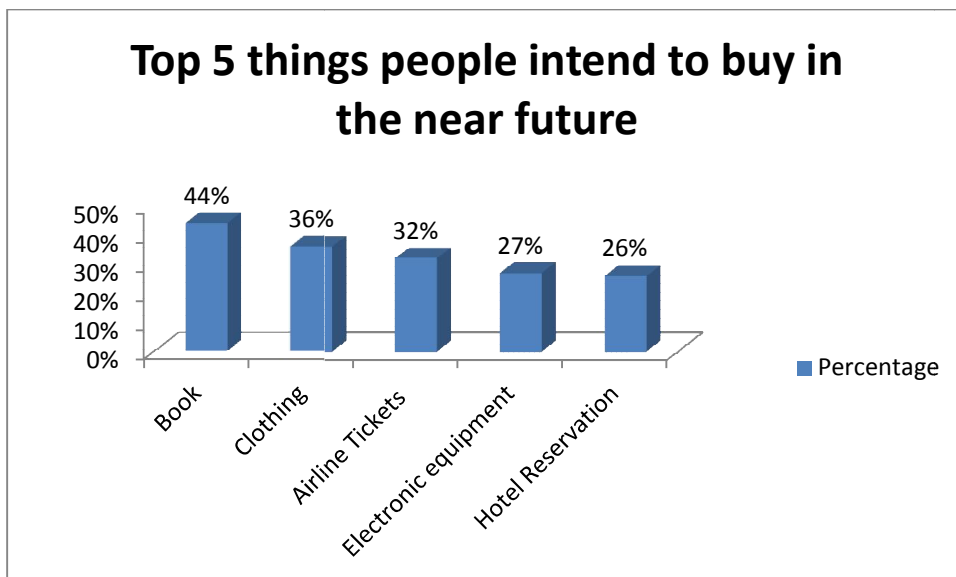
Figure 3Top 5 things people intend to buy in the near future

(Source: Global trends in Online Shopping, A Nielsen Global Consumer report, June 2010)
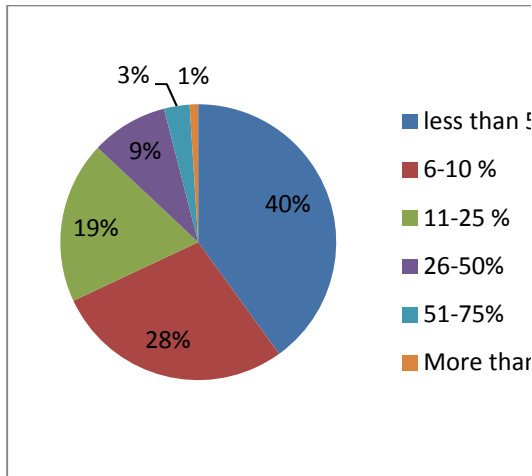
Figure 4 How Much of Total monthly spending is made online in East
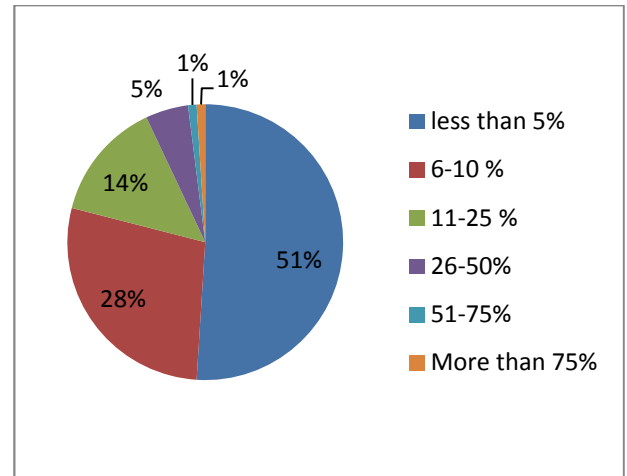
Figure 5How Much of Total monthly spending is made online in West

(Source: Global trends in Online Shopping, A Nielsen Global Consumer report, June 2010)

This review also says that people make purchase decisions on the basis of prior study online about the product and also about the store selling it.

The new eCommerce revolution is beyond channels and borders. Customers are looking for instant satisfaction, they use multiple channels and they are ready to buy in any country. Retailers need to be very proactive to respond to this new generation customers and to be leaders In the market. The global eCommerce summit is one of the leading International event which focuses on the innovative and important changes and developments in the eCommerce cross border trade and also on the channel retail.

In a way, the B2B and the B2C eCommerce market are less different than people think, says James Hardy, pointing to the fact that the global SME space is highly fragmented and very lean. The internet enables SMEs to find each other and 'create markets that didn't exist'. Alibaba.com serves as a platform to connect the demand and supply side.

However, the marketing challenge in B2B online trade is not the same: 'Trends such as m-commerce and multichannel play a much smaller role in B2B e-commerce'. Whilst much of Europe is in early stages of eCommerce growth, both China and the United Kingdom have huge and constantly growing eCommerce industries. The United Kingdom has a strong infrastructure to enable online and mobile commerce which has helped make it so popular for businesses and

consumers alike. In China, due to its disparate geographical spread and economic growth, eCommerce has seen a natural adoption rate, even over traditional bricks-and-mortar retail.

Culturally, the United Kingdom and Europe is more a buyer market and China is a supplier market, which affects the way companies market their goods and brands. In the United Kingdomits more about the brand. In China its more about the product, but Chinese companies are becoming much more savvy about brand building. Chinese suppliers have very good quality manufacturing but becoming a trusted brand takes time to develop.

'Asian companies can learn a lot from European companies about brand, and the power of an emotional connection with your consumers through multiple touch points, from the look and feel of the site, to the quality and accessibility of customer service. Asian businesses are starting to focus and invest heavily in building brands, which will help their move into global markets,

2.7 Research gaps

In this section, we will analyze the literature review in order to find out the gaps between the theory and the real industrial trends. Those gaps have been detected showing similarities and differences in previous research.

2.7.1 Gap 1

In the researches done the opening of the secret to the missing relation between the objective of business, system functionalities, and the required information is the ley gap while making a successful ecommerce system, which is also responsible for the changing trend in the market every season.

2.7.2 Gap 2

The bridge to the connection of Determining the audience, their goals and objectives Generate a list of intended audiences Identify what prospective customers expect and the Goal to enhance site visitors' experience – Escorting them quickly to the merchandise – Speed and responsiveness are crucial – The seven-second rule. The absence of placing the rules on practice.

2.7.3 Gap 3

The gap between the provided information for payments in many studies provided are not the accurate form of being secured, for many small retailers the usage of online payment is creating an issue due to not being updated with the new laws and regulations necessary for international or national. The banking transaction online are different around the world making it complex during interactions between the eastern and western world.(source: Forbes

2.7.4   Gap 4

Gap between the agreements and the provided service for the merchants. Studies showed that many merchants are outdated on their online marketing due to being unaware of needful facts of trading online. To understand the links of the new and old features during the upgrading of the websites, after they are created. The merchants being threatened by the developer of not having the important features upgraded on the websites after a certain period needs more payments, creating havoc. (Building eCommerce system, Alexander Nikov, 2006)

Theory	Practice
Business Plan	Ecommerce System
Customer expectation	Visitor Experience
Payment Information	Transaction Online
Agreement	Provided Service
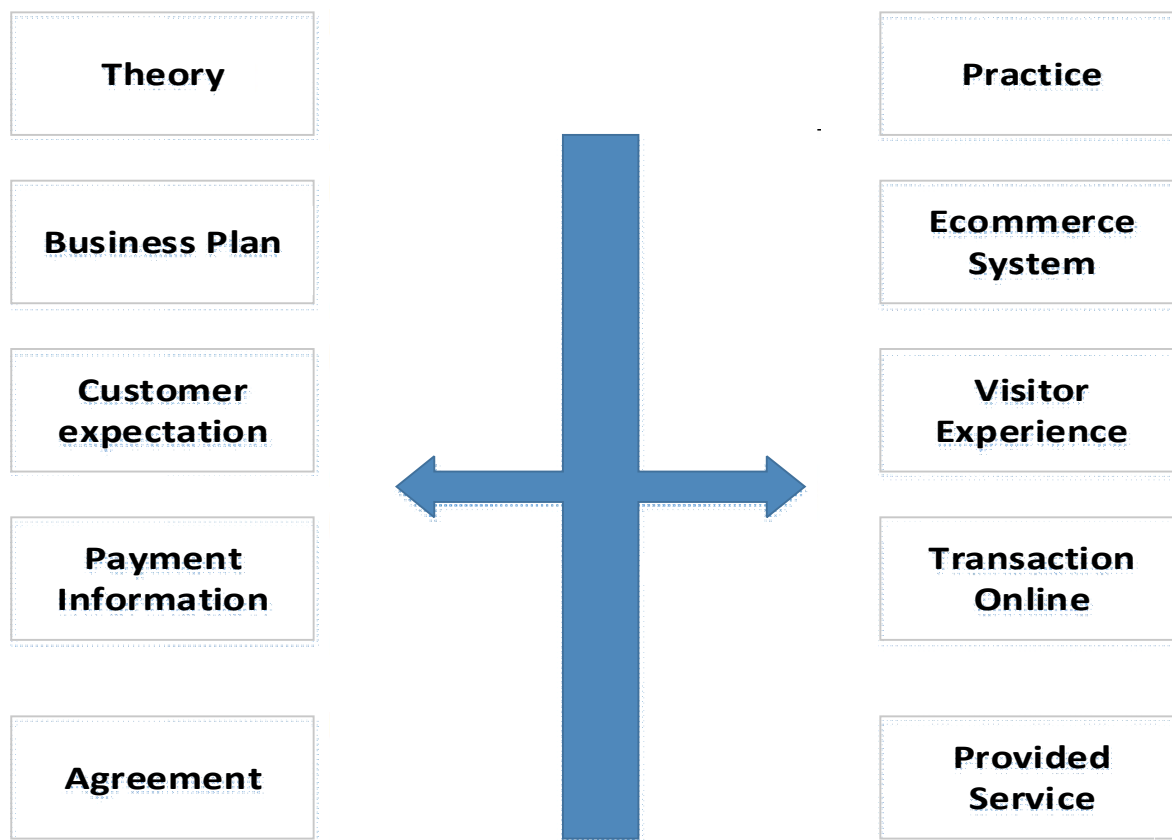
Figure 6 Gaps Summary

Gap

Gap 1	The missing relation between the objective of business, system functionalities, and the required information.
Gap 2	The connection of Determining the audience, their goals and objectives.
Gap 3	The gap between the provided information for payments and transaction online.
Gap 4	Gap between the agreements and the provided service for the merchants.

Chapter 3 : Introduction about ISO 9126 Standards

The importance of Quality management is keen in every business for successful performance. The different problems in quality, the main factors and skills involved in Quality management are discussed briefly. The ISO is a body which provides industrial, commercial standards of quality to the reputed companies.

Software assurance provides trust and confidence to customers. It explains the software quality management for present growing eCommerce shopping around the globe. The standard ISO 9126 is used to evaluate the software quality. This standard focuses into six factors (efficiency, maintenance, reliable, portable, functional and usability) and all have their own specifications which can evaluate the quality of any website for best performance.

This chapter goes into a deeper clarification of the eCommerce website performance, evaluation with ISO 9126 and also explains the ways to improve the status of different websites by following the metrics of ISO 9126. This standard is also used to evaluate the case study of our thesis for wine shop hunters; it helped to create the better future of this eCommerce site.

3.1   Quality problems

What is software quality? Someone said that software quality is the speed of implementation while the others said that it must suitable with the user's requirement. Another one told the software without errors or easily used is high quality. In general, they say that software quality is software satisfies the user's requirement.

3.2   Quality Management

The term Quality management being the most recent and important phenomenon does not just mean to assure 'good quality' by the more general definition, but rather to ensure that an organization or product is consistent, can be considered to have four main components: quality planning, quality control, quality assurance and quality improvement (Wikipedia).

There are certain principles to improve the performance for any company: Customer focus, Leadership, People Involvement, Process approach, system approach to management, continual improvement, factual approach to decision making, mutually beneficial supplier relationships (Wikipedia).

3.3   Quality Management systems

A set of coordinates activities to direct and control an organization in order to continually improve the effectiveness and efficiency of its performance. Control of the QMS will depend on the size and complexity of the organization. ISO is a site-based system, and local audits and reviews are essential, even if these are supplemented by central reviews. It always tries to have a

balance between the customer requirements and his organization's requirements. These requirements can be met only when sufficient data and information is provided starting from the supplier to the final customer. (KanchanaRatnam; t.t. Rajkumar; Uma Maheshwari, Quality Management System for Corporate, 2014)

3.4   Software Quality management

We might accept it or not, but software has become a part of our society and its unfair to consider a world without software. Most famously named as Software Quality Management has many functions like to avoid faults, to company-wide awareness and responsibility of all the members of quality culture, reduction of learning curve and also ensure continuity of process during changes within the team.

3.5   Software quality assurance

The methods by which this is accomplished are many and varied, and may include ensuring conformance to one or more standard, such as ISO 9000 or a model such as CMMI.

Software assurance: software assurance is "the planned and systematic set of activities that ensures that software processes and products conform to requirements, standards, and procedures to help achieve:

Trustworthiness - No exploitable vulnerabilities exist, either of malicious or unintentional origin, and

Predictable Execution - Justifiable confidence that software, when executed, functions as intended."

(Samate.nist.gov, "Main Page - SAMATE project". 2013)

3.6   ISO/ IEC 9126Standards

It's the international standard to evaluate software quality. It is a clarified and divided method quality attributes in order to create measurable values to guarantee software quality.

The standard is divided into four parts:

- Quality model.

- External metrics.

- Internal metrics.

- Quality in use metrics.
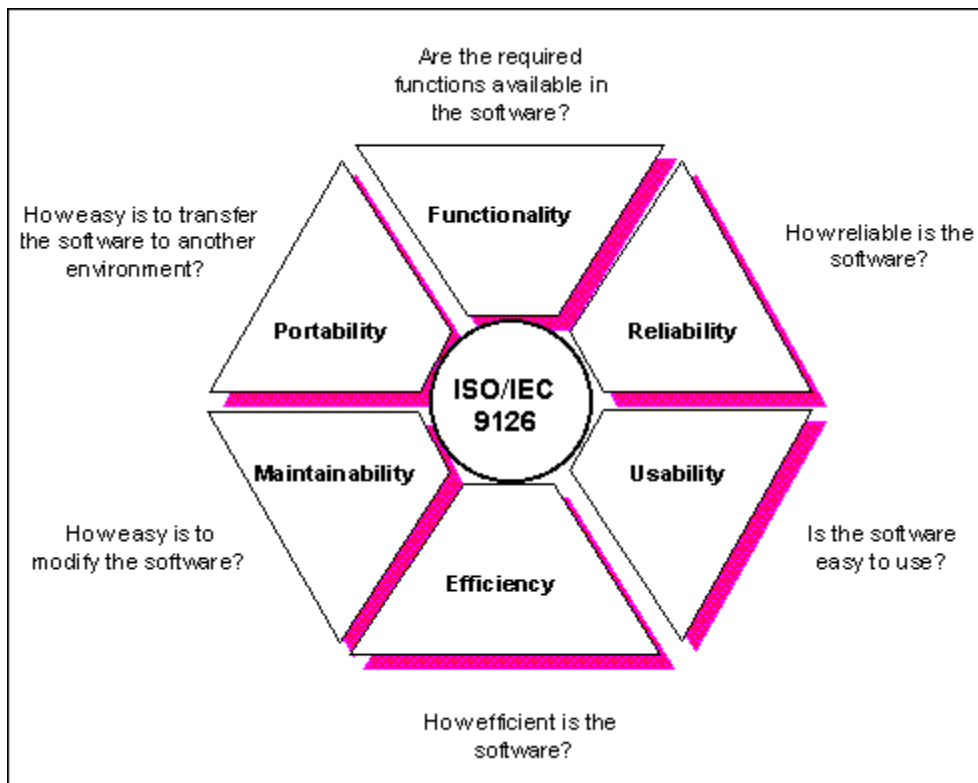
Figure 7The six quality characteristics of a software

(Source: ISO/ IEC 9126, Quality characteristics and guideline for their use, 1991)

It is a model which is used to evaluate performance, safety or satisfaction, etc. All features become software quality management. In practice, ISO 9126 doesn't use to evaluate software quality completely, but we can base on some its specific aspects to evaluate software quality.

(ISO/IEC JTC1 /SC7   N2416R, Japan, 2002)

ISO 9126 model used to evaluate internal and external quality.

Stability

Analyzability

Testability

Changeability

Maintainability

Suitability

Accuracy

Functionality

Compliance

Security

Interoperability

Learnability

Understandability

Usability

Operability

ISO/ IEC 9126:
Quality Model

Adaptability

Conformance

Co-existence
Installability

Portability

Replaceability

Time Behaviour

Efficiency

Resource Behaviour

Recoverability

Reliability

Maturity

Fault Tolerance

Figure 8 ISO / IEC 9126: Quality Model

(Source ISO/IEC JTC1 /SC7   N2416R, Japan, 2002)

3.6.1   Functionality metrics

It measures the functional behavior of a system which may be observed from the Differences between the results and the requirements;

3.6.2   Suitability metrics

It measures the occurrence of an unsatisfying function testing and user operation of the system.

3.6.3   Accuracy metrics

It measures the frequency of users encountering the occurrence of inaccurate matters .

3.6.4   Interoperability metrics

It measures the number of functions involving data , which are transferred easily between these software product.

3.6.5   Security metrics

It measures an attribute such as the number of functions with, or occurrences of security problems.

3.6.6   Functionality compliance metrics

It measures an attribute such as the number of functions, compliance problems, which are satisfied standards, requirements.

3.6.7   Reliability metrics

It measures attributes the behaviors of the system.

3.6.8   Maturity metrics

It measures such attributes as the software freedom of failures caused by faults existing in the software itself.

3.6.9   Fault tolerance metrics

It measures the software capability in cases of operation faults.

3.6.10 Recoverability metrics

It measures such attributes as the software with system being able to re-establish its adequate level of performance and recover the data directly affected in the case of a failure.

3.6.11 Reliability compliance metrics

It measures an attribute such as the number of functions with, or occurrences of compliance problems, in which the software product fails to adhere to standards, conventions or regulations relating to reliability.

3.6.12 Usability Metrics

It measures the extent to which the software can be understood, learned, operated, attractive and compliant with usability regulations and guidelines.

3.6.13 Understandability metrics

Users should be able to select a software product, which is suitable for their intended use.

3.6.14 Learnability metrics

It assesses how long users take to learn how to use particular functions, and the effectiveness of help systems and documentation.

3.6.15 Operability metrics

It assesses whether users can operate and control the software.

3.6.16 Attractiveness metrics

It assesses the appearance of the software, and will be influenced by factors such as screen design and colour.

3.6.17 Usability compliance metrics

It assesses adherence to standards, conventions, style guides or regulations relating to usability.

3.6.18 Efficiency metrics

It measures such attributes as the time consumption and resource utilization behavior of computer system including software during testing or operations.

3.6.19 Time behavior metrics

It measures such attributes as the time behavior of computer system including software during testing or operations.

3.6.20 Resource utilization metrics

It measures such attributes as the utilized resources behavior of computer system including software during testing or operating.

3.6.21 Efficiency compliance metrics

It measures an attribute such as the number of functions with, or occurrences of compliance problems, which is the software product failing to adhere to standards, conventions or regulations relating to efficiency.

3.6.22 Maintainability metrics

It measures such attributes as the behavior of the maintainer, user, or system including the software, when the software is maintained or modified during testing or maintenance.

3.6.23 Analysability metrics

It measures such attributes as the maintainer's or user's effort or spent of resources when trying to diagnose deficiencies or causes of failures, or for identifying parts to be modified.

3.6.24 Changeability metrics

It measures such attributes as the maintainer's or user's effort by measuring the behavior of the maintainer, user or system including the software when trying to implement a specified modification.

3.6.25 Stability metrics

It measures attributes related to unexpected behavior of the system including the software when the software is tested or operated after modification.

3.6.26 Testability metrics

It measures such attributes as the maintainer's or user's effort by measuring the behavior of the maintainer, user or system including software when trying to test the modified or non-modified software.

3.6.27 Maintainability compliance metrics

It measures an attribute such as the number of functions or occurrences of compliance problems, where is of the software product fails to adhere to required standards, conventions or regulations relating to maintainability.

