



Pharmad^ology

MAADI STEM SCHOOLS

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Table of Contents

Table of Contents	2
Introduction.....	7
EGYPT GRAND CHALLENGES:	8
Improve the use of alternative energies:	9
Recycle garbage and waste for economic and environmental purposes:	10
Deal with urban congestion and its consequences	11
➤ Environment Issues.....	12
➤ Urban Economy.....	13
Work to eradicate public health issues/disease.....	13
➤ Neglect in public issues	13
Increase the industrial and agricultural bases of Egypt	15
➤ Agriculture bases.....	15
➤ Industrial Bases	16
Address and reduce pollution fouling our air, water and soil:.....	17
➤ Water pollution:	17
➤ Soil pollution:.....	17
➤ Air pollution:	18
Improve uses of arid areas.....	18
➤ Causes of desertification	19
➤ Impacts of desertification	19
➤ Methods of solving the problem of desertification	19
Manage and increase the sources of clean water:.....	20
Deal with population growth and its consequences.....	20
Improve the scientific and technological environment for all:.....	22
Reduce and adapt to the effect of climatic change	23
➤ Egypt and Climate Change	23
Some of Egypt common issues	26
Addiction	26
➤ Effects of drug abuse and addiction	27
Infectious diseases	28
Pregnancy and women with children	29
Social Issues of the Alzheimer's Patient and Family.....	30

Issues related to the mental health problem:	33
Issues related to the energy consumption in Egypt:	36
➤ Increased Carbon Footprint.....	36
➤ Increased Risk of Climate Change	37
➤ Reduction in Supply.....	37
➤ Higher Energy Costs.....	37
Industry problems in Egypt.....	38
➤ Unbalanced Industrial Structure.....	38
➤ Low Demand.....	38
➤ Regional Concentration	39
➤ Loss in Public Sector Industries.....	39
➤ Industrial Sickness	39
➤ Lack of Infrastructure	40
➤ Improper Location Base	40
➤ Lack of Capital.....	40
➤ Shortage of Industrial Raw Material	41
➤ Higher Cost of Production and Low Quality of Goods.....	41
➤ License Policy	42
➤ Lack of Institutional Organization	42
Agricultural problems in Egypt.....	43
➤ FOOD, POPULATION, FAMINE AND HISTORY.....	43
➤ Hunger.....	44
➤ Small Land Owners in the Developing World	45
➤ Large Land Owners in the Developing World	46
➤ Higher Food Prices.....	47
➤ Roads, Food Distribution, Logistics and Crop Prices	47
➤ Commodity Prices and the Negative Affects of Globalization	48
➤ Empowering Women Farmers.....	49
Blood donation.....	51
Climate change problem:.....	54
Environmental problems:.....	56
Problem to be Solved	57
Identification of problem	57
➤ Real shortage or confusion over efficacy of substitutes?	58

➤ Where could the problem lie?	59
➤ Any remedies?	60
➤ Drug shortage crisis hits Egyptian market again	61
➤ Drug shortage problem.....	63
What will happen if this problem is not solved?.....	64
What might happen if this problem is solved?.....	64
Research.....	65
Topic related to problem:.....	65
Topic related to the solution:	65
Factors that are related to the problem:	65
➤ Self-Medication Problem in Egypt:	65
➤ current issues in Egypt health system:	67
➤ Medicine deficiency in Egypt:	70
The factors that are related to the solution:.....	71
➤ Programming languages:.....	71
➤ C# programming language?	79
➤ Websites and applications:	83
➤ ASP.NET Framework:	116
➤ Location Based Services (LBS)	119
Other Solutions Already Tried:	128
Practco.....	128
➤ Advantages:	129
➤ Disadvantages:.....	129
1mg	130
➤ Advantages:	131
➤ Disadvantages:.....	131
NetMeds:	132
➤ Advantages:	132
➤ Disadvantages:.....	132
SmartMedics:.....	133
➤ Advantages:	133
➤ Disadvantages:.....	133
Solution and Design Requirements	134
Website Functionality requirements:	134

Website design requirements	135
Selection of Solution:	137
Selection of prototype:	139
Functionality:	139
Website design requirements	140
Materials and Methods:	145
Materials:	145
Methods:	145
> First: The type of the application (mobile app, web site, desktop app)	145
> Second: The website functionality, design, and database	145
> Third: Analyzing the project	146
> Fourth: Designing the website	146
> Fifth: Developing the functionality code	152
Safety:	152
Test plan:	153
Design requirements	153
> Website Functionality requirements:	153
> Website design requirements	154
Testing steps:	155
Data collection:	156
Functionality Test	156
> Determine medicine availability effectively	156
> Uploading medical prescriptions	156
> Order medicine online	157
> Reserve medicine online	157
> Determine location effectively	158
Website Design Test	158
> Easy user interface	158
> Showcase the website's feature effectively	159
> Well formatted content	160
> Use familiar formats	160
> Fast load times	161
Analysis and discussion:	162
Functionality requirements	162