3.6.28 Portability metrics

It measures such attributes as the behavior of the operator or system during the porting activity.

3.6.29 Adaptability metrics

It measures such attributes as the behavior of the system or the user who is trying to adapt software to different specified environments. When a user has to apply an adaptation procedure other than previously provided by software for a specific adaptation need, user's effort required for adapting should be measured.

3.6.30 Installability metrics

It measures such attributes as the behavior of the system or the user who is trying to install the software in a user specific environment.

3.6.31 Co-existence metrics

It measures such attributes as the behavior of the system or the user who is trying to use the software with other independent software in a common environment sharing common resources.

3.6.32 Replaceability metrics

It measures such attributes as the behavior of the system or the user who is trying to use the software in place of other specified software in the environment of that software.

3.6.33 Portability compliance metrics

It measures such attributes as the number of functions with, or occurrences of compliance problems, where the software product fails to adhere to required standards, conventions or regulations relating to portability.

Chapter 4 : Applying the ISO 9126 standard to the eCommerce Website

In chapter 1 we made the outline of our thesis with the introduction of the following chapters, the idea about the thesis is actually focusing on. In chapter 2 we tried to explain the World of eCommerce, its establishment in the past few years and its future. In Chapter 3 the standard, which the eCommerce follows for its review on the Quality management, is ISO 9126 which is keenly discussed. To qualify for the standard ISO 9126, there are certain metrics on which the websites are reviewed. Then we explain the quality management of an eCommerce website. This chapter explains in detail the main components of eCommerce websites on the basis of quality. Each component has certain criteria's, which are highlighted and briefed. It deals with all the main features of Hunters website which are relevant to the easy access to the customers. The Use Case diagram of the eCommerce sites and the block diagram explaining the functioning of the eCommerce site, and the whole procedure during the shopping and the different tabs the customers hit. The website has certain information which is not highlighted to the extent it should, explaining these factors are not only important but also needed to be modified accordingly. Quality does not depend only on the service provided, but also the added facilities, all the facilities provided on the homepage are good but not popping to the best catchers.

4.1   Description of the theme

Search Products		Join Site By Creating an Account		My Account

View Product listing				View/ Edit Profile

View Product details		Login		My orders

| View Cart | | | | |

| Manage cart | | | | |

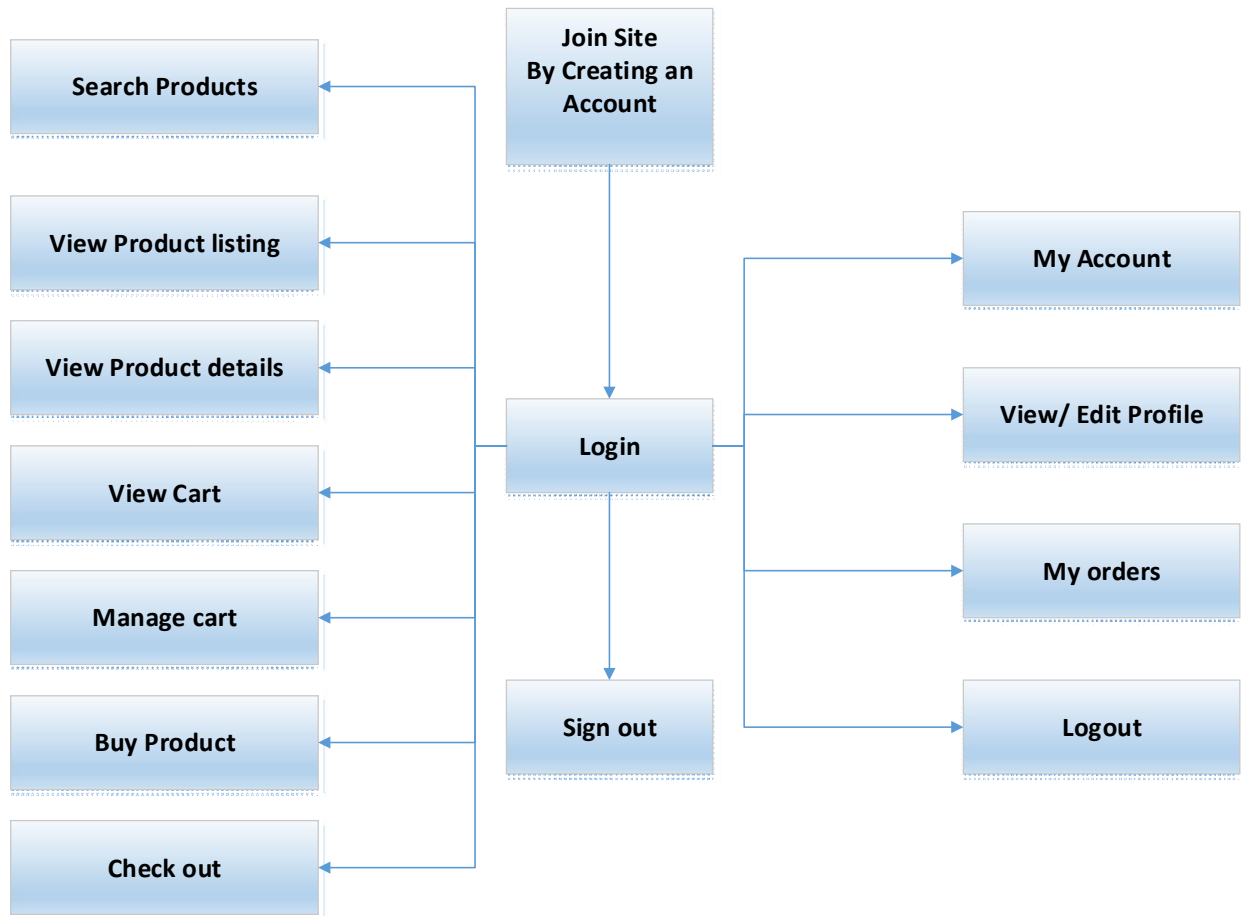| Buy Product | | Sign out | | Logout |

| Check out | | | | |

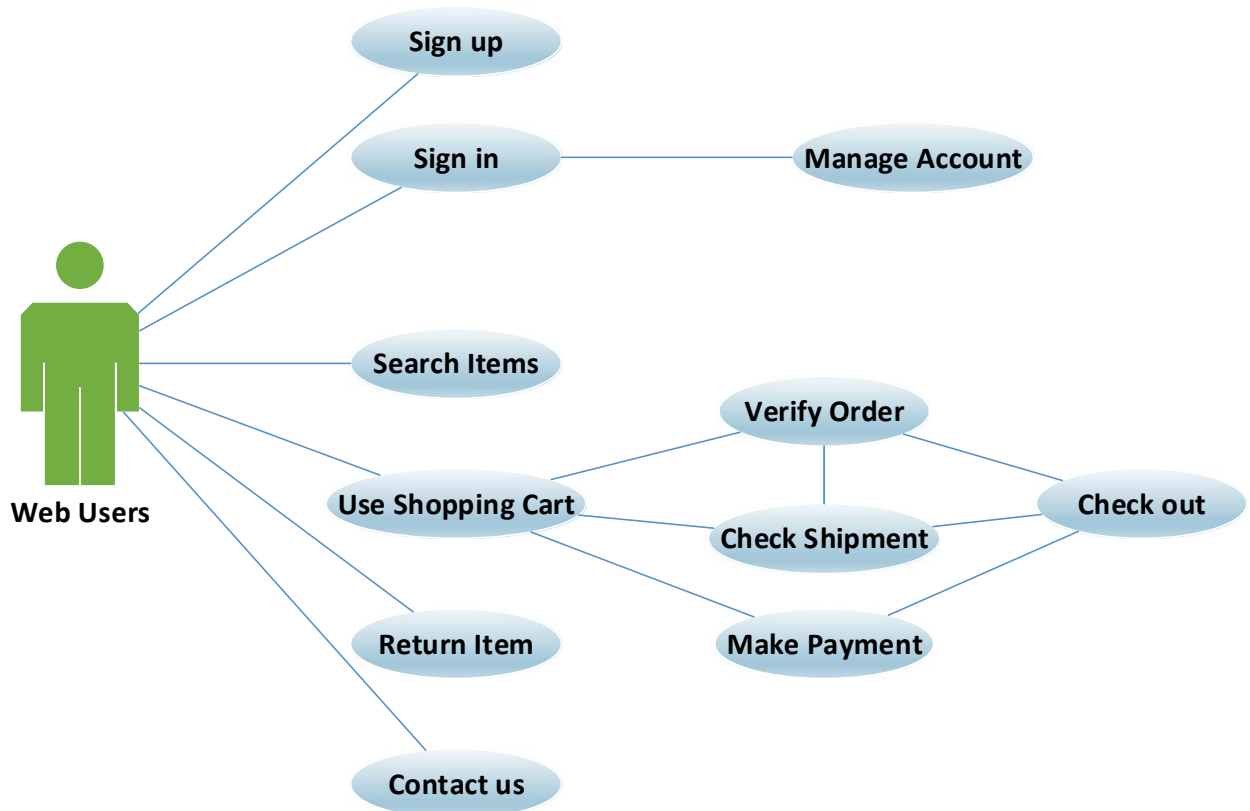**Figure 9ECommerce System Block Diagram**

Figure 10 Use Case Diagram of ECommerce website

4.2   Some characters of eCommerce need to evaluate

4.2.1   Site map

We should consider a site map in eCommerce website carefully. Site map describes the overview scheme of all the components in eCommerce website appropriately and exactly. When it is presented under tree view, it helps user search information quickly and effectively.

For a successful online business, every merchant needs to think from a customer point of view. As the Online shoppers have a short attention span, a small scroll through the site they can create an opinion about the site, so it's very important to have the crucial things involved in the first page of the site.

4.2.2   Branding and good logo

When a customer visits a site, it's important that in the first few seconds he can understand if he is in the right place and also if the site sells items he desires. This can be

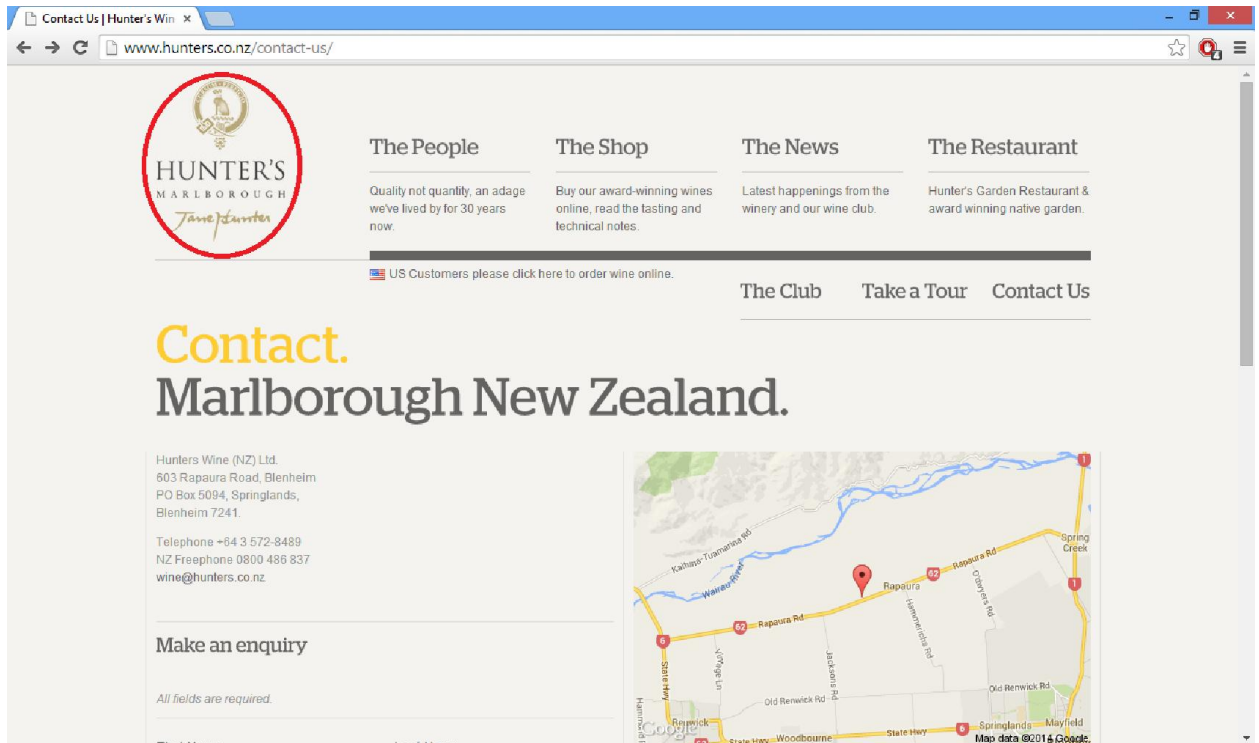possible with the logo and branding, these need to be clear to help the customer deciding if he is interested.

4.2.3   Less time to load

Patience in human has taken a setback, especially in the online industry. While creating an online shop its very important for merchants to provide customers with a fully optimized and speedy facilities. To help merchants test the performance of the site there is GKmetrix. There are some factors, which also reduces the site speed and even blocks it for sometime, like big images, service provider, server, etc. It also depends on the web hosting provider, it's very important to check for its reliability.

4.2.4   The source of payment

The payment options are very crucial to convert from a visitor to a customer. It has to be trustworthy, safe and easy. Being aware of many fraudulent activities happening online, the customer is very strict about sharing bank details online, to help them be secure its necessary for the merchant to create a visible Icon everywhere on their online site.

4.2.5   Free delivery, Promotions and Discounts:

Online shopping being a new trend the competition is huge, so to attract the customers the Discounts, promotions, mode of delivery, packages etc. are very helpful. When a user just visits the page, the promotions actually attract them for the further surfing. Free shipping is one of the best deals a customer can receive and will definitely look forward in the future transactions as well. This can reduce the abandoned carts, increase the conversion rate and also average order value.

4.2.6   Support, Contact Information, Customer care:

The advantage physical shopping over online shopping is the direct interaction with the shopkeepers for some curious details about certain products. This can be solved with the facility of Customer service, which is not very tiring to be always to different persons but be efficient and right to the correct executive. There needs to be

- Correct and updated contact Information.

- Live chat.

- Social media.

- Collaborated companies information.

- About us.

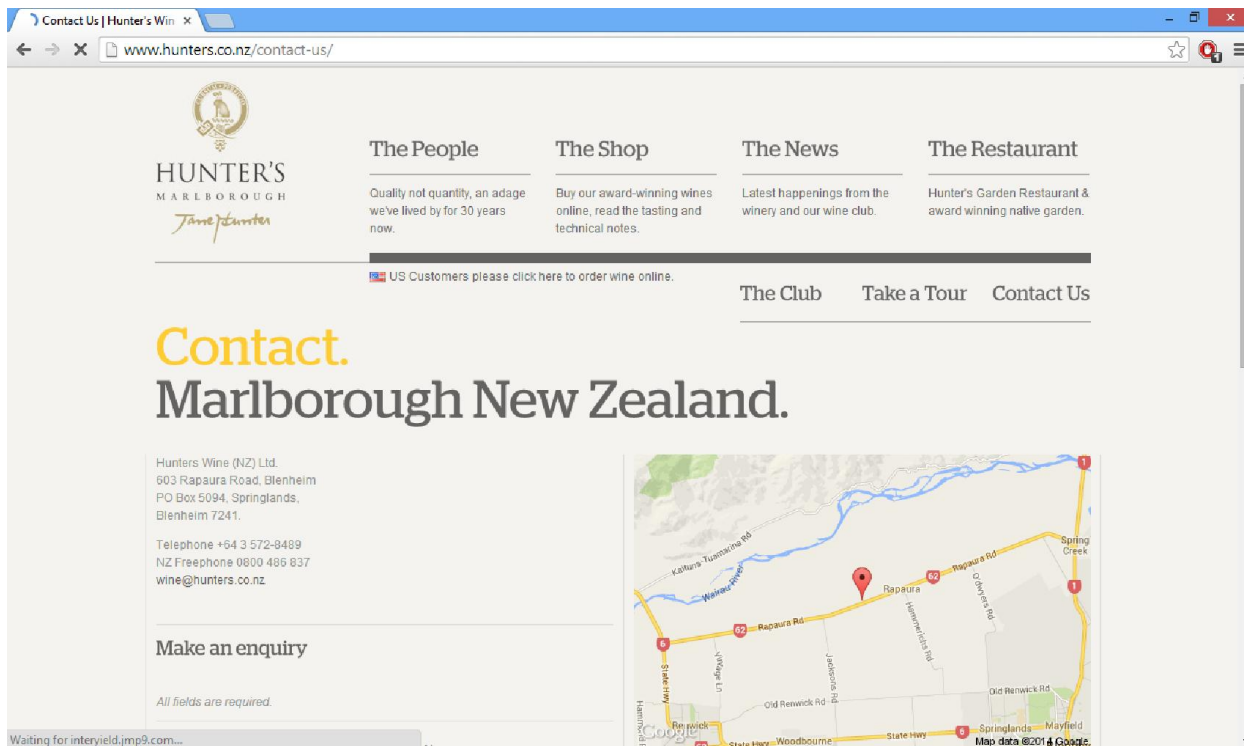- Links to different sources of partners.

Figure 12 Hunter Wine Shop Contact information

4.2.7   Medium of Socialization

Social media is very helpful for online shopping and business. A very good mapping of the online site can be through social media (Facebook, twitter, instagram, g+ etc).