Website design requirements:	163
Test results for the website requirements:	174
Conclusion:	176
Recommendations:	177
Learning Transfer:	178
APA citation:	184

Introduction

Egypt like many other countries is suffering from many problems which affect the economy, environment, social life and sustainability. Health care in Egypt is one of the catastrophic problems that waits to be the ruling grand challenge in our country, so directing our forces towards it will help improving Egypt's current status in medical field. Egypt's health challenges disproportionately affect the rural poor and have the potential to impact the country's economic prosperity more broadly over the long term. One of the most serious health issues is the shortage of medicine combined with the patients' inability to get their medicine especially in urgent situations. Nowadays, this problem is really concerning as, day by day, people fall ill and it might be a serious issue if the medicine is not available or if there is so much effort needed to find it which consequently leads to health deterioration and even death. Effective and efficient communication is crucial in healthcare. Our website "Pharmadology" provides the perfect connection between the patients and the pharmacies helping them in getting medicine, information about the nearby pharmacies, ordering their medicine online or even reserve it. Pharmadology website also helps them to check availability of any required medicine, developing a great communication between the patient and any professional doctor for consultation to improve their healthcare.

Pharmagology was built using C# programming language which encompasses a strong typing, functional, and component-oriented programming in addition to the MVC framework which is used to design and create interfaces and structure allowing each to change without affecting the other. Some special design requirements were determined to test the website and they are classified into two main categories: functionality and design. A survey was then made in order to target different aspects of the website and tests these design requirements to ensure its effectiveness in solving the problem providing a new way using modern technology to help the patients reduce the time, effort, and money needed for getting their medicine. From our users' feedback, it was concluded that the website is working in an effective way as all users were satisfied by using the website. Therefore, all of the determined design requirements were achieved making the website a suitable and reliable solution ready for commercial using worldwide.

EGYPT GRAND CHALLENGES:

Egypt like many other countries is suffering from many problems which affect economy, environment, social life and sustainability. These problems represent an obstacle for its development. In order to solve these issues, we must consider them as challenges that we are trying hardly to solve and find solution for these challenges through thinking and finding creative ideas to reach the solution.



| Improve the use of alternative energies:

The non-renewable energy resources represent an essential problem that faces the whole world in general and Egypt specifically. As Egypt has been suffering severe power shortages and rolling blackouts over the past years, necessitating the requirement to look to alternative energy options to help meet continuously increasing demand especially for electricity.

Some of the main reasons why are the non-renewable energy resources represent a serious challenge that Egypt aim to overcome it:

They pollute the environment because of the harmful gas emissions resulted from burning such energy resources.

They will run out in the near future based on the scientists' predictions.

They are not sufficient to be used and satisfy the need for the large generations.

On the other hand, Egypt has an abundance of land, sunny weather and high wind speeds, making it a prime resource for the next alternative energy generation.

So, the renewable energy resources are really considered a prime solution for this problem and a really good alternate that:

- ✓ They will never run out as they are renewable.
- ✓ They don't harm the environment as they are ecofriendly.
- ✓ They are relatively not expensive compared to the non-renewable energy resources.

Egypt's demand for electricity is growing rapidly and the need to develop alternative energy resources is becoming ever more urgent. It is estimated that demand is increasing at a rate of 1,500 to 2,000 MW a year, as a result of rapid urbanization and economic growth. However, renewable energy makes up only 1 percent of the total energy consumption in Egypt. So, it is needed to redouble the efforts to increase this percentage.



Figure 1



Figure 2

Recycle garbage and waste for economic and environmental purposes:

The impact of waste accumulation can be highly drastic for many communities in developing countries. In Egypt, the issue gets more challenging as there are no clearly-defined strategies for an efficient management of solid waste, which inflicts serious environmental risks on Egyptian communities and drains a considerable portion of the local economy so we aim to improve solid waste management in Egypt by exploring the options by which solid waste can be sustainably managed, and reviewing international models of sustainable management systems. Eventually, a strategy is formulated for the sustainable management of solid waste on the local scale of Egypt.

There's a standard recycling practice in many countries: households sort their garbage in different categories before discarding it, with separate containers assigned for solid waste of different types, and others for organic waste. But in Egypt, households still produce mixed waste. This makes sorting it, prior to recycling, one of the tasks of garbage collectors — a task which exposes them to serious health risks. Still, garbage collectors in Cairo objected to a recent decision by the city's governor to set up a system encouraging citizens to sort and sell their own garbage. The setting up of kiosks is a new approach that was piloted in some districts in Cairo last March. The idea is to encourage people to sort their own garbage, sell salvaged solid materials through these kiosks, and donate the money to charities of their choice. But the city's garbage collectors depend on selling salvaged waste material for their livelihoods, and so they objected to the decision after a meeting held on 13 April with Shehata al-Moqadis, the head of the Garbage Collectors union. They also demanded an increase in the cost of collecting garbage from houses in the districts where these kiosks are already established — from five to 30 Egyptian Pounds per month (0.25 US\$ and 1.5 US\$, respectively).

Most of Cairo's garbage collectors live in Ezbet El-Zabbaleen quarter, otherwise known as Garbage Collectors village. It is located along a road leading to Mokattam neighbourhood, where vehicles unload tons of garbage collected by the quarter's residents prior to their sorting, processing, and recycling.



Figure 3

According to research conducted by the American University in Cairo in 2009, the estimated population of the Zabbaleen district is between 50,000 and 80,000 people, with some 30,000 working in the garbage village located in Mokattam. Several generations of the village's residents have worked in recycling waste collected from Cairo neighborhoods.

In 2003, the government contracted foreign companies to take charge of the capital's garbage collection. Refuse from each building was collected by doormen and put in large bins in front of the building to be picked up by specially equipped garbage trucks.

The concerns were not unfounded, since the AUC study showed, "The Zabbaleen village recycled about 85 per cent of the capital's collected garbage while the companies recycle about 20 per cent only of the waste they collect, with a total net weight of eight tons a day in Cairo alone."

Unofficial figures indicate that the Zabbaleen still collect about 8,000 tons of garbage a year — more than half the daily output — and the companies about 3,000, leaving much of the remaining 6,000 tons on the streets.

Garbage is recycled only in Cairo and Alexandria, while the garbage of less-privileged governorates and also that left on the streets in the country's two largest cities is dumped in the desert, in the six government-operated dumps, or, more often than not, in canals and the Nile River, posing serious health hazards.

Deal with urban congestion and its consequences

43% of the population of Egypt lives in 223 cities, of which 56 % are concentrated in the Greater Cairo Region as well as Alexandria governorates.

The Greater Cairo Region is one of the largest metropolitan area on the African continent. It is a prime engine for economic growth in Egypt and with over 18 million inhabitants, it accommodates close to 20% of the country's population.

According to the Ministry of Local Development, about 1,171 areas across the country are considered informal, inhabiting a population of around 15 million inhabitants. Around 60% of these areas are located in the Greater Cairo Region.



Figure 4

Urban planning, infrastructure and service delivery have not been able to keep up with the rapid urban growth experienced in Egypt over the last four decades. There is a lack of public space and increasing deficiencies in infrastructure and services. Due to inefficient public land management systems and outdated housing policies, impoverished individuals have no alternative but to settle in unplanned and sometimes unsafe areas. In addition, infrastructure is deteriorating, public services and transportation systems are stretched to the limit, air and noise pollution levels are high and traffic congestion is chronic in most areas. The complex set of institutional arrangements that fragment responsibilities, also constrains efficient service delivery. A lack of efficient and accountable planning and management systems in Egypt, as well as rapid urbanization, has caused socio-political and economic challenges that the country has not been able to address. This contributed to a situation from which the recent so called “Arab Spring” events could develop, that called for a more transparent and accountable government, social equity and justice.

➤ Environment Issues

The river Nile determines the environment of Egypt, establishing a clear distinction between arable land and the desert. The fertile land of Egypt represents only 3.9% of the overall national territory, and it is divided up into two geographical regions: the Delta and Upper Egypt. The capital city, Cairo, is located in between the two and has a population of circa 20 million people. The density of this megacity is circa 20,000 inhabitants/km². The urbanisation in Egypt is also affecting regional capitals – such as Alexandria – by increasing their population exponentially. This is partly due to the rural population shift, partly explained by the demographic explosion. Despite the governments’ efforts to make the irrigation system in the Nile Valley and in the Delta more efficient during the last century, the demographic growth and its urban expansion is currently the biggest threat for the natural resources of the country. In fact, water pollution and poor sewage treatment is partly responsible for a high infant mortality throughout the country. In terms of energy, Egypt still has a strong oil and gas dependency -96% of its primary energetic needs- which has provoked the appearance of other environmental issues in the last 50 years, such as solid waste management and air pollution.