Customers check the number of followers, reputation, viewers of the marketing videos, updated events, updated posts and also the new launches. New visitors always try a social media to be associated with the eCommerce site. Through the social media:

- Sales increase

- Drive New leads and Nurture Customer

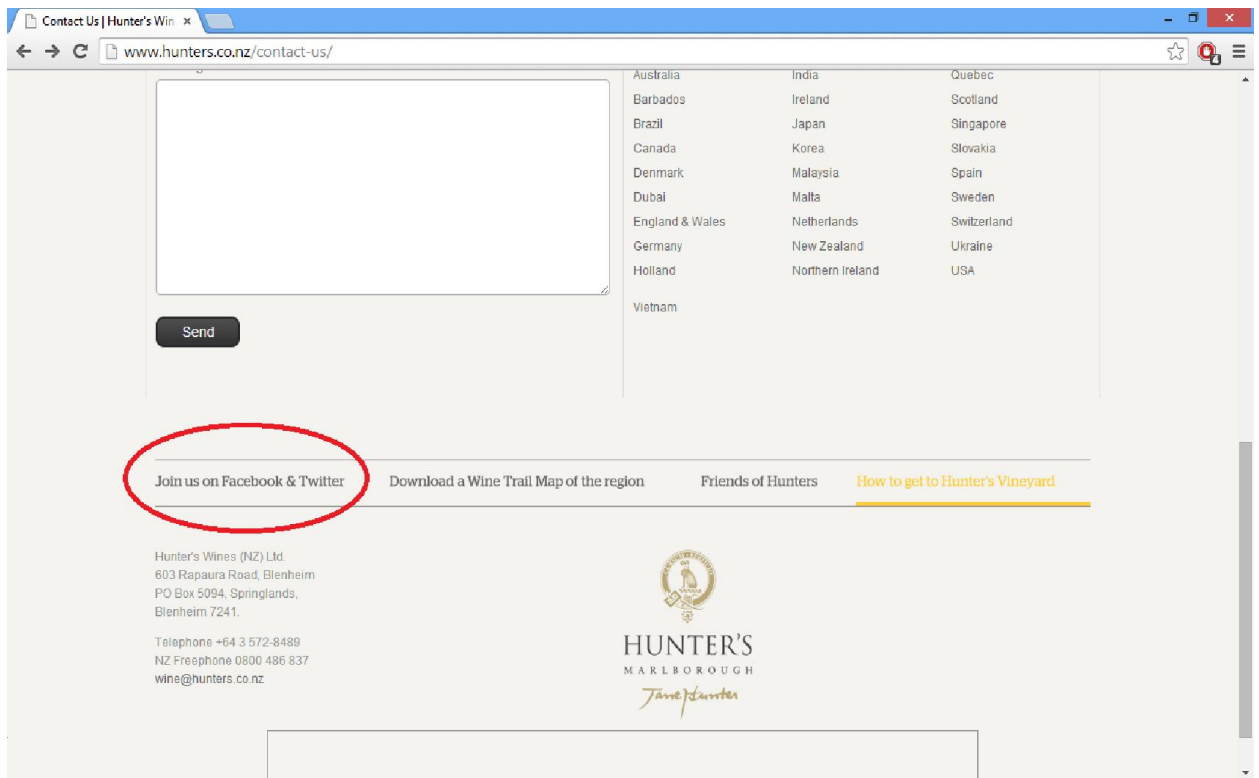- Improves the brand presence and stays relevant

Figure 13 Hunter on Facebook and Twitter

4.2.8   Shopping cart

It is one of the most important functions in an eCommerce website system which supports customer support procedure.
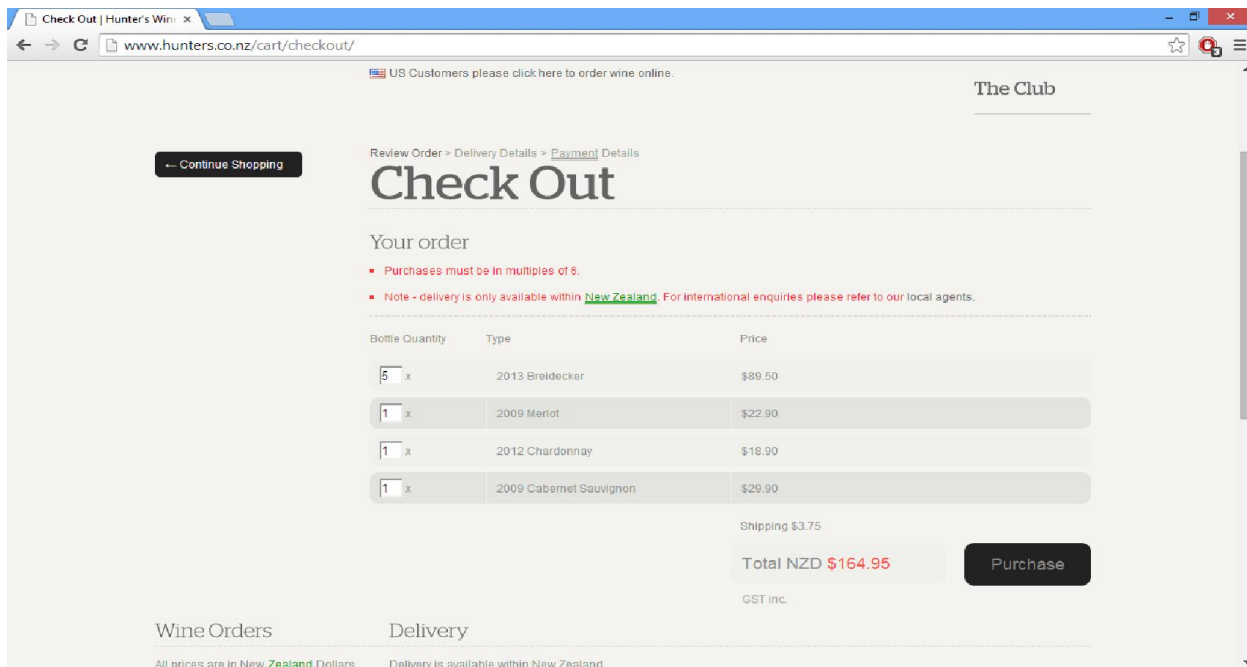
Figure 14 Hunter Wine Shopping cart

4.2.9 Search Engine

Does the website have simple or advanced search?

Simple search: if it has one input form to type key word, do not allow use logic operations in searching.

Advanced search: it allows logic operations in searching index or combines documents and products feature.

4.2.10 Color

When designing the interface, we should consider carefully choosing the appropriate color in order to have a nice interface.

4.2.11 Product's Presentation

It provides users all the necessary information about products or services which eCommerce system has. It can be presented in term of document, images, videos or sounds. If it is an image, we need to check can it zoom or not? Does it have 3D picture?
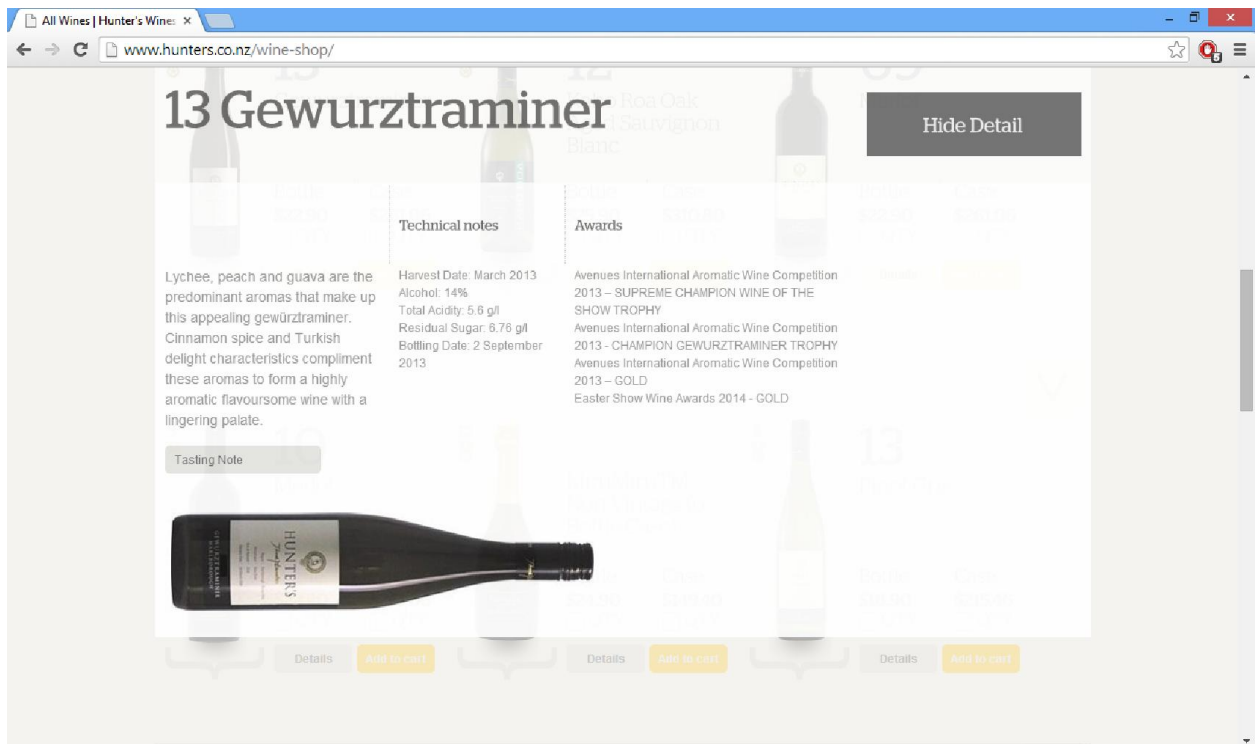
Figure 15 Hunter wine product detail

4.2.12   Browsing to the main page

For a customer who has not accessed internet frequently, when they come to some sub websites they want to come back Home website. If on the current website they are surfing; we don't have a connection to the home website, it will be difficult for them.

4.2.13   Multilinguasism

It will orient diversity users and vast region; it helps our systems expand without borders.

4.2.14   Discount

This function will help users when they buy products

4.2.15 Shipment

Shipment method; shipment time, receiving time is one of the important factors which affects the success of eCommerce system.

4.2.16   Company profile

This is an overview about all the business operation of eCommerce system, it bring customer necessary information.

4.3   Criteria to evaluate eCommerce system

4.3.1   Functionality

4.3.1.1 Security

it describes the eCommerce system security.

4.3.1.2 Privacy

Privacy policy:

We consider our system to have safety policy or not? Does it guarantee or not?

Encryption

This attribute shows an eCommerce system using encryption to protect important data or not? Such as password, credit card code…

Secure server

This attribute shows that server secure can be implemented or not?

Transaction forms

It describes transaction security with server.

Broadcasting

It describes server broadcasting and related security.

4.3.1.3   Accuracy

This attribute describes system accuracy which includes delivery information, price, tax or product information, etc.

Purchase procedure:

It describes to purchase product, procedure

Shipment information:

It shows product information when buying

Cost analysis:

This is information about product price, tax or transportation price.

Taxes

It describes tax information.

Shipment cost

It describes product shipment cost

Product information

It shows product information

Searching procedure

It describes searching procedure

Term expansion

It shows search procedure can be extended like advanced searching using operations or not?

Input correction

It shows that searching procedure can be able to fix input errors or not?

4.3.1.4   Interoperability

This attribute shows system interaction, can system update automatically and independently or not?

Technology

This attribute describes system technology.

Updates

It shows update ability.

Brown independence

It shows system independent ability.

4.3.1.5 *Suitability*

This attribute describes compatibility, suitability between users and other components

Personalization

It shows an individual aspect in an eCommerce system, especially with client.

Client profile

It shows the customer profile like name, age, address, occupation, phone, email, etc.

Personal store

It shows personal storage in an eCommerce system, like product list need to buy, product information, user information.

Language

It shows system 's language.

Internationalization

It shows international attribute about which language use in eCommerce system.

Culture independent

It shows the language use of the system have independence with national culture, group or not?

Worldwide_used Design

It shows system can be used worldwide or not? It means that the using language in the system can solve this problem or not?

Terminology

It shows features about terminology, signal using in the system.

Common symbols

It shows system use common signals, symbols or not?

Simple terms

Does system use simple term or not?

Localization

It shows eCommerce system to have private page for each region, nationalities, provinces or not? Does it have options about language or not?

Local website

It shows system to have a different local website or not?

Language choice

Can system choose different languages to show on the website or not?

Navigation

It shows website navigation ability.

Seminal websites

It shows is it system have a link to similar websites or not?

Link to main page

It shows that from sub websites does it have links to the main page or not?

Navigation diagram

Does the system have connection scheme to pages in the system or not?

Index

Does the system have page index or not?

4.3.2 Reliability

It shows system reliability.

4.3.2.1 Fault tolerance
It shows system's fault tolerance.

Error rate

It shows error rate.

Recoverability

It shows system state recovery ability or not?

Undo function

It shows function system remove new operations to go back old state?

Navigation buttons

Does the system have navigation buttons or not?

4.3.3   Efficiency

It shows system efficiency.

4.3.3.1   *Time behavior*
It shows time problem.

Loading time

It shows loading time.

Search

It shows search problems in the system.

Search history

It shows system can store previous search result or not?

Result processing

It shows result processing.

4.3.3.2   *Resource behavior*
It shows resource behavior.

Access text

It shows access text.

Access graphics

It shows access graphics.

4.3.4   Usability

It shows the system's usability with users.

4.3.4.1   *Attractiveness*

It shows attractiveness with users.

Design

It shows website design problem.

Graphics

Does the system use graphics or not?

Colors

Do the system use colors or not?

Product

It shows product presentation.

Text

Does the system has a text introduction or not?

Visualization

It shows visualization, image.

Images

Does the system use pictures or not?

Addition images

Does system have another picture about product or not?

Multimedia

It shows mulitimedia to introduce products.

Audio

Does system use audio or not?

Video

Does system use video or not?

Animation

Does the system use animation or not?

Node 3d rotation

Does system use 3D to present the product or not?

Motion

Does the system use motion in product presentation or not?

4.3.4.2   *Learnability*

It shows the function layout, system manipulation.

Template

It shows system function layout in a website.

Search features

About search tool.

Top

Does it on the top?

Bottom

Does it on the bottom?

Navigation features

Website navigation.

Horizontal bar

Use horizontal bar to navigate the website.

Hierarchical bar left

Use Hierarchical bar left to navigate page?

Purchase features

It shows product purchase.

Upper right

It puts on upper right.

Other position

It puts on another position.

4.3.4.3   *Operability*

It shows about eCommerce system manipulation.

Searching

Search tool.

Search engines

It is integrated search.

Advanced methods

Does it integrate advanced search or not?

By key word

Does the system allow search according to the key word?

Informative features

It shows informative features.

Compare features

Does the system have compare functions between products or not?

Notification services

Does the system have alerts, notifications about the products or not?

Metaphors

It shows purchase.

Shopping cart

Does the system have shopping cart or not?

Shopping list

Does the system present product list or not?

4.3.4.4   Understandability

It supports users.

Help

About users' guide.

Faq

Does the system has a Frequent answer question for users or not?

Contact

Does the system have contact information like address, telephone, email for customer contact or not?

Online help

Does the online support system or not?

Interactive help

Does system support interact or not?

Business information

It shows business information.

Business policy

Business policy of system.

Business profile

Document about business profile system, the eCommerce system owner.

Chapter 5 : Research Goal and Methodology

The main goals of the thesis are discussed with the help of a case study. Here we deal with the case study of Hunter wine shop, eCommerce website the drawbacks in the website and their improvement opportunities. The case study is supported by survey, done on basis of how many people like to drink wine, their mode of buying wine, and the critical factors to focus while customer places the order. The questions were divided on two parts depending on their significations. The questions were depending on the age, gender and also percentage of people willing to buy wine online. The answers to the questions will detect the website on the basis of the quality standard ISO 9126 parameters, and then the weak areas will be stressed upon. Depending on these data the Juran trilogy will be applied to improve the website quality and also sales.

5.1   Research goals

The primary objective of the study is to develop a reliable statistic profile of the behavior of the wine online customer and their evaluation on Hunter wine online website. It contains the overview of the industry, the analysis of demand, supply characteristics and the quality attributes.

Besides, intensive questionnaire interviews aim to collect the statistic data about customer purchase hobby, customer evaluation based on different cultures, gender, frequencies.

The study about wine industry was chosen, because wine online shop is an typical eCommerce shop which will be popular in the near future. Total 156 respondents were asked to participate. Then the results was gathered from the all survey and computed for interpretation.

5.2   Methodology

The questionnaire includes 2 parts:

Part 1: It focuses on wine customer profile in order to classify customer according to age, gender, wine hobbies. The survey is divided some parts: Online wine purchasing behavior, Reasons for and against buying wine online, purchasing patterns, Purchase Influences and Research and Trust.

It will answer some questions such as:

- How often do customers drink wine?

- Customer behavior with wine online market and reasons for and against buying wine online?

- What are these factors which involve on purchasing wine online?

- When buying online, for whom does customer usually purchase?

- How do shoppers research wine online and what type of online wine information is reliable?

1. What is your age?

2. What is your gender?

3. How often do you drink wine?

4. Who purchase wine for you?

The above four questions are to report the demographic profile. This would be very useful for analyze the differences in selecting wine, offerings, services and the expectation of different age, gender, frequency according to their demographic pattern.

Online wine purchasing behavior

5. How often do you shop for wine online?

6. Do you shop for wine more online or offline?

These two questions are to understand client purchasing behavior.

Reasons for and against buying wine online

7. Why do you purchase wine online?

8. Why don't you purchase wine online?

These two questions are to figure out the reason customer purchase wine online as well as discover disadvantages of wine online.

Purchasing patterns

9. What most influences your online wine purchases?

This question to find elements which influences on customer purchase transaction.

Purchase Influences

10. When buying wine online, for whom do you usually purchase?

This question is to find whom customer buy wine for.

Research and Trust

11.   How do you research wine online?

12.   What type of online wine information is most trustworthy?

These questions are to recognize sources which customer gets information and which channel is the most reliable?

Part 2: It collects shoppers evaluations about Hunter wine online shop and be divided some parts which based on ISO 9126 quality standard: Functionality, Reliability, Efficiency, Usability.

The method was applied practically for evaluating the usability of website by using questionnaire in the form of scale items, which help users to show their level of agreement to a statement. In this rating method, questions are grouped into categories based on the quality factors they address.

A merit value for each response of the questions is assigned according to the responses as show in the table below.

Response options	Merit points
1: strongly disagree	0
2: disagree	0.25
3: neutral	0.5
4:agree	0.75
5: strongly agree	1

The merit points for each factor will be calculated as this formula:

$X = \sum_{i=1}^{n}$ (merit point of each question of a factor/ total number of questions for the factor)

The value of the merit points of the factors range between 0 and 1, which indicates different level of quality (bad, poor, moderate, good and excellent).

Average Merit Point , x	Quality level
$0 \leq x < 0.2$	Bad
$0.2 \leq x < 0.4$	Poor
$0.4 \leq x < 0.6$	Moderate
$0.6 \leq x < 0.8$	Good
$0.8 \leq x < 1$	Excellent

Instructions: Rate your level of agreement or disagreement with following statements about the website from 1 to 5. (1 : strongly disagree, 2: disagree, 3: neutral, 4:agree, 5: strongly agree)

Functionality

1.   The information provided clearly in the website about delivery, price, tax or product information, etc.

2.   The process of selecting / deselecting them for purchase

3.   The responsiveness of the website

4.   The security of paying methods for products

5.   Does the system support enough essential functions for eCommerce website.

Online shoppers will evaluate the website in term of functional aspects. Does the websites have enough function to satisfy customer demand like the typical eCommerce website? Those questions ask shoppers assess the information on the website, the process of choosing wine, responsiveness, the security payment, etc.

Reliability

1.   Clicking on a link takes to a valid page

2.   When some error occurs, the website recover quickly

3.   I can access anytime

About the Reliability aspects, we consider does customer can access website anytime or not? When error happens, does our system recover quickly?

Efficiency

1.   it is possible to find what I want within an acceptable time

2.   it is possible to switch between pages in an acceptable time

3.   The website does not use plug-ins or proprietary software

4.   I can access the website from my favorite browser

On the Efficiency aspect, we consider the time to find what customer want , the switching time between pages, does website use plug-ins / proprietary software? And customer can access from their favorite browser?

Usability

1.   The web site appearance was attractive.

2.   It was easy to navigate through different sections of the web site.

3.   The instructions in each item were clear to understand.

4.   It was clearly understood where you were at each step of the activity and knew what to do next.

5.   The introduction of each section gave you background information on the section that followed.

6.   The additional information and hyperlinks provided helped you to better understand the subject areas intended to present.

About usability, does website interface attractive? Is it easy to navigate? The instructions, is it clear or not? Additional information is it enough for shoppers?

What overall rating would you give to the website?

This question is used for overall rating website from customers.

After receiving the survey data, we apply Juran trilogy theory, which includes 3 parts: quality planning, quality control and quality improvement in order to figure out the current performance follow ISO9126 standard. From that, we suggest some solutions to improve website quality in a positive way.

Chapter 6 : Findings and Analysis Data FollowingJuran Trilogy

The case study of Hunter wine online shop is explained in detail. The study is initiated with the description of the company, and then the Juran's trilogy is applied following the task in 3 stages: Quality planning, Quality control and Improvement.

The survey has been taken as a reference to apply the Juran's trilogy. Each stage has some sub steps which needs to be detailed to have the goals accomplished. Every page of this website is scanned to be sure of the requirements fulfillment for the customer shopping online. The presentation, branding, logos, payment methods, secrecy, confidentiality of the customer details, shipping rules, loading time, additional benefits, gifts and other facilities has to be in alignment with the top quality service of the website. Examples are made to compare the best of the industry performance so that the standards created for the site is correct and best fit. The ISO 9126 is applied with all its factors and provided a solution to some of the problems of the website which in future with this application can be corrected and also help them to lead the market.

6.1   Introduction

Hunters is family-owned winery established in Marlborough, New Zealand over 30 years ago. From their very first vintage in 1982 Hunter's won six medals at the National Wine Show. New Zealand sauvignon blancs first came to the attention of international wine drinkers when Hunter's won the top award at the Sunday Times Wine Festival in London in 1986. And then again in 1987, 1988, 1992 and 2001. The 1985 vintages from Hunter's, Montana and Cloudy Bay introduced the British wine-drinking public to New Zealand wine and Sauvignon Blanc has been connected with wine from the Marlborough region ever since. Hunter's is the only Marlborough vineyard established in the 1970s to still be owned by its original family - more than 30 years after being founded. Their main market is Asia Pacific ocean, especially in New Zealand, Australia and America.