➤ Urban Economy

Although there has been a slight improvement in the Egyptian peoples' economic situation over the last decades, the country is, due to various reasons, still struggling to reach sustainable and diversified economic growth. The proportion of the population living in extreme poverty declined from 8.2% in 1990 to 3.4% in 2008/9. The total poverty ratio declined from 24.2% in 1990/1992 to 21.6% in 2008/2009. Updated data has not been available since the revolutions.

According to Egypt's Household Consumption and Expenditure Survey, the upper poverty line also stagnated at about 40% between the 1990s and 2008/2009. However, accompanying the revolutions, the rates of economic growth had declined to approximately 2% during the past three years.

| **Work to eradicate public health issues/disease**

Egypt's health challenges disproportionately affect the rural poor and have the potential to impact the country's economic prosperity more broadly over the long term.

The Healthcare system in Egypt is Divided between different Institutions:

Ministry of Health on Population which delivers 30% of Services.

the Ministry of Higher Education and Scientific Research delivering 30% of Services through University hospitals.

the Health Insurance Organization providing 10% of services and independent ministries providing the remainder.

There are plans to reform healthcare and implement a universal health insurance for every Egyptian by 2030. but now we still have a lot of problems which are:

➤ Neglect in public issues

In Egypt Poor women are 20 percent less likely to receive regular antenatal care than wealthy women, under-five mortality for children born in the wealthiest quintile is 19 deaths per 1,000 live births versus 42 deaths for the poorest, the highest rate of Hepatitis C in the world; seven percent of Egyptians between the ages of 15 and 59 suffer from chronic hepatitis C. as well as a reduction in key best practices related to good maternal and child health such as early breastfeeding. Some of these trends can be linked to low-quality health care services, poor health behaviors, and weak management of health systems in the public sector.

Statistics	
Total population (2016)	95,000
Probability of dying under five	(per 1 000 births, 0)
Probability of dying between 15 and 60 years' m/f (per 1 000 populations, 2015)	205/121
Total expenditure on health per capita (Intl \$, 2014)	594
Total expenditure on health as % of GDP (2014)	5.6

The past two centuries have seen enormous achievements in control of infectious diseases, previously the leading cause of death, in large improved nutrition. This has led people to put their faith in the notion that medical science would succeed in overcoming the remaining obstacles. Vaccination has eradicated smallpox, nearly eradicated poliomyelitis and greatly reduced many other highly dangerous infections such as diphtheria, tetanus and measles. New diseases such as HIV and new forms of influenza have taken both professional and popular opinion by surprise and have renewed the challenges before the world public health community. Emergence of antibiotic-resistant strains of common organisms due to overuse of antibiotics and lack of vaccines for many danger resources.

According to the reports, the 10 most important public health problems and concerns are:

- ✓ Alcohol-related harms
- ✓ Food safety
- ✓ Healthcare-associated infections
- ✓ Heart disease and stroke
- ✓ HIV
- ✓ Motor vehicle injury
- ✓ Nutrition, physical activity and obesity
- ✓ Prescription drug overdose
- ✓ Teen pregnancy
- ✓ Tobacco use

Increase the industrial and agricultural bases of Egypt

➤ Agriculture bases

Egypt takes a broad view of food security, recognizing that with limited land and water resources, it will never be self-sufficient in grains, vegetable oil, and animal proteins. Agriculture is a major component of the Egyptian economy, contributing up to 14.5 percent of GDP and 28 percent of all jobs. Agriculture employs almost 45 percent of all women in the United States, Egypt is primarily a bulk commodity (e.g., soybeans, cotton, and corn) destination.

Think about how much food you eat each day. Now, think about how big the human population is and how much food is needed to feed all of those people. Since the development of agriculture, most of the food needed to feed the population has been produced through industrialized agriculture. Since the 1960s, the amount of food produced through this type of agriculture has increased drastically, and currently there is enough food produced to feed every human on Earth.

Although industrialized agriculture has been successful in producing large quantities of food, the future of food production is in jeopardy due to problems in agriculture. Two of the most major problems in agriculture are the loss of agricultural land and the decrease in the varieties of crops and livestock produced.

Environmental impact of agriculture:

- ✓ Climate change
- ✓ Deforestation
- ✓ Genetic engineering
- ✓ Irrigation
- ✓ Pollutants
- ✓ Soil degradation



Figure 5

➤ Industrial Bases

The industrial production movement in the Arab world began in the early 19th century and was confined to the primary industries such as food and clothing, where the industry depended on livestock and the muscle strength of the labor force. The colonization that invaded the Arab world played a significant role in the delay of industry, the people were busy either by wars or by trying to secure a living, especially after the independence of some Arab countries, where the industry suffered from many problems.