6.2 Juran's Trilogy

The methodology is a strategic structure for the implementation of quality management. The Trilogy encompasses the details of specific tools and steps to improve quality. Juran's Trilogy is comprised of three major stages which taken as a whole, form the basis for the entire quality management effort.
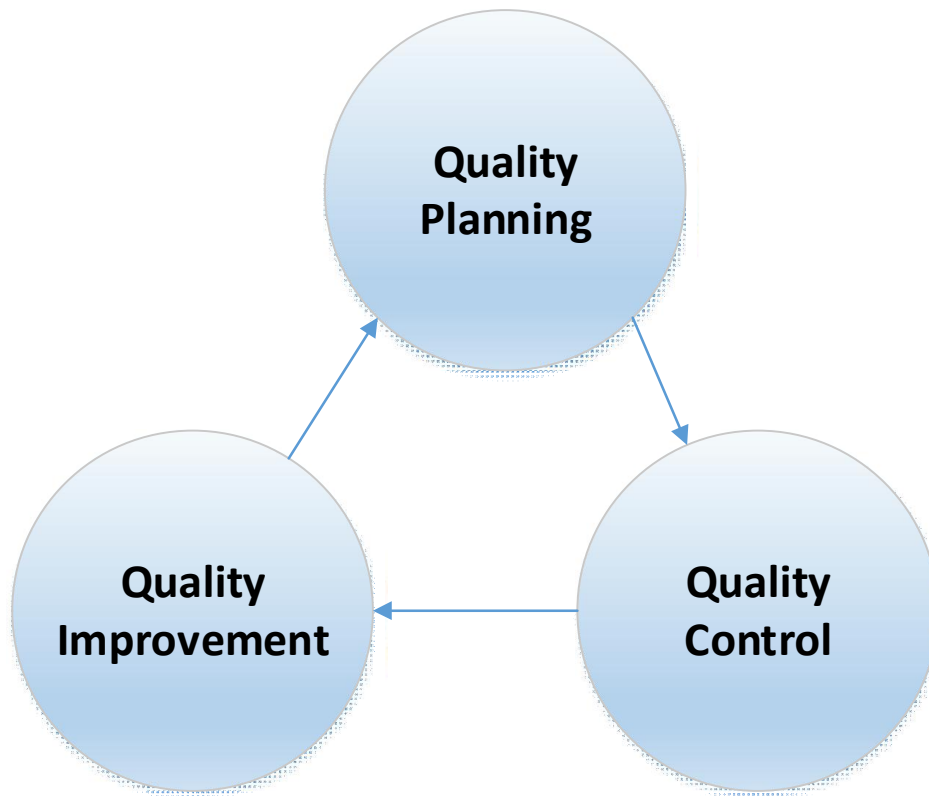
Figure 17 Juran's Trilogy

6.3   Quality Planning

Quality planning is the first stage of the Juran's Trilogy and is essentially concerned with the design of products and the creation of processes that will be able to meet established goals and do it under operating conditions. The steps involved in this stage are:

1 • Identify the customer

2 • Find the needs

3 • Specify a product.
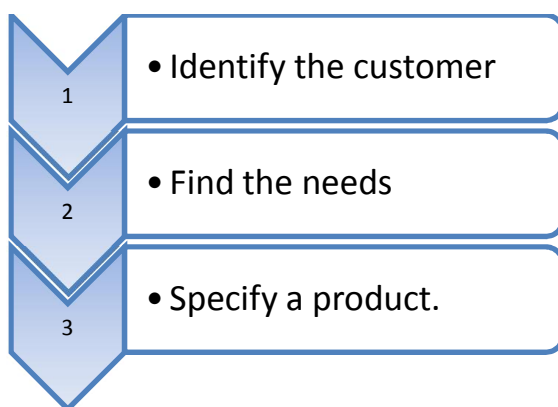
Figure 18 Quality Planning

6.3.1 Identify the customer

In order to follow the steps that are comprised in this phase, it was necessary to make a survey to identify our customers and analyze its opinions in line to be able to understand the needs and develop a product that satisfy them.

A sample of 156 persons of all ages and genders was obtained after the development of the survey.
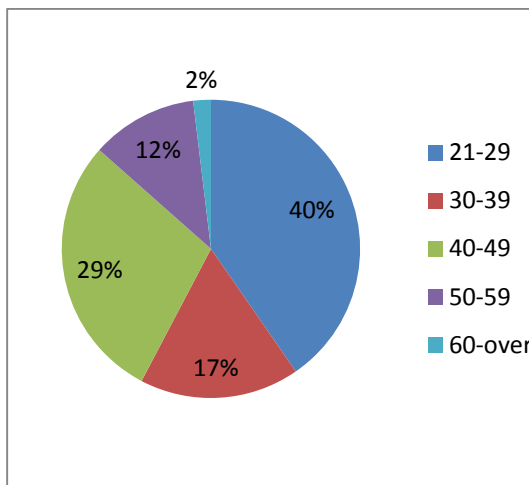
Figure 19 Age of Respondents
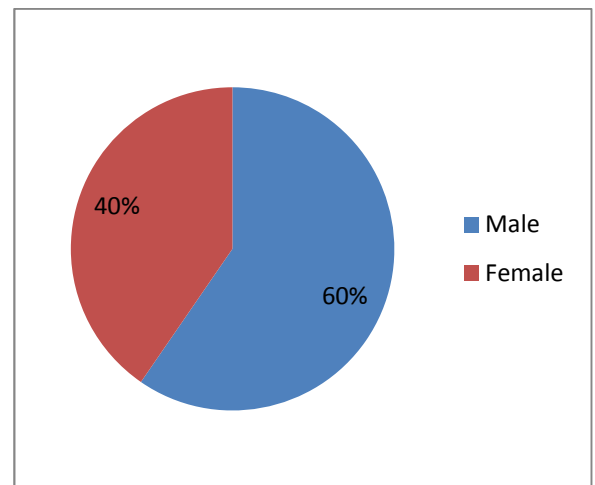
Figure 20 Genders of Respondents

How often do you drink wine? This question is developed to clarify our target customer and its preferences. These results showed that the 97% of the people drink wine from Daily, weekly, Monthly to a few time a year. Additionally, 40% buy their own wine and 44 % purchase wine for them by spouse or close friends.
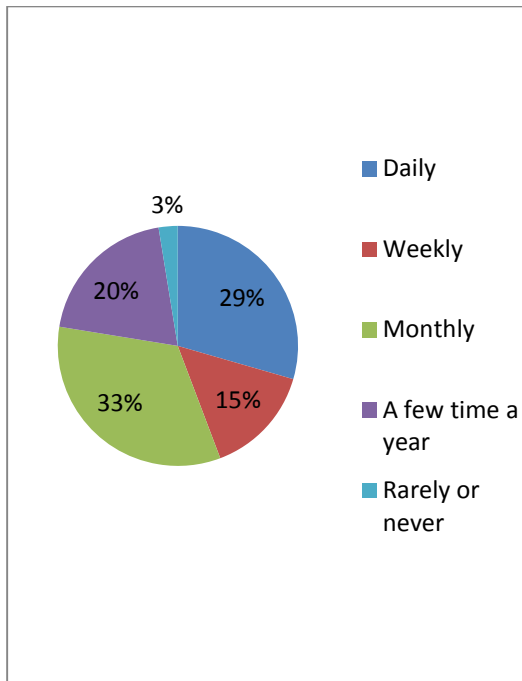
Figure 21 Customer Frequency
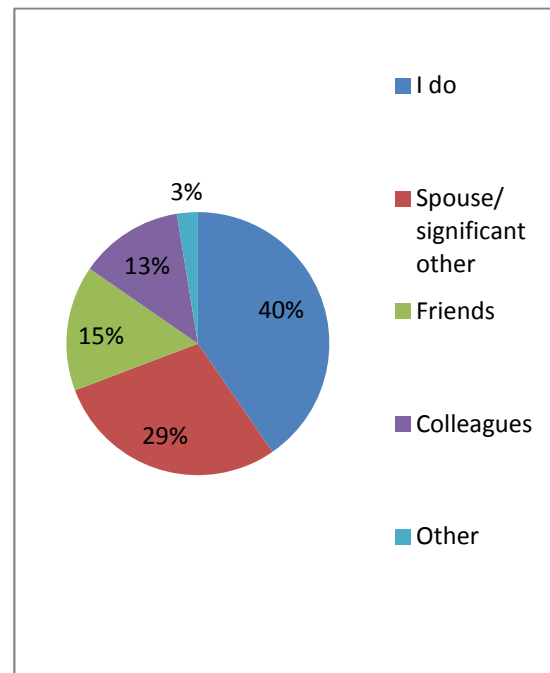
Figure 22 Who buy wine for customer?

6.3.1.1 *Online wine purchasing behavior*

Only 16 % customer buy wine online regularly (daily, weekly, monthly) and 7% claim to shop for wine more online than offline.
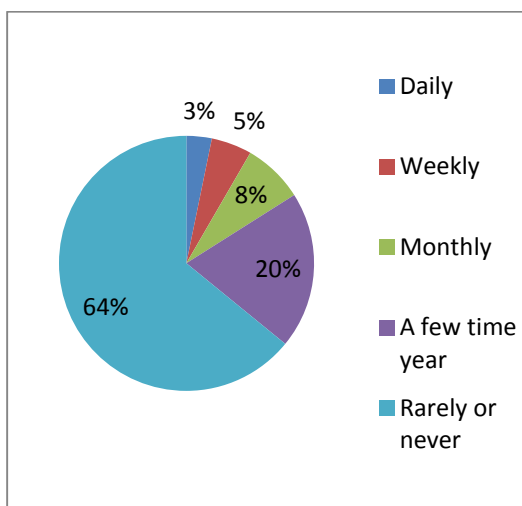
Figure 23 Online wine purchasing hehavior
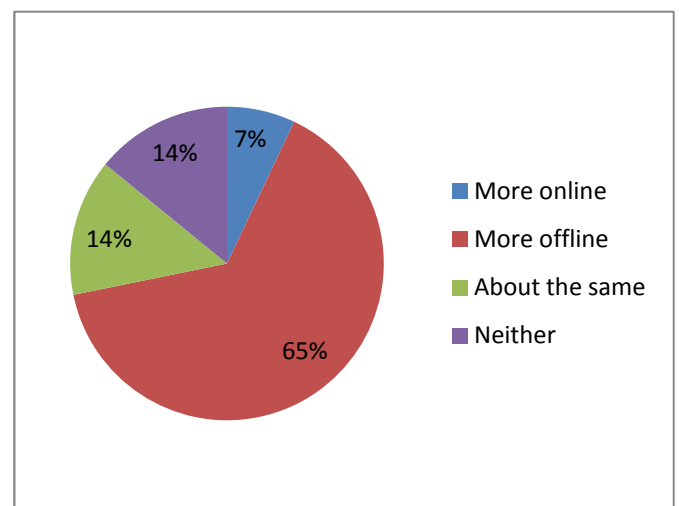
Figure 24 Do customers prefer to buy more online or offline?

6.3.1.2 Reasons for and against buying wine online

Convenience, selection and price seem to be the reason for purchasing online, but no reason rises to the top.
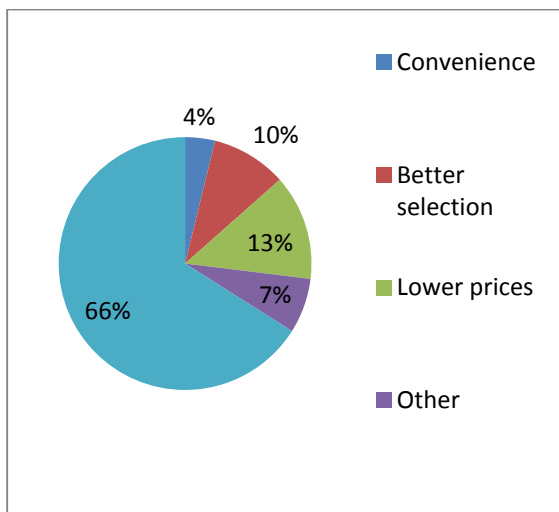
Figure 25 Reason to buy online

Shipping is the largest obstacle with a combined 36% of respondents citing shipping cost, time or state restrictions as a reason not to purchase wine online.
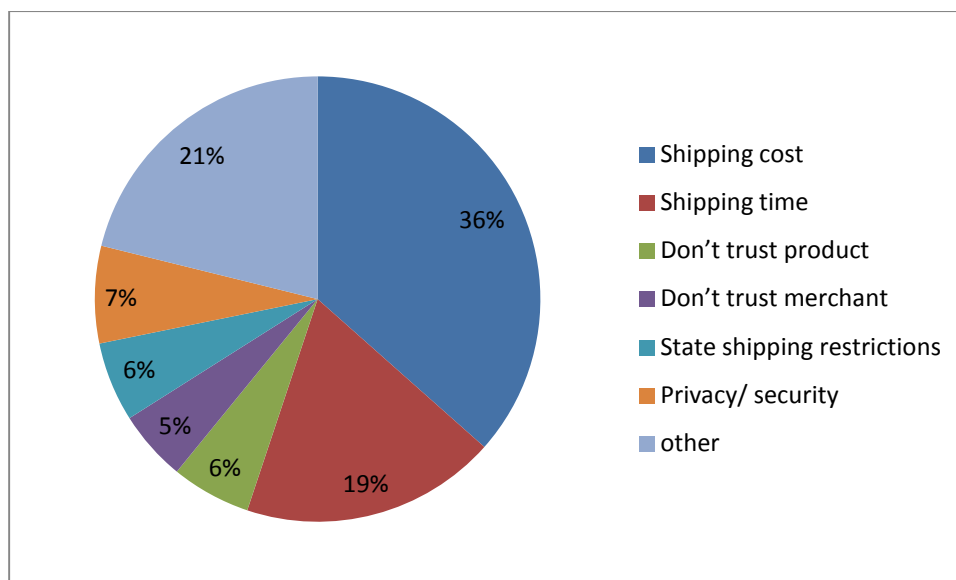
Figure 26 Obstacle to buy wine online

6.3.1.3 Purchasing Influences

There are many factors involved with purchasing online. Personal recommendations are the most influential with Advertisement a second. Rating and reviews have the largest influence on purchase behavior.
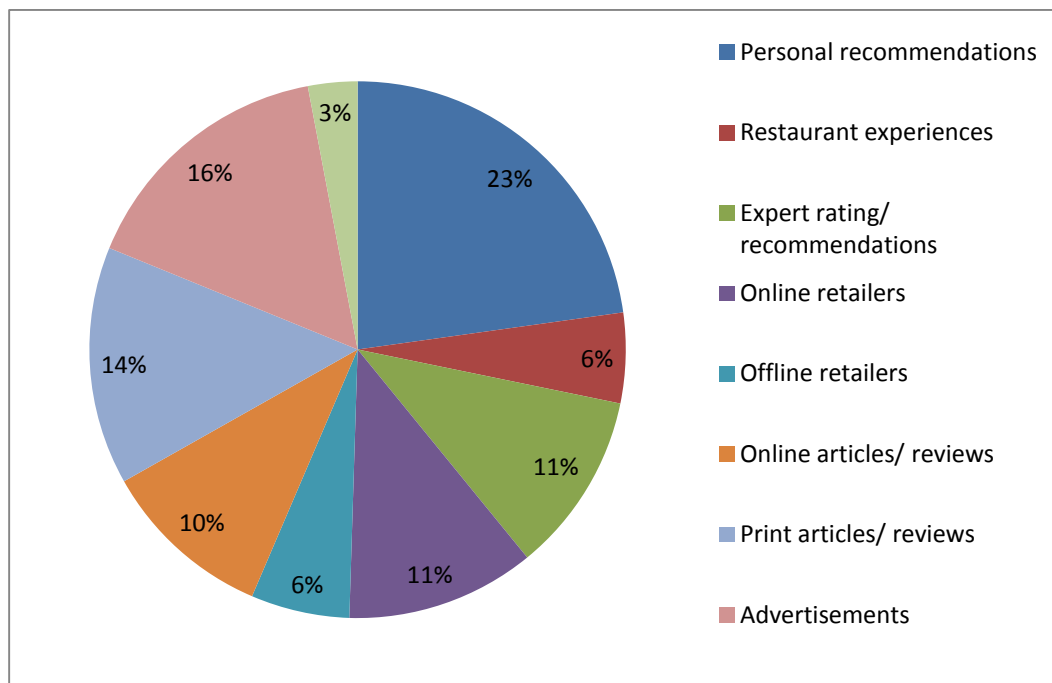
Figure 27 Purchasing influences

Of those purchasing online, the majority of purchases are for personal consumption.
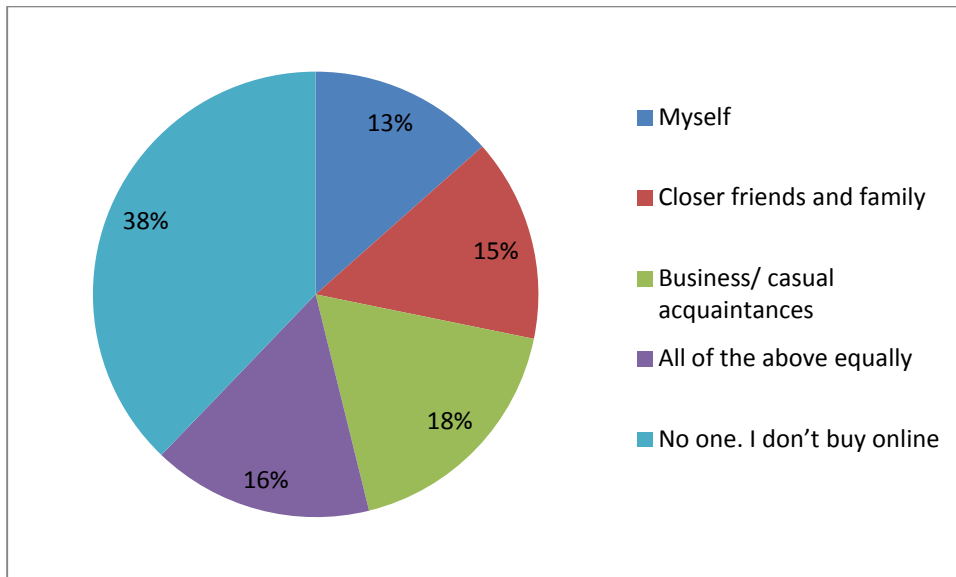
Figure 28 customers buy wine for whom?

6.3.1.4 Research andTrust

Online wine shoppers conduct research via a wide variety of sources, with wine retailers showing a decided edge with nearly 44% of respondents.
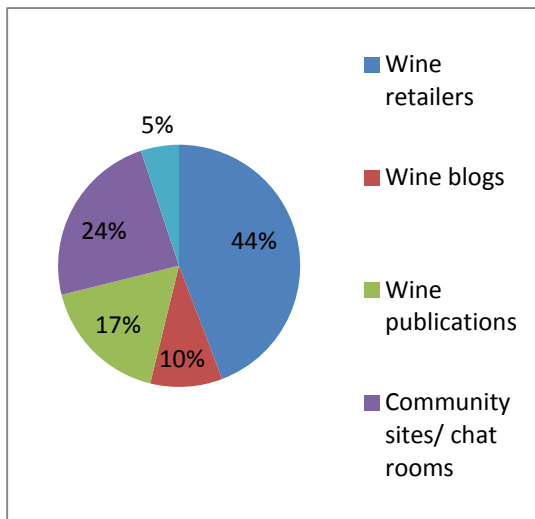
Figure 29 The source of references to buy wine

User reviews and expert ratings are trusted most by 74% of wineshoppers, far more than anyother form of information.
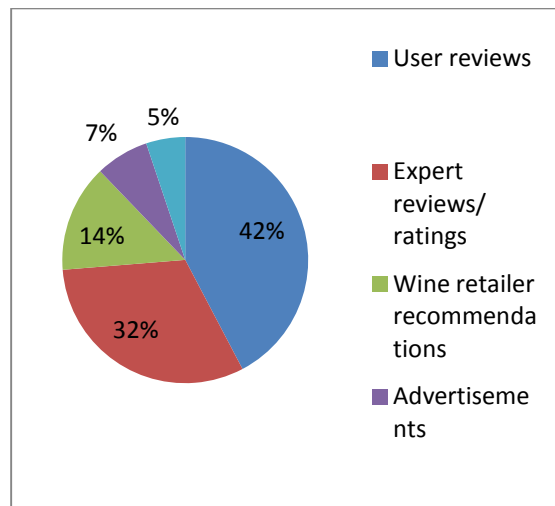
Figure 30What type of online wine information is most trustworthy?

6.3.2   Specify a product- Apply ISO 9126 in eCommerce website quality evaluation

6.3.2.1   Introduction

This part introduces a model which used to evaluate eCommerce system quality. It can be used for user analysis and eCommerce system quality, based on expert evaluation and user survey. This part discusses about the eCommerce system quality evaluation. ISO 9126 quality factors express on user: Functionality; Reliability; Usability and Efficiency.

6.3.2.2   ECommerce quality

ECommerce quality relates to websites quality and provided services for end users. ECommerce quality system relates to 4 factors/ functionality; reliability; usability; and efficiency.