Figure 6

❖ *Problems of Industry in the Egypt*

- ✓ Sector, and the increase in production costs.
- ✓ Drain and consume a lot of natural resources, especially water that is heavily wasted.
- ✓ The fear of the owners of capital, and lack of appetite to invest in industrial fields.
- ✓ Tax evasion and customs of factory owners.
- ✓ Poor quality of industrial products.
- ✓ Excess costs of energy sources such as electricity and oil.
- ✓ Lack of experienced and competent technical staff.

❖ *Factors that could turn Egypt into a world-famous industrial hub*

- ✓ Cheap labor
- ✓ Investment incentives
- ✓ A transportation networks
- ✓ Raw materials

Address and reduce pollution fouling our air, water and soil:

Stakeholder, and every person has something to contribute to advance effective pollution prevention awareness. It is known that the environment is polluted when there are substances that can be harmful to the health of living organisms in the environment more than the amount they can tolerate. The most common pollution causing health hazards today are the air, water and soil pollution.

➤ Water pollution:

Water is the base of life, which without life cannot exist. The contamination of water bodies such as lakes, rivers, oceans, underground water and seas by harmful substances is known as water pollution. Polluted water becomes unfit for drinking, bathing, washing and irrigation due to sewage, industrial wastes, pesticides and fertilizers from farming and garbage dumping.

➤ Soil pollution:

Soil pollution occurs when the presence of toxic chemicals, pollutants or contaminants in the soil is high enough concentration to be of risk to plants, wild life, human and of course the soil itself.

Carbon dioxide, carbon monoxide and nitrogen dioxide are usually present in the air in small quantities and they are not harmful to us.

However, when present in quantities more than which we can tolerate, they become pollutants.

Soil pollution is the contamination of soil due to these harmful substances. Polluted soil becomes unfit for growing crops and plants and is usually accompanied by water pollution. The major causes of soil pollution are over irrigation, pesticides, sewage and garbage dumping, deforestation and mining. Water and soil pollution usually occur together as polluted water seeps into soil and contaminates it.

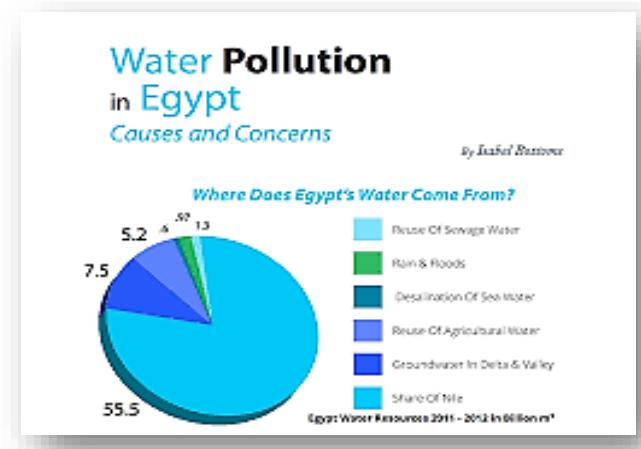


Figure 7

➤ Air pollution:

Air pollution is usually caused by burning of fossil fuels like petroleum and coal, burning of wood, factories, vehicles and power plants. These dangerous gaseous emissions, from all of the previous causes and examples, can affect consequently our health in a negative way making it one of the most dangerous pollution to be cut out.

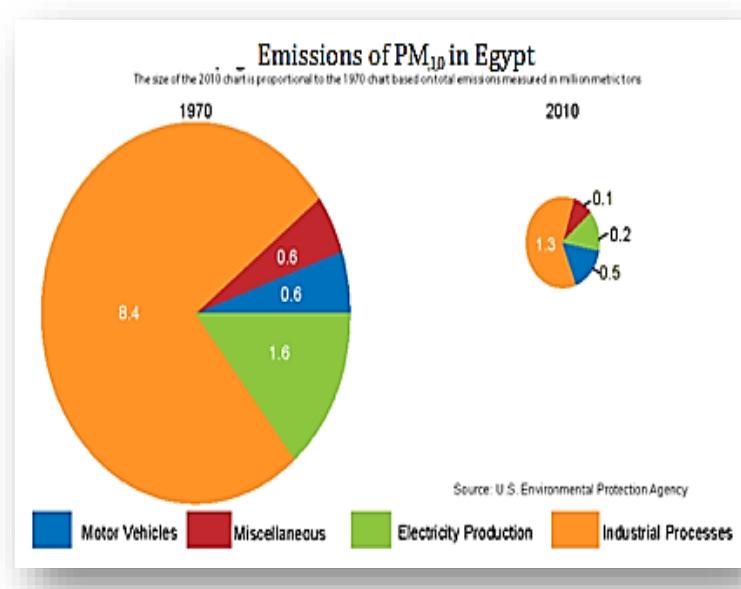


Figure 8

Improve uses of arid areas

Egypt is located in an arid- to semi-arid zone. The inhabited area of the country constitutes only 4% of the total area of the country (1 million km²), and the rest is desert. The main source of water, the River Nile, which provides more than 95% of all water available to the country.