Functionality

Functionality is all the functions; attributes of the system to satisfy user requirements. It includes suitability; accuracy; operability and security:

Some features such as the name of the website, loading time, this place make the first impression for users. The website is the place where anyone can access, surf or visit therefore we need an interesting interface, adapt with any browsers, support Multilanguage, contain accurate information or important things.

Moreover, Shop cart or Sitemap or other functions allow people make a product list to save time or effort. Other tools for users are searching, this function must be accurate and quick to choose the suitable products and reduce searching time. In order to be more efficient; we need to integrate advanced search in search tool and website need to have a site map;

Another feature is paying method; the eCommerce system must support various paying methods such as bank transfers, credit cards… In every method; the most important problem is security. A web site needs to have a FAQ or support service to provide all information or guideline for the user. Besides that; eCommerce system should have some functions like to recognize users when they login on the web; or store their favorite product they often visit and guarantee to satisfy user requirements:

Reliability

It includes carefulness; error ability and recover. It relates to information accuracy (text, image, etc.) provide products, services as well as the service relationship (store list; storage, search)

It satisfies if it can be recovered even in broken case. The most important factor is the security in financial transactions. There are 5 elements during electronic transactions: secret, authentication; remote control, responsibility, data usage. To satisfy all the requirements, we can use digital signatures or secure protocol, encryption to guarantee system reliability or transaction safety.

Another important feature is that system must protect user privacy. The user has personal information like address, telephone number, bank account; hobby, it's our system can allow user public or hidden their information; or adding more information.

Usability

It defines as a set of attributes create for using and evaluate usage privately. It includes fault-tolerance, understanding, implementable. It can be the preparation of websites to have accurate information; thumbnails, videos, product images, the interface must attract user and have clear guidelines. The access to the website must be simple and easy. Moreover, we must prepare effectively all the services like shop cart, product list; site map, paying methods to guarantee all users without experience can use easily. ECommerce system must be updated frequently, the latest products must be presented.

Efficiency

It is the system's ability provides suitable functions to optimize resources and improve performance in specific conditions. It is based on 2 elements:

- Time behavior.

- Utilization resource.

6.4 Quality Control

The second stage of the Juran's Trilogy is quality control. Here the company should simultaneously take steps to ensure that its operations maintain the level of quality that was planned for. The following steps are comprised in this stage:
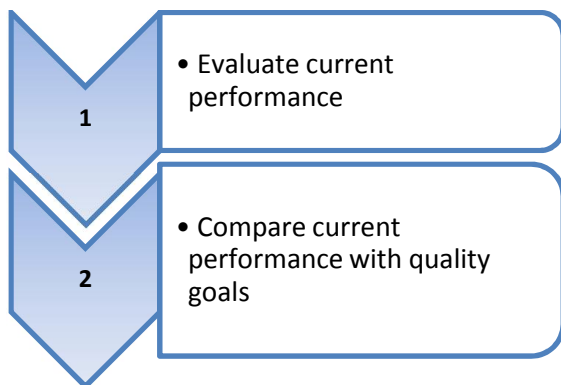

Figure 31 Quality Control

6.4.1 Evaluate current performance

Questions for each of 4 factors were grouped under one category for the purpose of analysis. Then, we find out the quality level of wine Hunter online shop website.

number	quality factor	sub quality factor	merit value	quality level
		information	0.55	moderate
		purchase process	0.51	moderate
		responsiveness	0.63	good
		security	0.50	moderate
1	Functionality	essential functions	0.39	poor
		validity	0.67	good
		recovery	0.63	good
2	Reliability	accessibility	0.5	moderate

			3	e
		acceptable time	0.54	moderate
		switching time	0.54	moderate
		plugin software	0.65	good
3	Efficiency	favorite browser	0.67	good
		appearance	0.68	good
		navigation	0.65	good
		instruction	0.73	good
		next steps	0.55	moderate
		background info	0.60	moderate
4	Usability	additional info	0.68	good

An explanation of the results is given as follow.

6.4.1.1 Functionality

The results for the information, purchase process, security functionality of the website have moderate quality. This suggests that shoppers are not comfortable with the information, purchase process and security (It just supports the delivery within New Zealand and customers only can be delivered if they buy more than 6 items). Moreover, the result for the essential functions characteristic of the website showed a poor quality level, which indicates that the functionalities of the website do not have the appropriate degree of quality as expected by shoppers.

The analysis results indicated that the website has a good responsiveness quality followed by the efficiency quality factor.. In general, the mean average of the quality merit value of each 5 quality factors showed that the website has a moderate quality.

6.4.1.2 Reliability

The validity and recovery of the website showed good quality level, which indicates that the website will restore back well to the original state, after some errors occurred. The

accessibility characteristic of the website showed a moderate quality level. This shows that users can not visit the website at anytime and we need to upgrade the infrastructure system.

6.4.1.3 Efficiency

The results of the time behavior factor showed that the website has a moderate quality level. This means that visitors think the time the website takes to load pages and the time it took them to perform any task in the website is reasonable. The results for the plug-in and favorite sub factor showed that the website has an good quality. Therefore, users are very satisfied with the accessibility of the website because they can access the website from different hardware platforms, mobile devices and browsers.

6.4.1.4 Usability

The appearance, navigation, instruction and additional information of the website showed a good quality level. Hence indicating that the website's user interface, navigation, instruction, additional information are clear to most of the users. However, we have issues when the users don't understand well what to do next and the background information is not clear. These characteristics is evaluated at moderate level.

Number	quality factor	merit value	quality level
1	Functionality	0.52	moderate
2	Reliability	0.61	good
3	Efficiency	0.60	moderate
4	Usability	0.65	good
	Average	0.59	moderate

Although, there are quality factors such as Functionality and Efficiency where some improvements need to be made, the result showed that the website at this moment has an acceptable quality and shoppers are satisfied with the quality of the website.
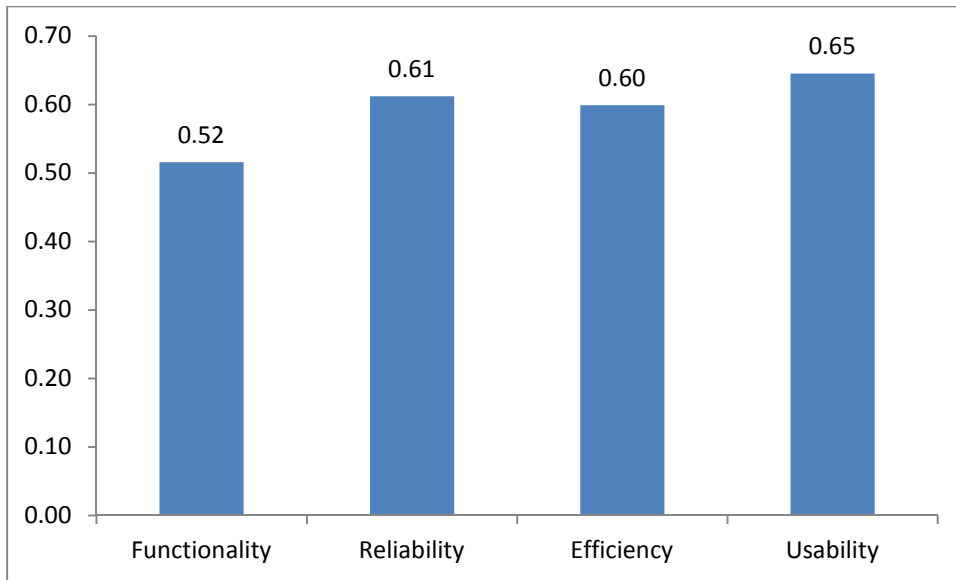
Figure 32 Quality factors evaluation by shoppers

6.4.2 Comparison of user's perception of the quality of Wine Hunter website and results of analysis

Apart from the Likert scale type questions, users were asked to give a rating to the overall quality of the Hunter wine website (bad, poor, moderate, good and excellent). The responses gathered showed that 22% of the users rated the website as having good quality. 34% of the users rated the website as having a moderate quality, 17% of the shoppers rated the website as having poor quality. 6% of the shoppers gave it as having a bad quality while another 21% of shoppers rated the website as having an excellent quality. The highest percentage of the shoppers rated the website as having a moderate quality.
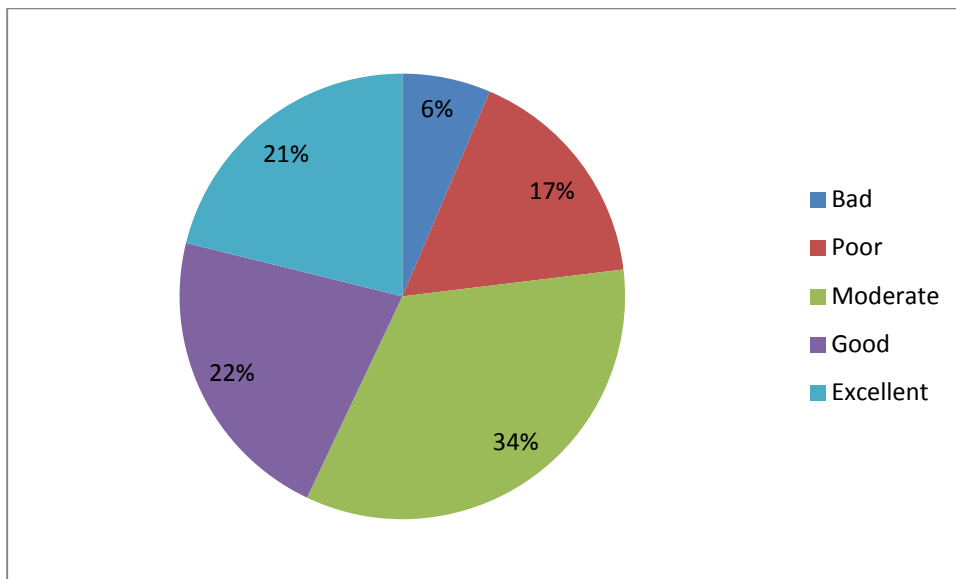
Figure 33 What is the overall rating shoppers for the website?

By comparing the result of each factor analysis and the rating given by users, it is observed that both results are quite similar. The factor result indicated that the website has a moderate quality. Similarly, majority of the users rated the website as having a moderate quality, which reflect that the factor analysis gives a reliable result that matched with the user's perception of the quality of the website.

6.4.3   Compare current performance with quality goals- Competitor analysis

In this thesis, we will analyze 4 other wine online shops and compare with Wine Hunters shop in New Zealand. They are:

1. https://www.winesale.co.nz/

2. http://www.blackmarket.co.nz/

3. http://www.winedirect.co.nz/

4. http://www.glengarrywines.co.nz/

	attribute	Wine sale	Black Market	Wine Direct	Glengarry Wines	Hunters Wine
	information	3	2	4	5	3
	purchase process	4	5	3	4	3
Functionality	responsiveness	4	4	3	4	4

		security	4	3	4	3	3
		essential functions	4	3	3	2	2
		validity	2	3	4	3	4
		recovery	3	2	5	3	4
Reliability		accessibility	2	1	3	2	3
		acceptable time	3	2	3	2	3
		switching time	4	3	4	2	3
		plugin software	4	4	5	3	4
Efficiency		favorite browser	3	2	3	4	4
		appearance	3	2	3	5	4
		navigation	2	1	4	3	4
		instruction	4	3	3	4	4
		next steps	3	2	2	3	3
		background info	2	1	4	3	3
Usability		additional info	4	3	2	3	4

Using a rate range between 1 to 5 for evaluating quality level, being 5 the best score possible, each characteristic was evaluated for each wine shop website. The results are showed in the following graph.
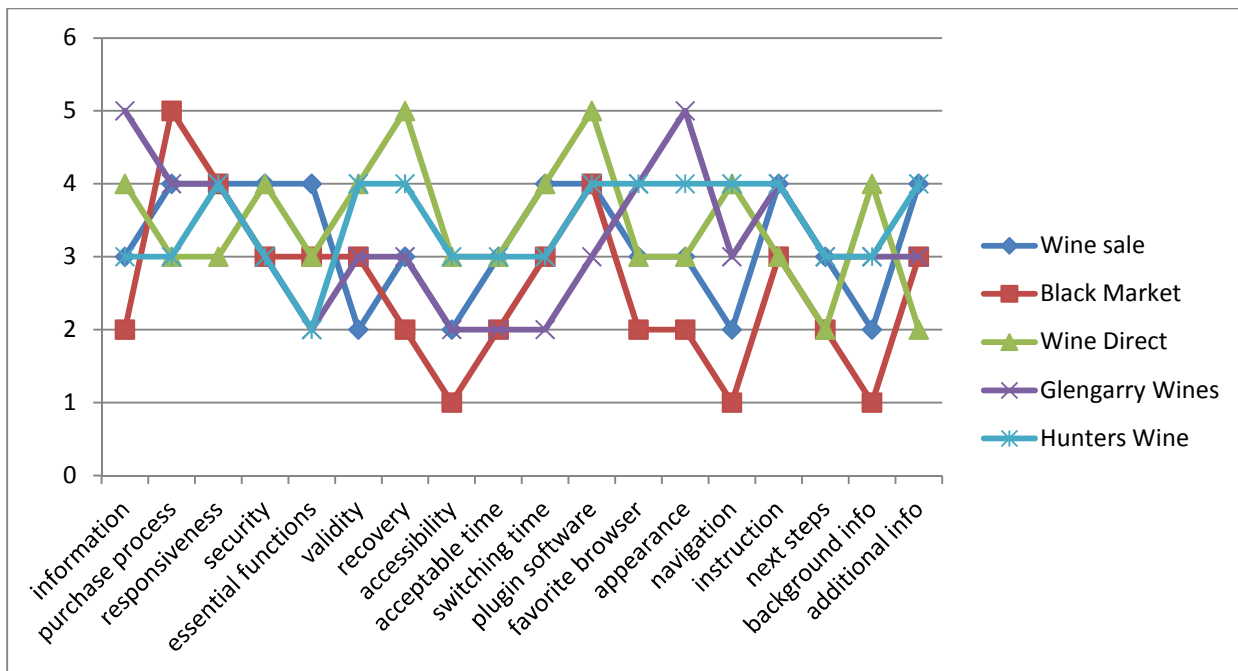
Figure 34 Competitor evaluation chart

6.5   Quality Improvement

The final stage of the Juran's Trilogy is quality improvement. This phase goes beyond control in that it allows the company's operations to reach levels of quality so far unattainable. The quality improvement process removes the chronic quality problems that were built into the products and processes in the planning process, for this purpose the following steps must be followed:

- Identify specific improvement needs.
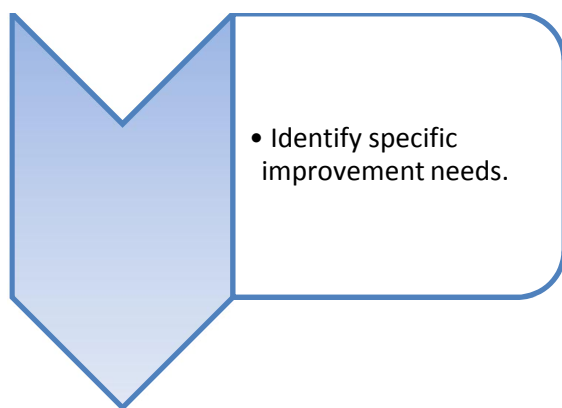
Figure 35 Quality improvement

6.5.1   Identify specific improvement needs

This website needs to have some addition features in order to improve voice of customer as follows:

6.5.1.1 Functionality

- This system should support user payment by PayPal or e wallet, insert symbol payment like Master Card, Visa Card.

- Our system can be extended by delivery internationally not only in New Zealand and the limit number of delivery products has to decrease, like 3 items. It will support and encourage users in a positive way.

- We can make Frequency Answers Questions to help customers familiar with website

- These system only support American clients to order online products so we need to extend more by deliver all around the world via delivery organizations such as DHL, Collisimo, etc.

- We can use 24/7 e-mail and phone support or using a chat service like **LIVEPERSON** or **BOLDCHAT** to directly chat with your customers if they need any advice or have any questions as they shop, your business must provide support before, during, and after it is needed to make customers happy. The more helpful your team is to your customers and the more information your customer base is empowered with, the more likely your customers will be happy with your company and purchase your offerings over others.

6.5.1.2 Reliability

This system need to have stable server in order to guarantee customers can access at any time and click to a valid page.

6.5.1.3 Efficiency

This system must help customers to find what their want as well as switch between pages in an acceptable time. The website does not use plug-ins or proprietary software and customer can access from their favorite browser.

6.5.1.4 Usability

- The web site appearance was attractive by using more beautiful photography. Having the right images of your offerings could be the difference between someone becoming a customer and deciding to move on to another website.

- Having beautiful photography doesn't mean you need to hire a really expensive photographer, but it does mean a time investment in capturing the right photos of your various products or services to help incite people to look through your offerings and buy.

- Ensure that the structure of your website is organized in such a way that it is both easy for visitors to browse and easy for search engines to understand. The point of having a website that is organized neatly is to make sure it is always clear where your visitors are on the website, it is easy for visitors to find what they are looking for and that it is easy to see what their other options are for related products or services. Make sure visitors have the option of taking many different actions with the persuasion of strong calls to action.

- Submitting a sitemap of your existing structure can help the search engines better map out how your website is organized. This is important in terms of visibility, since usability is one of the many factors the major search engines take into consideration when ranking the quality of a website. Organize your website into different high level categories and then from there, into smaller sub categories that fit within each larger category of your website.

- The additional information and hyperlinks provided helped you to better understand the subject areas intended to present.

Chapter 7 : Conclusions and Recommendations

7.1   Objective

The main objective of this part is to present the objective of our thesis, which is to present a framework of eCommerce websites with the full quality standards. To achieve this goal most of the study has been made on all the famous eCommerce websites based on products, services and also certain delivery systems. There were number of factors which were defining some of the different criteria's for success of the eCommerce, but there were some other critical factors as well which were not specifically addressed. Moreover, they do not adequately incorporate a particular viewpoint of users for the purpose of evaluation. As the case study is made on Hunters wine shop, which is a famous wine seller in New Zealand, in this Thesina some answers to the ongoing debate in the eCommerce world with its quality evaluation related to the user satisfaction were focused. It also tries to focus on the target groups of the wine industry shopping online, requirements of the security using the standard ISO 9126 (quality standard for eCommerce). Therefore, based on previous eCommerce website evaluation works, success factors of websites in general and website design guidelines were studied to help the process of identifying necessary quality factors for eCommerce website evaluation. Taking the customers users perspective and "satisfaction of users" as the definition of product quality, six high-level quality and other sub quality factors for eCommerce websites were identified.

7.2   Evaluation based on components

The necessary quality factors and sub quality factors identified for evaluating eCommerce websites based on target customer were arranged into a clear order of importance ranking.

All these attributes explain the behavior of the system, depending on the specific requirements. Then its followed by the explanation of the pattern the eCommerce websites work with the help of the block diagram, and the use case diagram. This mentions the each step taken by the user during the shopping, the basic components, which have certain functions, which serves particular, needs for the user. Then the criteria's on the evaluation of the website based on each component of the website are discussed with each metric in detail.

7.3   Case study quality evaluation

We then tried to explain the goals and the findings of the Thesina by considering a wine selling eCommerce website, Hunters wine shop online, a prestigious and authentic wine company located in New Zealand. The aim was to apply the proposed framework on a case study, Hunters wine shop website to evaluate how the framework performs compared to the base model. To address this objective, the proposed framework was used to evaluate the quality of the Hunters website by means of a questionnaire. To help with this we made a survey to gain

knowledge about the kind, and majority of people facing different issues respective to their age, sex and frequency of shopping online. The questionnaire was finally designed to analyze the website, it had two parts.

- First part consists of 12 questions, which recognizes the sources customer gets the information and the influence for their purchase.

- The second part consists of questions providing the information regarding the reliability, security, privacy of the website and their preference according to the customers. The standard ISO 9126 is then applied, following the answers to the survey. Based on the responses, the rating was made following the merits.

7.4   Analysis of website

The analysis is then made with favor of Juran's Trilogy of the quality management is taken as a main source of quality evaluation, is applied to encompass the details of specific tools and steps to improve quality. The certain stages of Juran's trilogy have provided some characters of eCommerce need to evaluate, like Branding and logo, loading time, secure mode of payment and support.

7.5   Sections and needs

In the first stage the product is designed according to the quality planning, which had the samples of respondents according to the age, gender etc., described the requirements and expectations of clients. The examples of different websites not only provided the alternatives, but also realized the advantages of the hunter's site. According to the information received, the opportunity to improve the presentation, contact info, product specifications etc. is grabbed with the reference to the other high selling online websites.

7.6   Maintain the quality

The Comparison of user's perception of the quality of Wine Hunter website and results of analysis of factors has proven that the website is not to the level of expectations. The result is moderate according to the users. Therefore to increase or maintain the quality further, Functionality and Efficiency are factors which needs attention.

7.7   Comparison

As a comparison 4 other websites were chosen to explain the exact difference of the characteristics, the hunters website stood to be not the excellent but best one. This is to point the further recommendations which could be made.

7.8 Reach the Quality peak

The main needs of the websites with all the analysis are listed down which could be the main reasons for the website to be redesigned to be best in the market not only in terms of Quality but also in terms of Operations and marketing. Visibility of the website can be improved only if the exact locations of the hidden problems are identified, therefore the main suggestions are listed to acknowledge the future undiscovered success of the company and to change the world of eCommerce.

7.9 Recommendations

The following points are recommended for future research work:

• The case study conducted on the Wine Hunter shop website only focuses on young people from 21-29 and in a short period of time (around 3 months). It published on some forum, websites in a long time but collected low response rates (156 participants). Perhaps, it could be better if we can increase more number of participants from many ages, genders, nationalities to collect many different perspectives. Therefore, we can get the accurate survey evaluation result.

• The format of questionnaire design is too long (2 parts with a lot of questions) make it difficult for customers. They can feel boring and time-consuming. Therefore, they can choose the evaluations randomly and we will receive the incorrect responses

• The survey is presented as a questionnaire and lack of interact face-to-face directly with the shoppers. There is no way to sure about the reliability from respondents, may be they are forgetful, don't consider the full context of the questions or answer base on their changes of emotions, behavior, and feeling. In order to avoid this problem, we can design a better method to collect right evaluation and suggests the appropriate solutions.

• Questionnaires are deployed on Google forms so that it is simply not suited for older or poorly educated people. They are not familiar with this kind of technology because of computer skills problem..

• We can develop a software packages to simplify the result of the questionnaire quickly and easily.

• We can do more research in the near future to compare and contrast to measure change or create new theories.

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Appendix A Screenshots of Pages Hunter Wine Shop Online Website
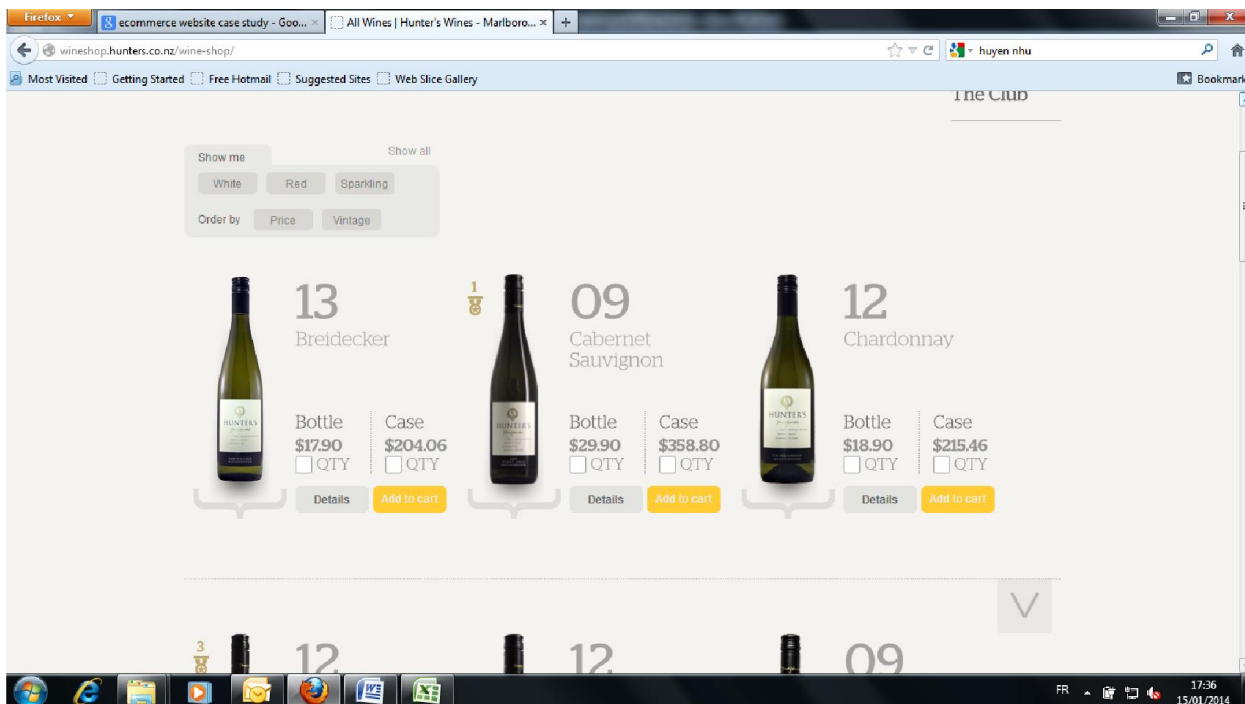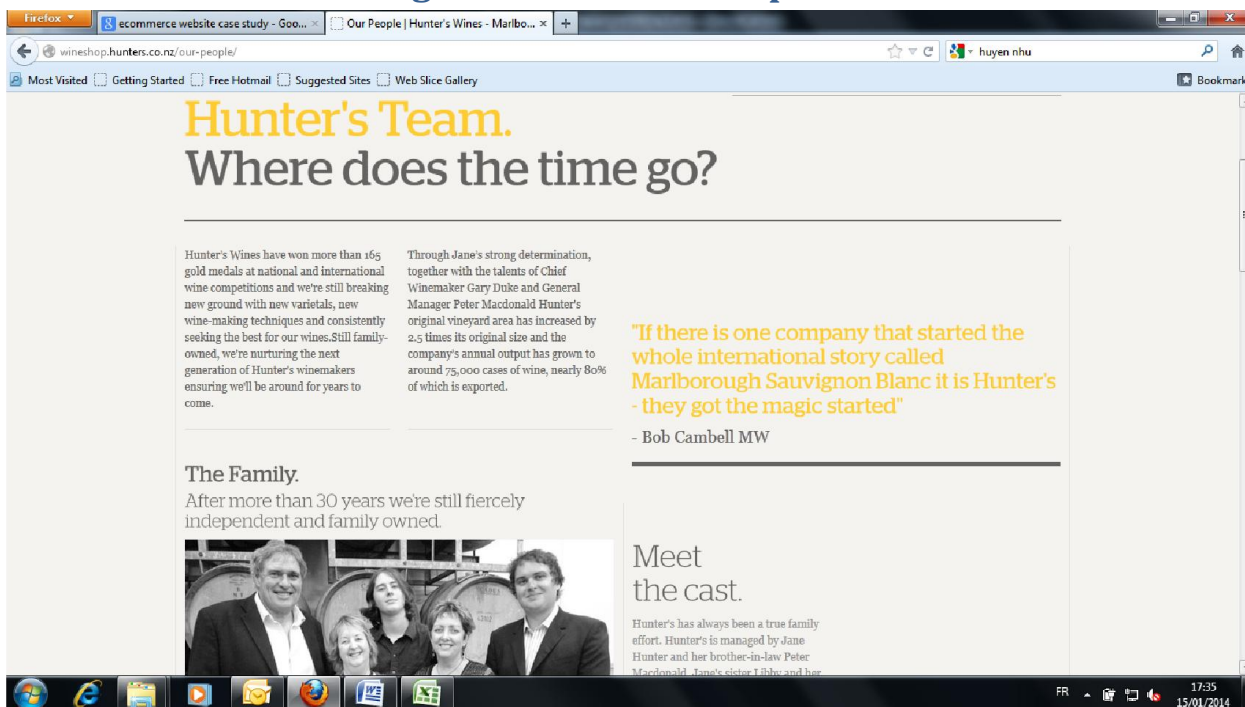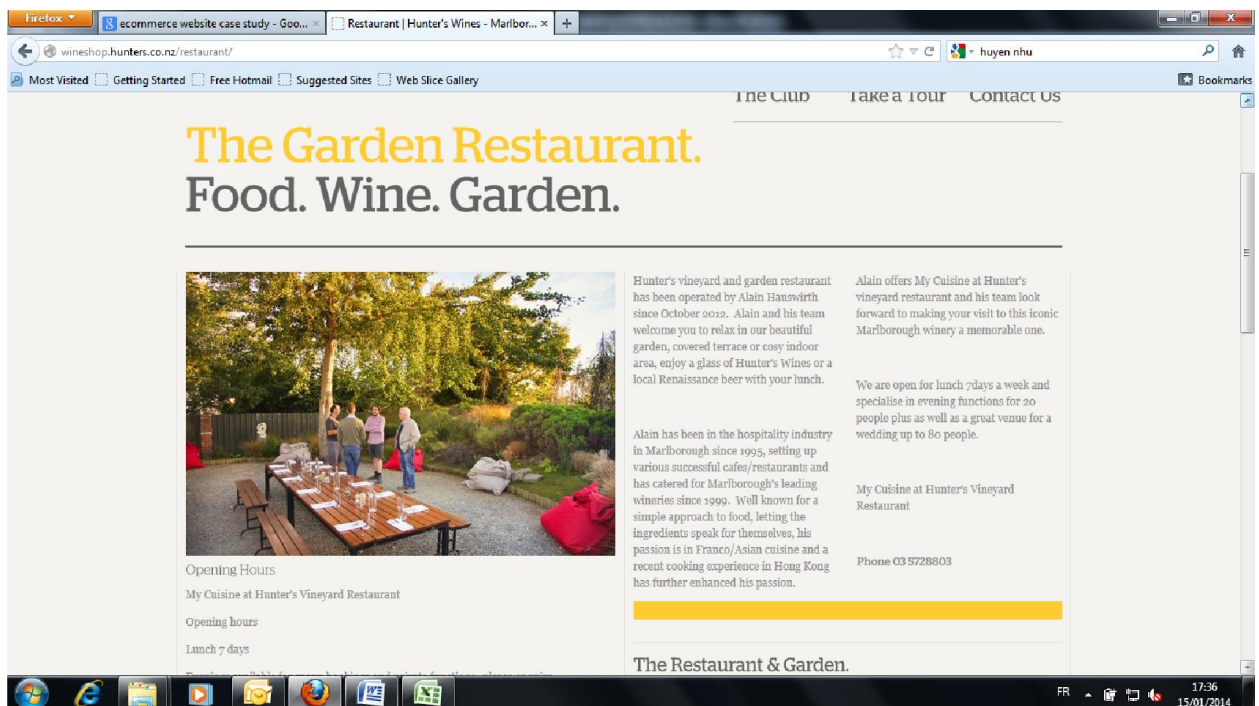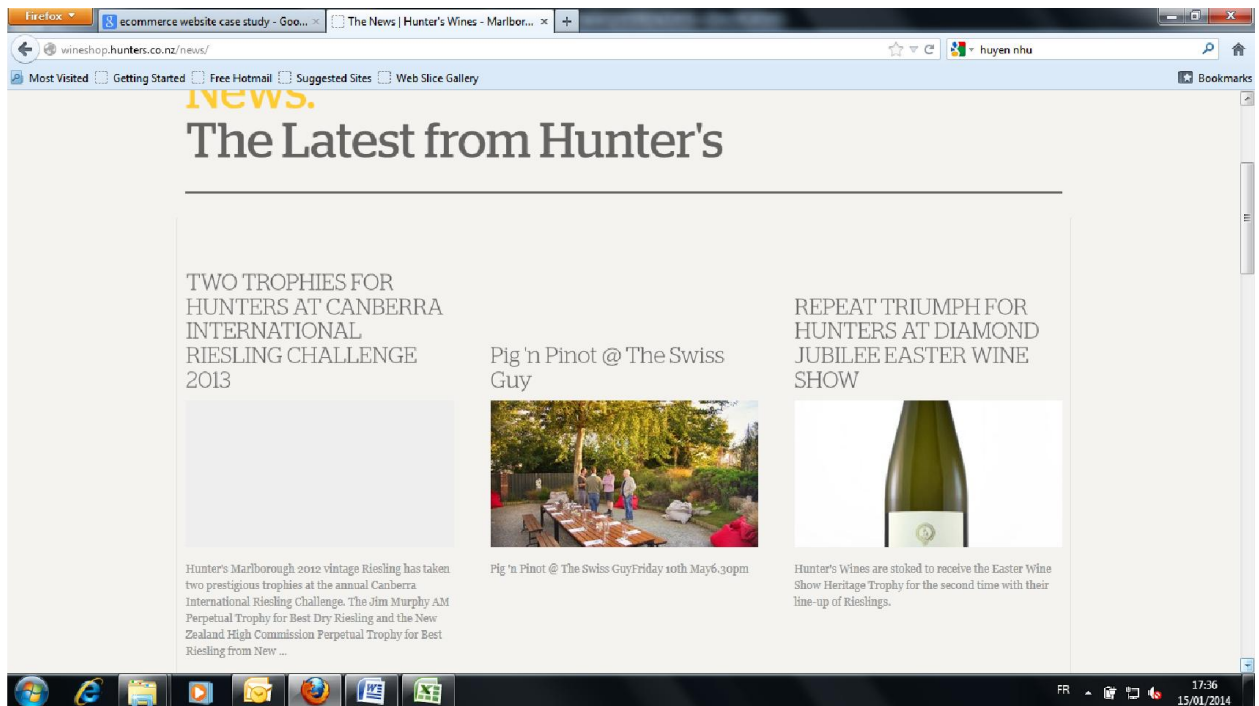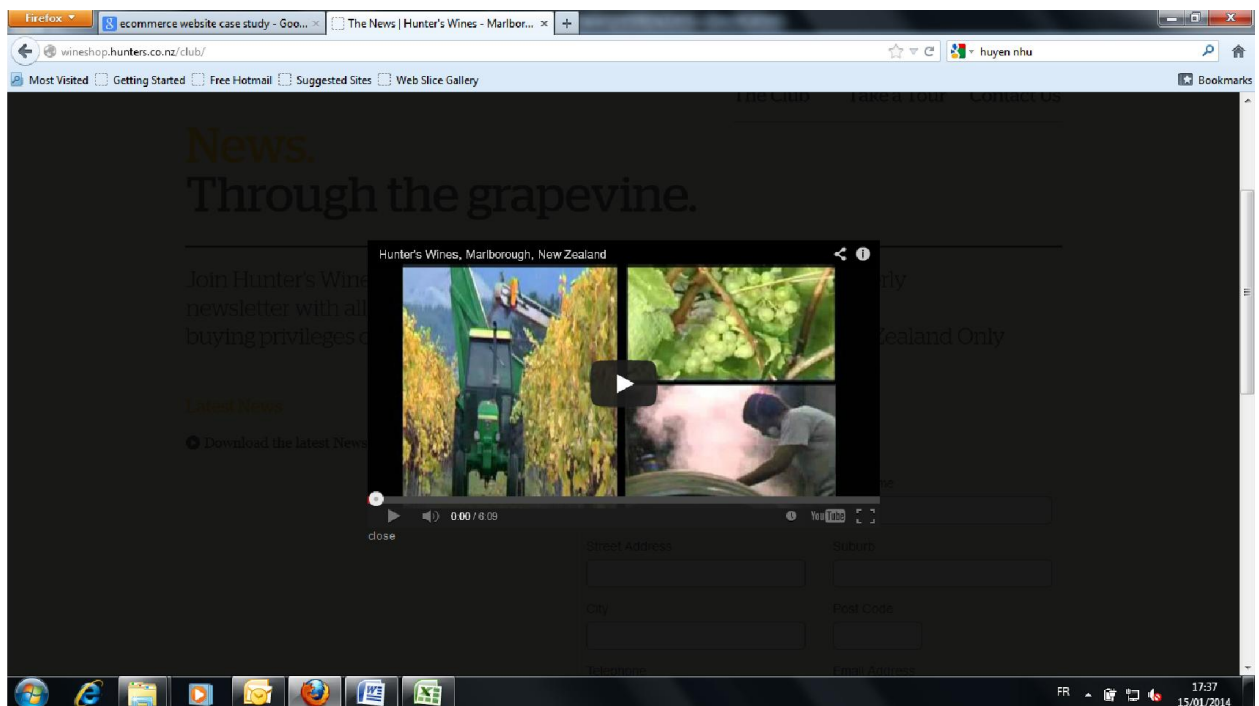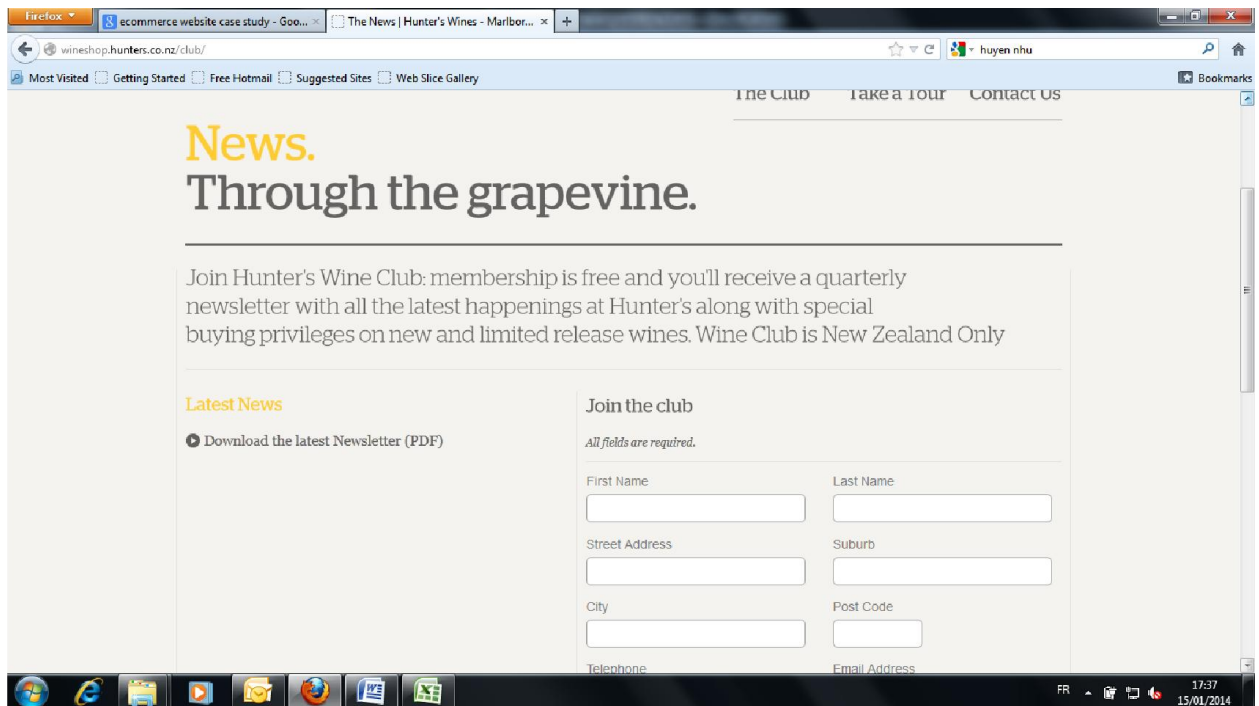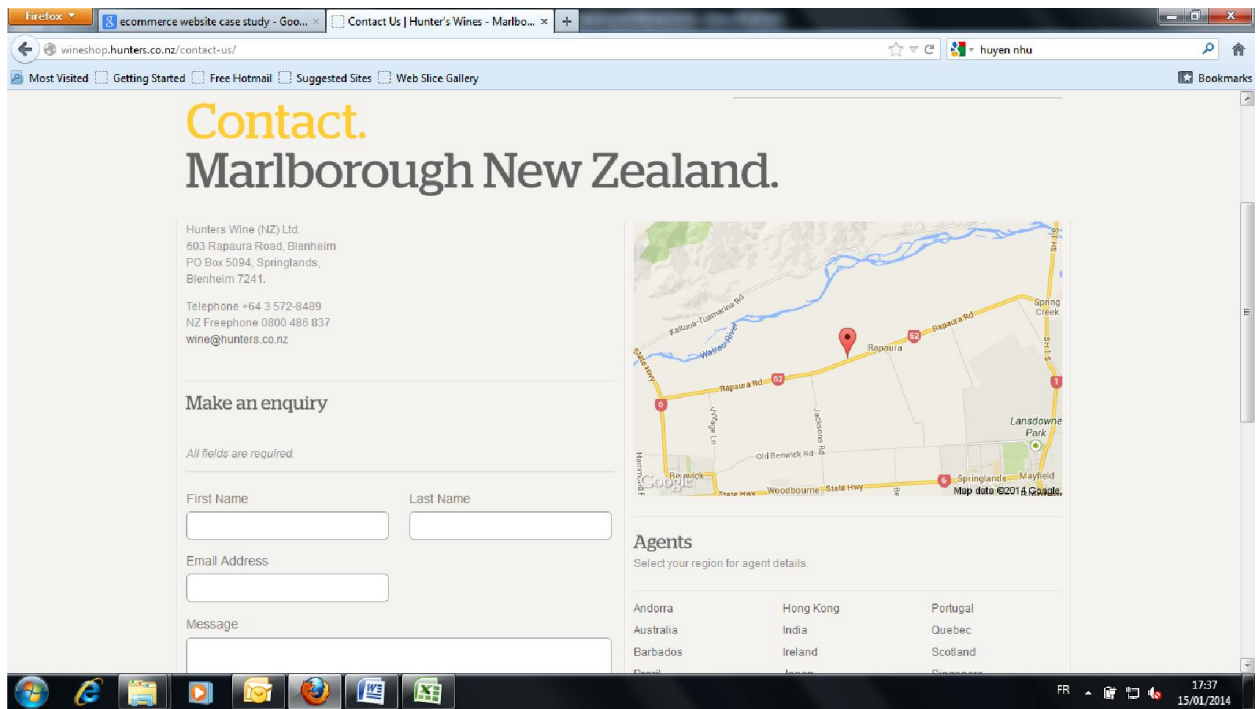
Appendix B Survey for Users Behaviors

Wine customer profile

1.   What is your age?

21-29

30-39

40-49

50-59

60 and over

2.   What is your gender?

Male

Female

3.   How often do you drink wine?

Daily

Weekly

Monthly

A few time a year

Rarely or never

4.   Who purchase wine for you?

I do

Spouse/ significant other

Friends

Colleagues

Other

Online wine purchasing behavior

5. How often do you shop for wine online?

Daily

Weekly

Monthly

A few time a year

Rarely or never

6. Do you shop for wine more online or offline?

More online

More offline

About the same

Neither

Reasons for and against buying wine online

7. Why do you purchase wine online?

Convenience

Better selection

Lower prices

Other

I don't purchase wine online

8. Why don't you purchase wine online?

Shipping cost

Shipping time

Don't trust product

Don't trust merchant

State shipping restrictions

Privacy/ security

other

purchasing patterns

9. what most influences your online wine purchases?