Egypt is one of the most arid lands in the world and Arid area causes because desertification in Egypt and it is a geographical phenomenon that means the decline or degradation of the capacity of the biological production of the land and cause complete abandonment of agricultural land, which leads to the food crisis Arid area could be broadly and simply defined as regions where evaporation exceeds precipitation.



Figure 9

Generally speaking, arid lands cover 47% of Earth's land surface and The United Nations announced in the seventies that Egypt is the first country in the world desert because of the harsh conditions that characterized the desert, where it contains about 86% of the land is very arid and 14% arid land and Egypt is an area of approximately one million square kilometers in the northeast corner of Africa.

Desertification of the arid lands of the world has been proceeding--sometimes rapidly, sometimes slowly--for more than a thousand years. It has caused untold misery among those most directly affected, yet environmental destruction continues.

➤ **Causes of desertification**

- ✓ Excessive or excessive use of land leading to soil depletion.
- ✓ Deforestation, which operates the cohesion of the soil of the earth.
- ✓ Overgrazing leads to depriving the land of its weeds.
- ✓ Poor irrigation methods as well as poverty.

➤ **Impacts of desertification**

The process of desertification can be developed and may increase in areas where it is created. It is associated with scarcity of rainfall, which has negative effects on the lives of the population, animal and agricultural development in different regions, and may lead to population migration from the region. Especially in the case of the spread of animal and agricultural breeding activities, and desertification has a direct impact on development rates because of the negative effects on the government's development plans and the economic growth of the country.

➤ **Methods of solving the problem of desertification**

- ✓ Environment and adhering to soil-related methods that help restore the natural balance between soil and communities.
- ✓ Dissemination of environmental awareness.
- ✓ Incorporate desertification control into the curriculum.
- ✓ The use of renewable energy sources instead of the use of firewood, which will help to maintain vegetation.
- ✓ The use of water resources in a way that ensures their protection.
- ✓ Preserving vegetation.

Manage and increase the sources of clean water:

Water is very important. it is the mainstay of life for every living organism. Most of plants cultivated by man depend on the quantities of water. Drinking water cannot be replaced by any other drink like tea or milk. Water is a part and parcel of our bodies, food and Earth.

However, people throw rubbish in it and companies throw wastes as well. This may lead to lots of great dangerous effects and problems in every life field. Indeed, Egypt has been suffering from severe water scarcity in recent years. The major factors affecting Egypt's water, like water distribution, misuses of water resources and inefficient irrigation techniques, population explosion, and of course pollution. Water issue in Egypt is rapidly assuming alarming proportion. By the year 2020, Egypt will be consuming 20 percent more water than it has. With its loosening grip on the Nile, water scarcity could endanger the country's stability and regional dominance.

Deal with population growth and its consequences



Figure 10

Egypt's worrying population boom fails to generate the same headline attention as terrorist attacks, the impact of economic reforms on the poor, the country's hyper-constrained politics, or accusations of human rights violations. Yet, the very real dangers it poses were highlighted when the head of the country's statistical agency, Abu Bakr el-Gendy, called this seemingly irrepressible tide a "catastrophe." To Egyptian President Abdel Fattah el-Sisi, it is a "challenge as critical as terrorism."

The numbers are certainly daunting. In 2000, the United Nations estimated that Egypt's population would hit 96 million in 2026. They were off by about 10 years. In 2017, there were some 104.5 million Egyptians, of which 9.5 million lived outside the country. The 2006 census counted 73 million people, an annual increase of 2.6 percent since then. Unless the fertility rate of 3.47 changes, by 2030, Egypt's population is expected to grow to 128 million. This growth, with 2.6 million babies born in 2016, comes at a time of unprecedented challenges on the climate front with serious implications for loss of arable land (also under pressure from housing), rising sea levels, and depletion of scarce water resources. The Nile faces upstream challenges as Ethiopia builds Africa's largest dam and pollution eats away at the river's usability for agriculture and other needs.

This growth has grave implications. The number of primary school students grew by 40 percent from 2011 to 2016. One can imagine the impact on a system where 35 percent of students entering middle school cannot read or write. Employment is another challenge, with 700,000 new entrants annually into a labor force where over 25 percent of those 18-29 years old—one-third of whom have university degrees—are unemployed. The International Monetary Fund projects a labor force of 80 million by 2028. Reminiscent of the 2011 revolution, in which youth played a major role, 61 percent of the current population is under 30 years old and 34.2 percent is under 15 years old.

According to Egypt's statistical agency, the population growth rate must be one-third that of economic growth to prevent living standards from deteriorating. Even if one accepted GDP growth of double the population growth rate, a more realistic 5.2 percent, the challenge remains that GDP growth in Egypt averaged 4.07 percent from 1992 until 2017. Yet, Egypt has done better on both accounts: It has sustained growth rates of well over 5 percent and lowered the birth rate to less than 2 percent—all within recent memory.

Figure shows two population projections to demonstrate the effect of population momentum over a period of 40 years (1996-2036). The top line shows the size of the population if the total fertility rate of 3.6 in 1995 continued. In this case the total population would reach 113 million in 2036. The second line shows the result of achieving the target of the Egyptian government--i.e., reducing the total fertility rate to replacement level by 2016. In this case the population will continue to grow to 88 million. The increase from 60 million to 88 million is due to population momentum, while the rest of the increase to 113 million is due to a fertility rate exceeding replacement level.

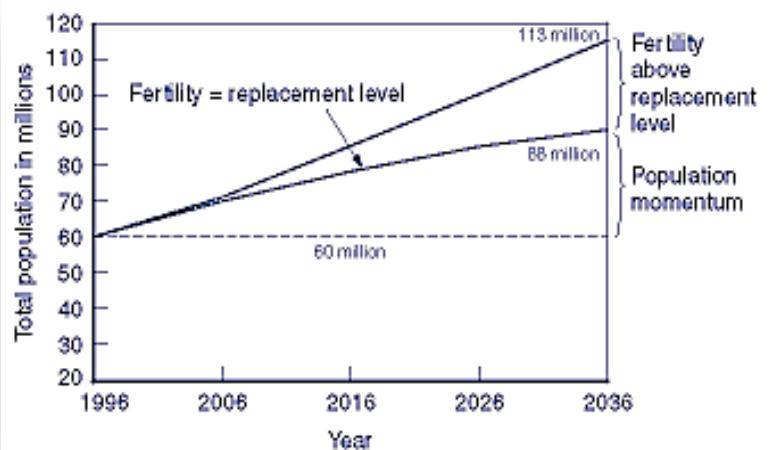


Figure 11

Improve the scientific and technological environment for all:

Improving scientific environments for citizens is an important thing as we encourage them to focus on. Till now, Egypt doesn't have stable bases or plans to have a scientific and technological environment. So many other challenges are preventing us from doing so, such as poverty, lack of techniques, non-having experience in such a category, educational mall-practicing and non-having enough knowledge and ignoring the new ideas and projects of graduated youth. We still have a hope trying to graduate new well-educated generations who will have the task of achieving their country's progress and development.



Figure 12

Reduce and adapt to the effect of climatic change

Today the world is facing multiple crises – economically, socially and environmentally.

Every year, the United Nations and representatives from the private and civil sector convene to find solutions to climate change and its threats to economies and livelihoods. Very recently, the annual conference was held in Cancún, Mexico. Expectations to reach a consensus breaking the political and financial deadlock were low. The outcome shows however that the international process to stem climate change is still alive and ongoing.

Developing countries are particularly affected by climate change as they are mostly located in regions that are more susceptible to its impact. In addition, they typically lack the financial resources and technological expertise for adaptation to climate change or its mitigation.

➤ Egypt and Climate Change

Egypt is a typical example of a developing country which is highly vulnerable to climate change and which faces numerous threats to its economic, social and environmental sustainability. This causes enormous fundamental pressures on Egypt's competitiveness. These pressures can also be described as growing threats to national security. They are fueled by a growing population and growing demand coupled with the constraints of a finite resource base and could develop into genuine crisis situations if not quickly and decisively addressed. These pressures include:

Energy Security — Unsustainable use of energy resources is one of the major reasons for environmental degradation and climate change. The consequence is energy scarcity and rising energy prices which increase poverty, strain national budgets and jeopardize Egypt's competitiveness for the future.

Water Security — Global warming results in sea-level rise due to the melting of glaciers and arctic ice. Consequently, the world's fresh water resources decline while salt water intrudes into underground reservoirs. Egypt is particularly susceptible due to its low-altitude Nile Delta.



Figure 13

Food Security — Limited water and agricultural land coupled with population growth and other factors are creating mounting pressure on Egypt's ability to provide food for its people in the future. Climate Change — Declining precipitation levels, changing weather patterns, and rising seas in the Nile Delta are slowly but steadily making a difficult situation worse, especially in the area of food and water.