Personal recommendations

Restaurant experiences

Expert rating/ recommendations

Online retailers

Offline retailers

Online articles/ reviews

Print articles/ reviews

Advertisements

Other/ none

Purchase Influences

10. When buying wine online, for whom do you usually purchase?

Myself

Closer friends and family

Business/ casual acquaintances

All of the above equally

No one. I don't buy online

Research and Trust

11.   How do you research wine online?

Wine retailers

Wine blogs

Wine publications

Community sites/ chat rooms

Other

12.   What type of online wine information is most trustworthy?

User reviews

Expert reviews/ ratings

Wine retailer recommendations

Advertisements

Other

Appendix C Survey for Website Evaluation

Instructions: Rate your level of agreement or disagreement with following statements about the website from 1 to 5. (1 : strongly disagree, 2: disagree, 3: neutral, 4:agree, 5: strongly agree)
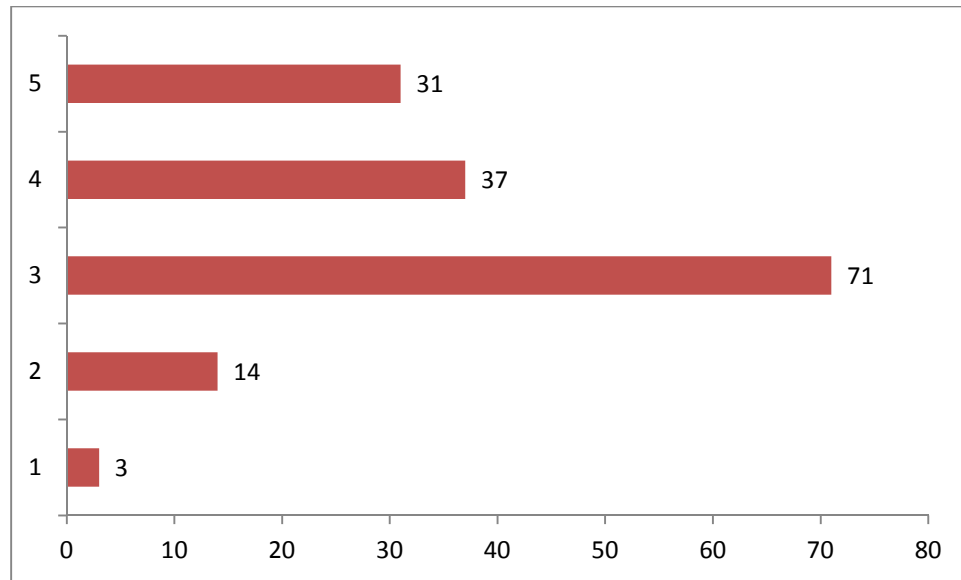
Functionality

6.   The information provided clearly in the website about delivery, price, tax or product information, etc.

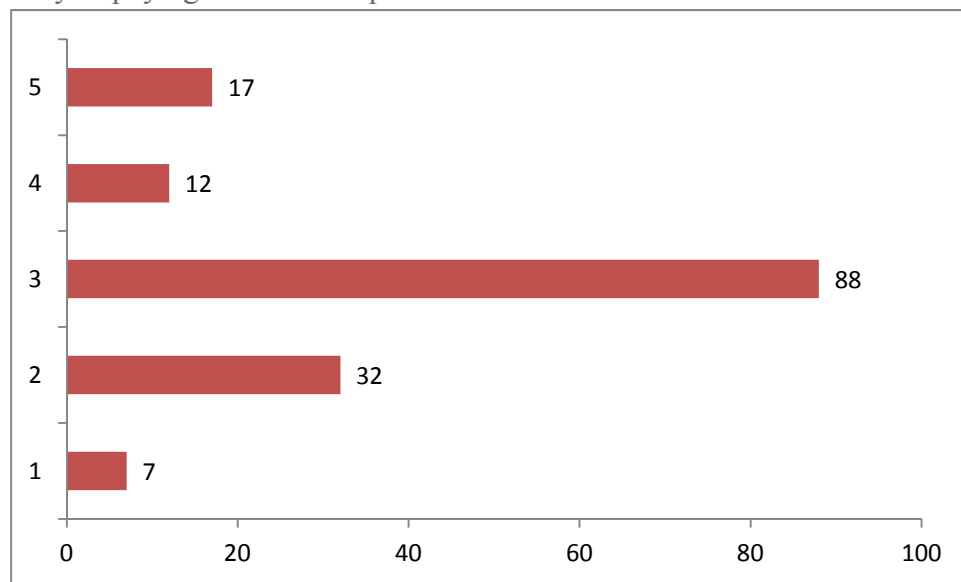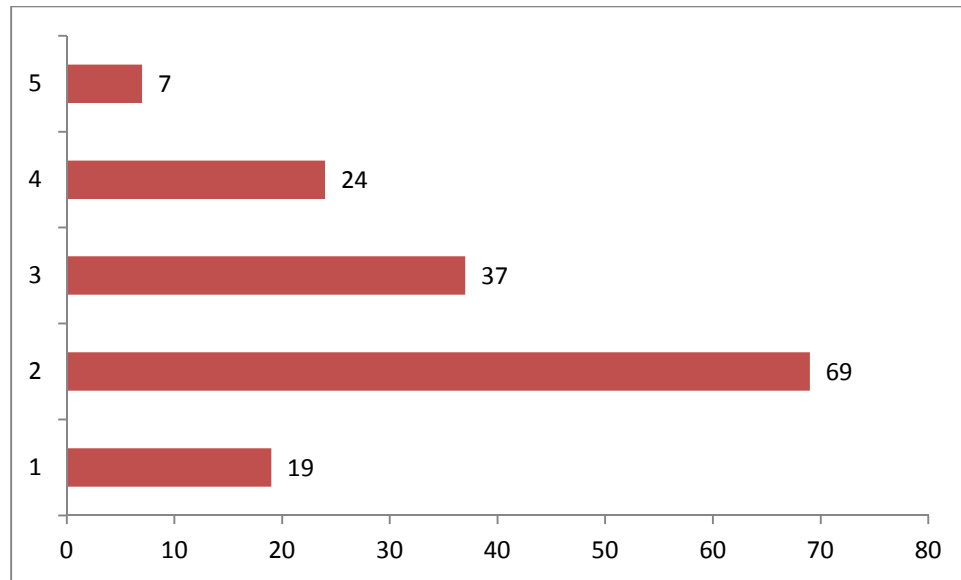7.   The process of selecting / deselecting them for purchase

8.   The responsiveness of the website

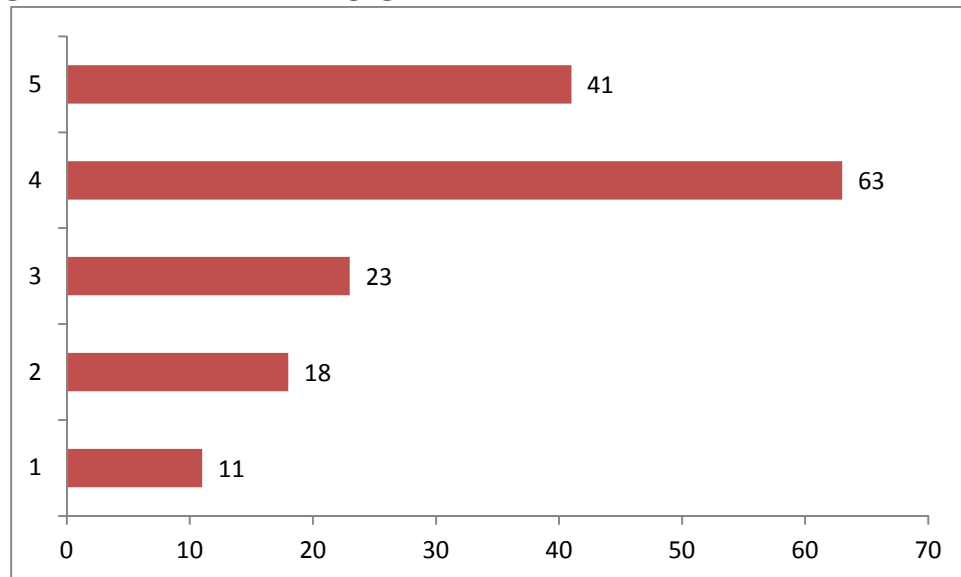9.   The security of paying methods for products

10.   Does the system support enough essential functions for eCommerce website.

Reliability

4.   Clicking on a link takes to a valid page

5.   When some error occurs, the website recover quickly

6.   I can access anytime

Efficiency

5.   it is possible to find what I want within an acceptable time

6.   it is possible to switch between pages in an acceptable time

7.   The website does not use plug-ins or proprietary software

8.   I can access the website from my favorite browser

Usability

7.   The web site appearance was attractive.

8.   It was easy to navigate through different sections of the web site.

9.   The instructions in each item were clear to understand.

10.   It was clearly understood where you were at each step of the activity and knew what to do next.

11.   The introduction of each section gave you background information on the section that followed.

12.   The additional information and hyperlinks provided helped you to better understand the subject areas intended to present.

What overall rating would you give to the website?

Appendix D The Result of Responses Users Behaviors

13. What is your age?
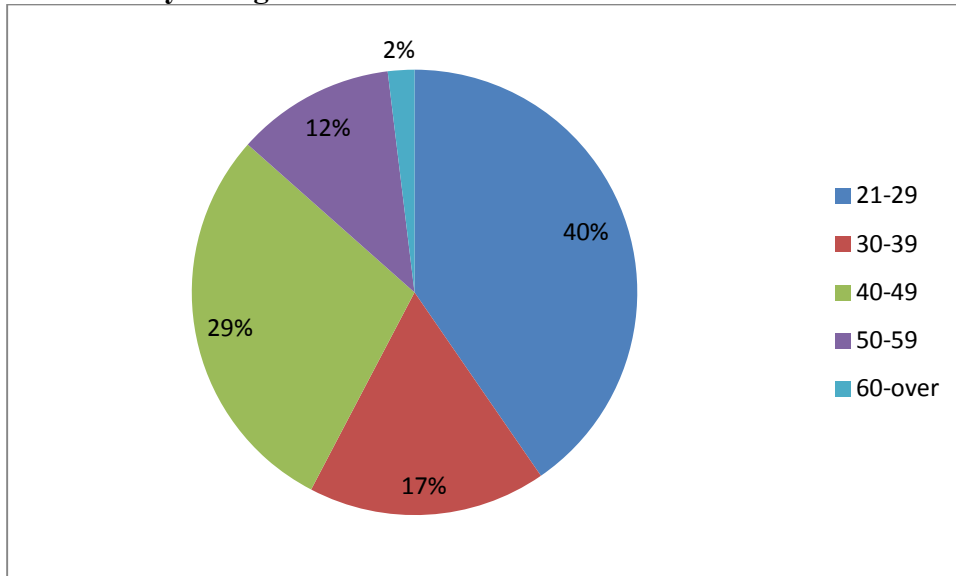
14. What is your gender?
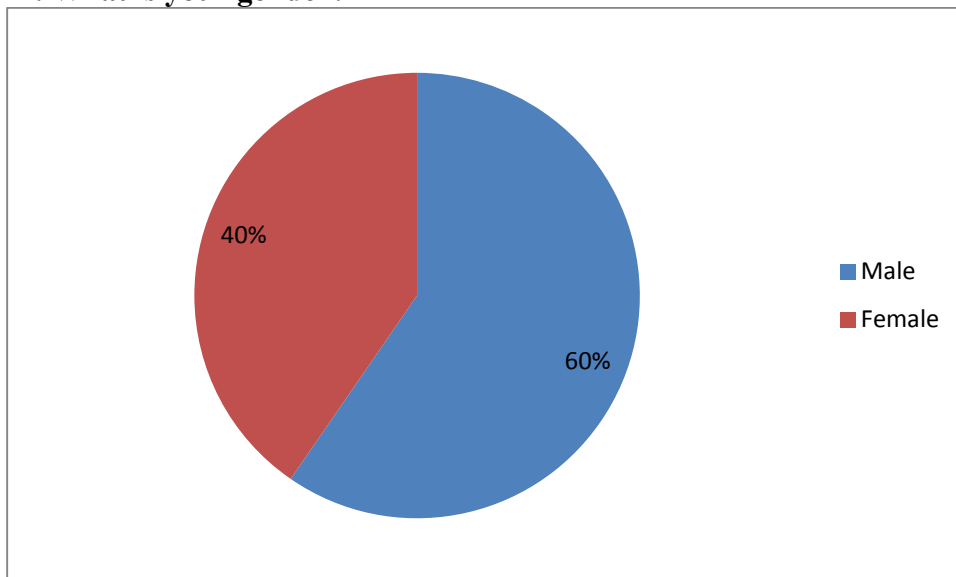
15. How often do you drink wine?
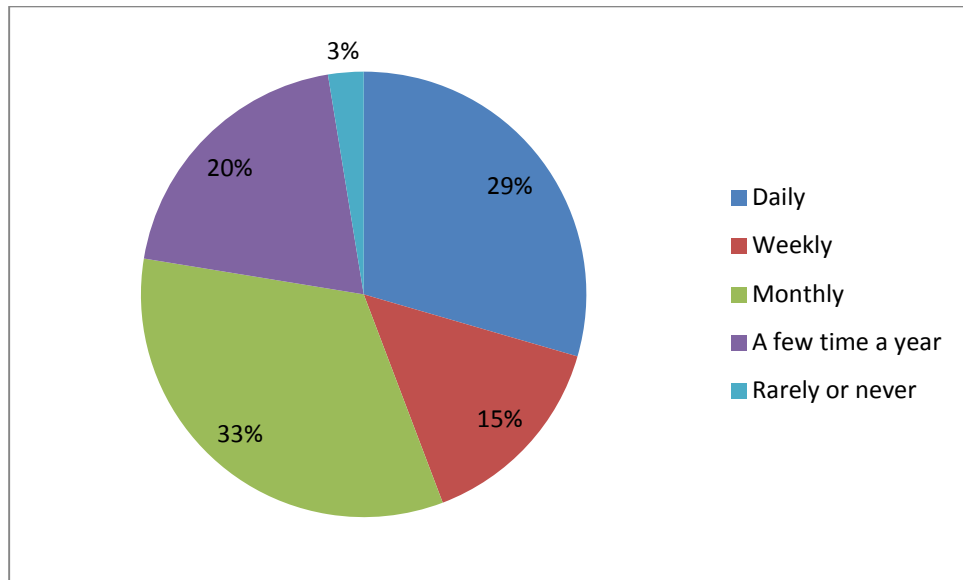
16. Who purchase wine for you?
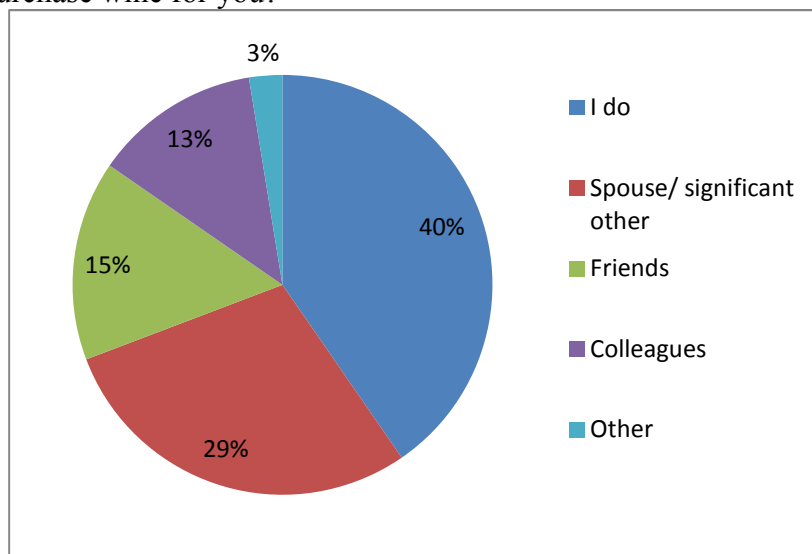
Online wine purchasing behavior

17. How often do you shop for wine online?
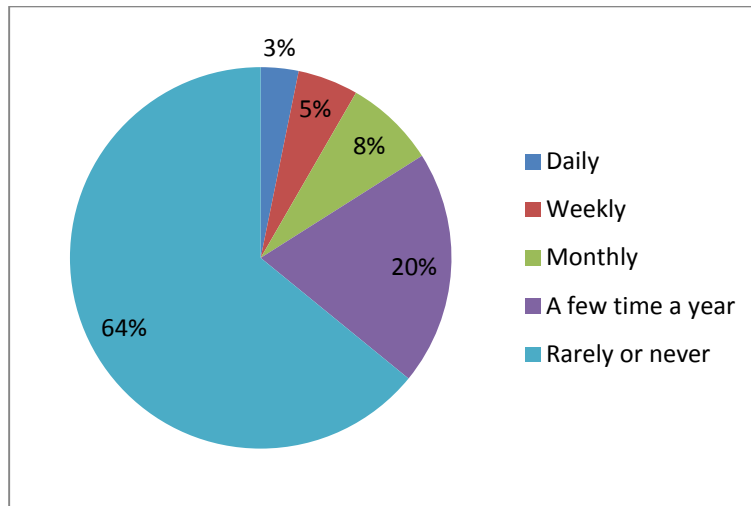
18. Do you shop for wine more online or offline?
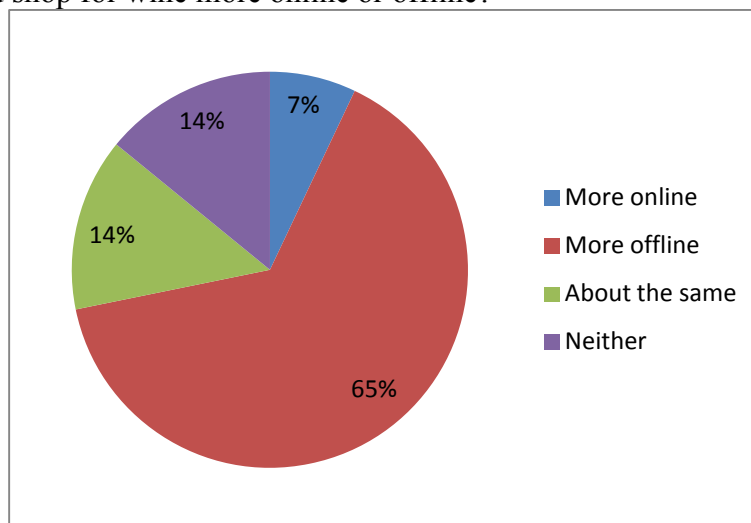
Reasons for and against buying wine online

Why do you purchase wine online?
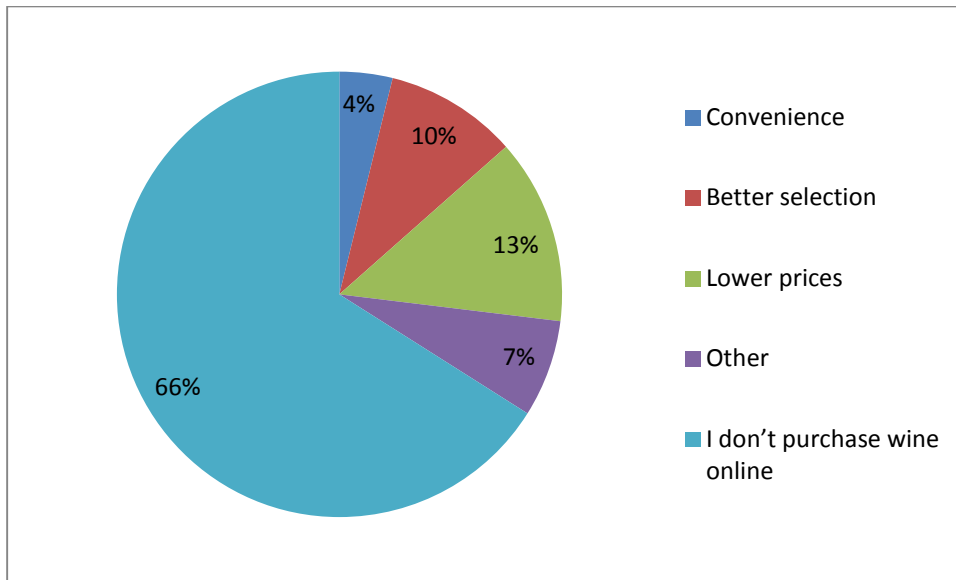
Why don't you purchase wine online?
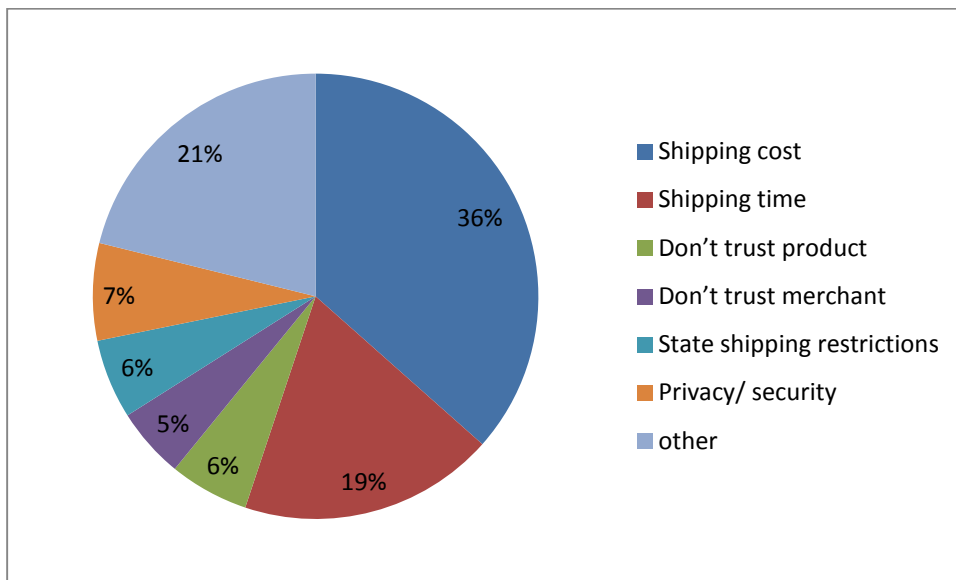
purchasing influences

what most influences your online wine purchases?
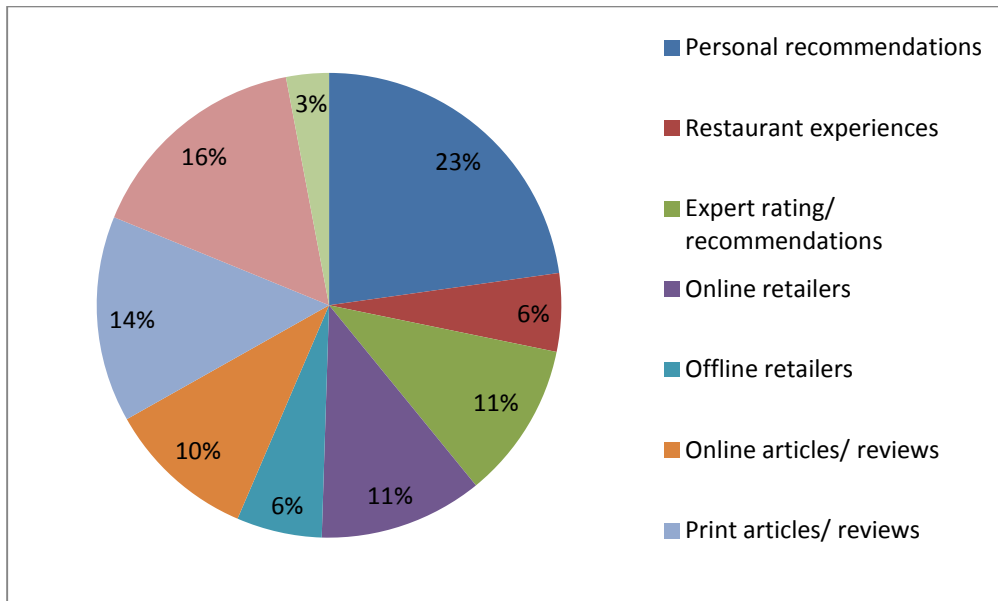
When buying wine online, for whom do you usually purchase?
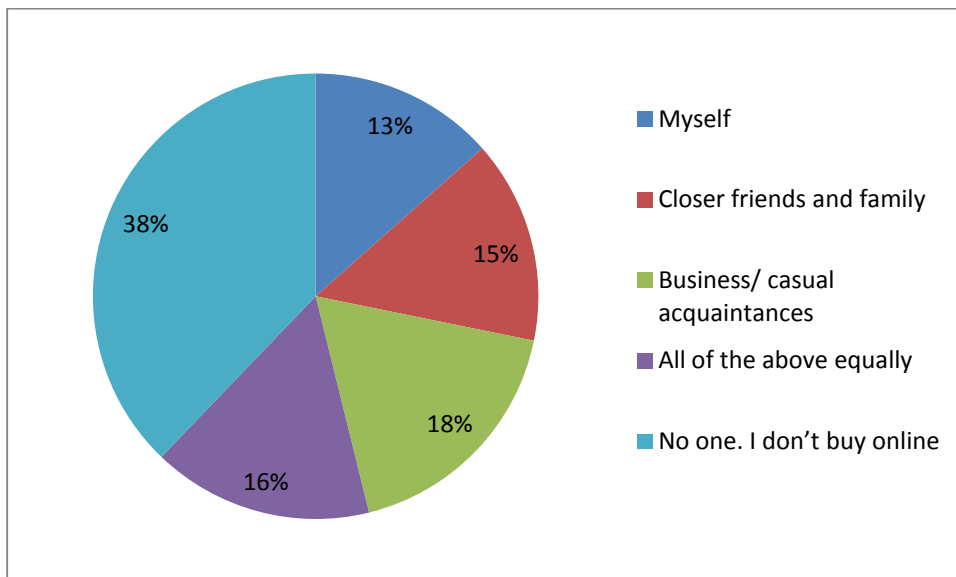
Research and Trust

How do you research wine online?
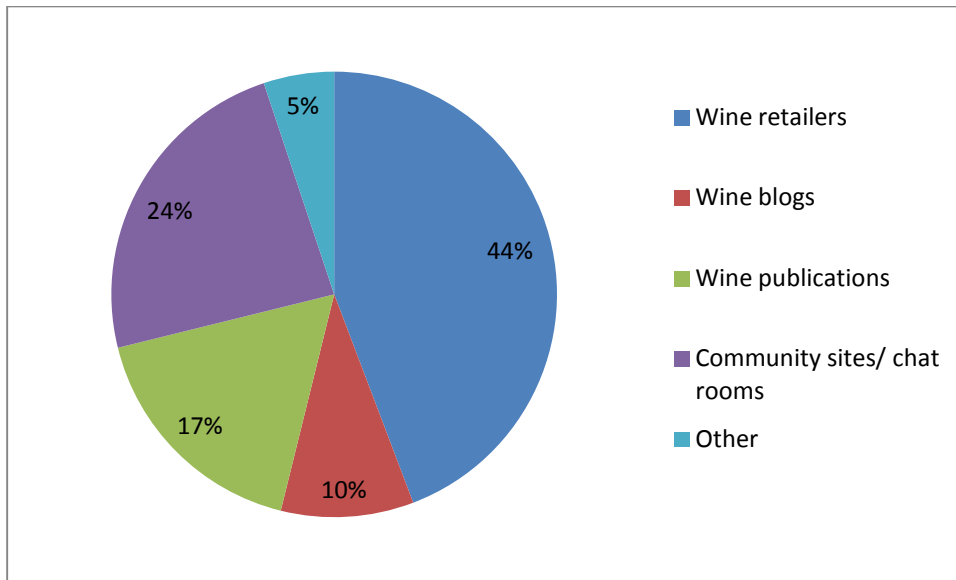
What type of online wine information is most trustworthy?
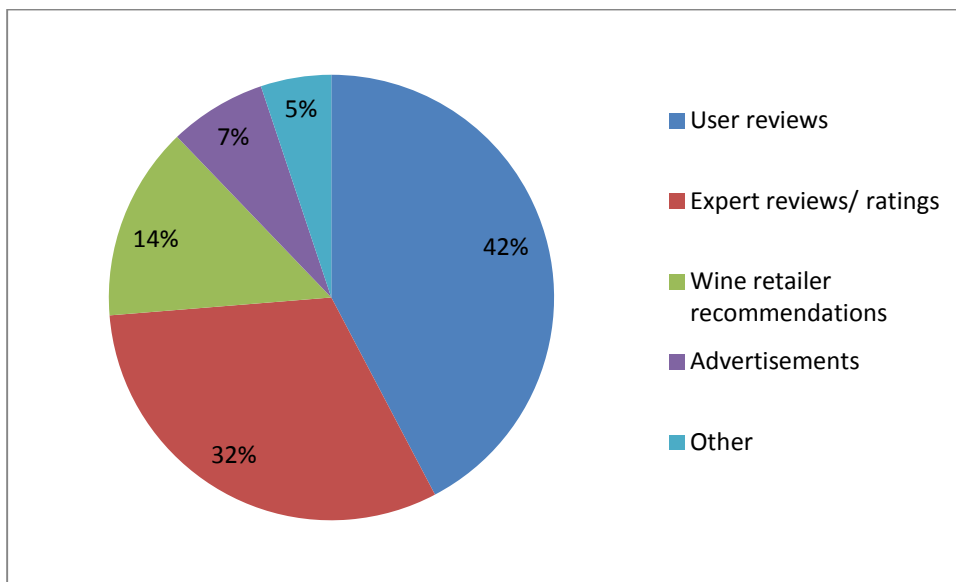
Appendix E The Result of Responses Website Evaluation

Functionality

1. The information provided clearly in the website about delivery, price, tax or product information, etc.

2. The process of selecting / deselecting them for purchase

3. The responsiveness of the website

Horizontal bar chart:
- 5: 31
- 4: 37
- 3: 71
- 2: 14
- 1: 3

4. The security of paying methods for products

Horizontal bar chart:
- 5: 17
- 4: 12
- 3: 88
- 2: 32
- 1: 7

5. Does the system support enough essential functions for eCommerce website.

Realiability

1. Clicking on a link takes to a valid page

2. When some error occurs, the website recover quickly

5	38
4	41
3	53
2	15
1	9

3. I can access anytime

5	11
4	65
3	25
2	44
1	11

Efficiency

1. it is possible to find what I want within an acceptable time

2. it is possible to switch between pages in an acceptable time

3. The website does not use plug-ins or proprietary software

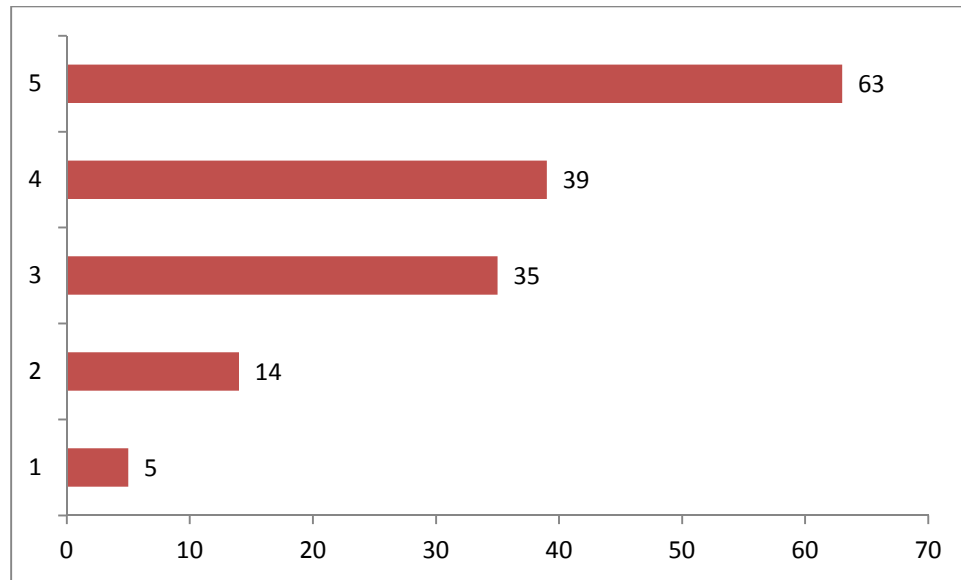**4.** I can access the website from my favorite browser

Usability

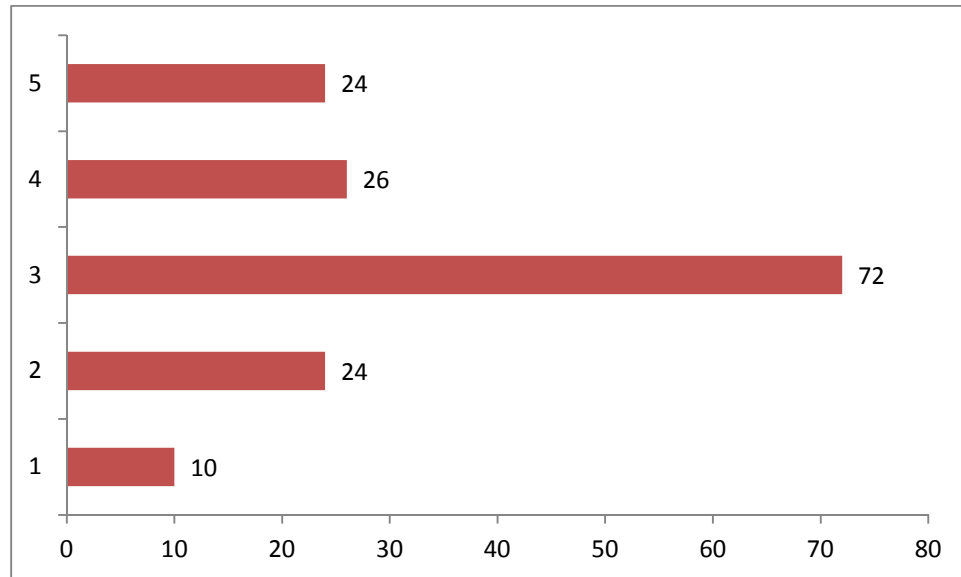1. The web site appearance was attractive.

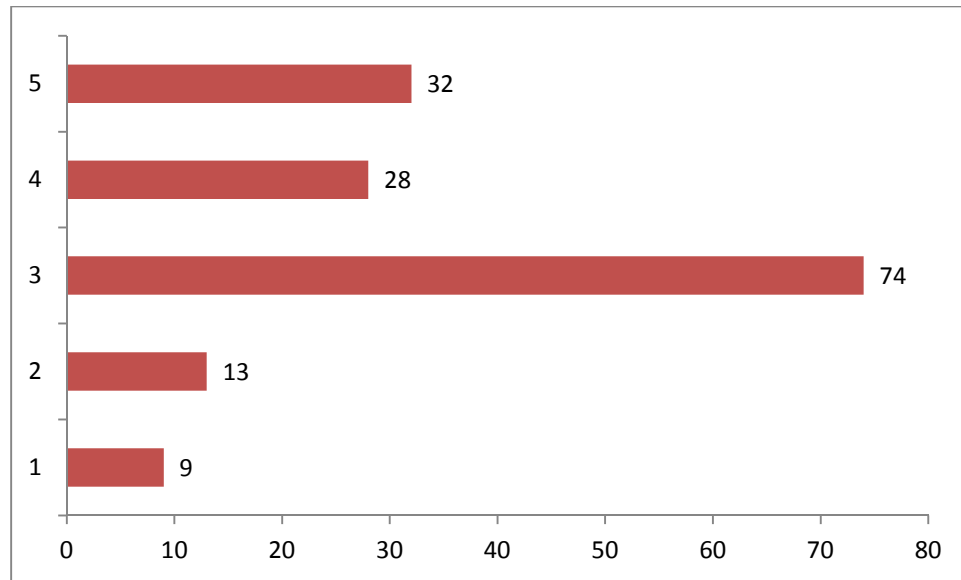**2.** It was easy to navigate through different sections of the web site.

3. The instructions in each item were clear to understand.
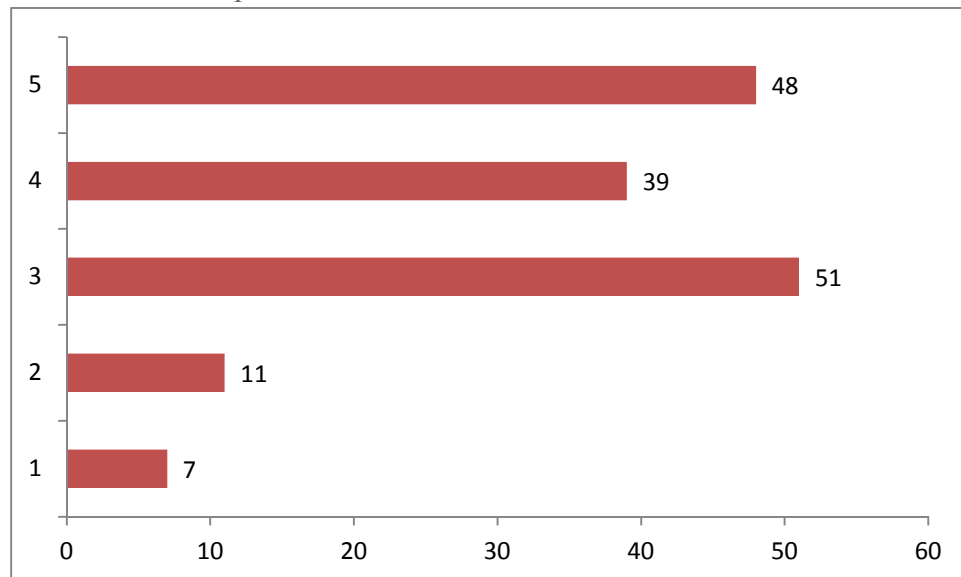
4. It was clearly understood where you were at each step of the activity and knew what to do next.

5. The introduction of each section gave you background information on the section that followed.

6. The additional information and hyperlinks provided helped you to better understand the subject areas intended to present.

What overall rating would you give to the website?