The Need for Jobs — Egypt's young population is hungry for work, and Egypt needs to generate over one million new jobs every year for its growing workforce.

The Poverty Gap — With millions still living under the poverty line defined by the United Nations, Egypt must lift the standard of living for those most in need.

The Financial Crisis — The continuing impact is being felt around the world hitting national budgets hard also impacting the availability of investment capital and development aid.

Companies are very much affected by the scarcity of available resources and they cannot survive in the future if they cannot predict and adapt to major trends like climate change.

Egypt's large population makes the country extremely vulnerable to climate change. Moreover, its densely populated Nile delta is seriously threatened by sea level rise. Climate change will also have its impact on citizens' health, and studies have been undertaken in an attempt to analyze possible adaptation measures. Vulnerability assessment studies in priority sectors have been undertaken as part of the process of developing the national action plan. The studies have indicated that the following areas are the most vulnerable in order of severity and certainty of results: agriculture, coastal zones, aqua-culture and fisheries, water resources, human habitat and settlements, and human health.

Egypt is a unique country with respect to its water resources. More than 95% of the water budget of Egypt is generated outside its territory. Although we cannot yet predict the impact of climate change on the Nile Basin, there are indications that the impacts will be significant. Any decrease in the total supply of water, coupled with the expected increase in consumption due to the high population growth rates will have drastic impacts.

Water management is thus one of the most important adaptation actions. Adaptation of supply includes measures to improve rain harvesting techniques, increase abstraction of ground water, recycle water, desalinate water, improve its transportation and rationalize its use. Meanwhile, adaptation of demand requires minimizing the need for water and optimizing the economic return of its unit volume.

Egypt is located in northern Africa, bordering the Mediterranean Sea between Libya and Gaza strip, with a coastal strip extending for about 3,500 kilometers, overlooking the Mediterranean Sea in the north, and the Red Sea in the east. The dominant feature of the northern coastal zone is the low-lying delta of the River Nile, with its large cities, industry, flourishing agriculture and tourism. The delta and the narrow valley of the Nile comprises 5.5% of the area of Egypt, but has over 95% of its people and its agriculture. Egypt's Mediterranean coast and the Nile Delta have been identified as vulnerable to seal level rise.

Egypt's climate is semi-desert characterized by hot dry summers, moderate winters and very little rainfall. The country is characterized by particularly good wind regimes with excellent sites along the Red Sea and Mediterranean coasts. Egypt has only one main source of water supply, the River Nile, which supplies over 95% of the water needs of the country. There is some winter rain in the delta and along the Mediterranean coast, west of the delta. Non-renewable underground fossil water supplies are accessible outside the river valley, especially in the oases. Consequently, agricultural development is closely linked to the River Nile and its management. The Nile waters originate outside Egypt, flowing through nine countries. Egypt's use of the Nile water is controlled by international agreement. Massive projects to divert some of the Nile waters to Northern Sinai, and to Toshka depression, in the extreme south of the country, are underway. Consequently, the water needs of the country are growing rapidly.

Some of Egypt common issues

Addiction

It is estimated that addicts in Egypt are spending \$2.9 billion on drugs each year.

Estimates on how many people are addicted to opiates, cannabis, amphetamine-type stimulants or heroin vary greatly, but range between 600,000 and 800,000, according to a 2007 study.

Half the 129,850 people who entered drug rehabs in 2007 were addicted to cannabis, while another 43 percent were dependent on opiates of various types. Another seven percent were addicts of amphetamine-type stimulants that would include ecstasy and methamphetamine.

The slums of Cairo and Giza are hotbeds of addiction. These slums are among the largest in the world and are home to hundreds of thousands of street children. Some authorities estimate that the number of these children may reach one million. Population density reaches 60,000 people per square mile, far denser than Calcutta or Djakarta. Some residents make a living collecting garbage from the winding Cairo streets that are too narrow for motor vehicles. The garbage is then sorted and salvageable materials are then sold. Entire decrepit and abandoned neighborhoods are stacked with non-salvageable refuse. Street children living in these areas find oblivion through the use of glue-sniffing, cannabis or prescription drug abuse.

For those with more income, alcohol, cocaine, heroin, cannabis, ecstasy, and methamphetamine are regularly abused. More than 12 percent of Egyptian students are dependent on drugs and other nine percent to bingo and three percent to hashish.

In 2005, the total number of heroin addicts in Egypt was estimated to run somewhere between 20,000 and 30,000. A 2007 report stated that 8.5 percent of Egyptians—or six million people—are addicted to drugs. The majority of them are between 15 and 25 years of age. Rising rates of unemployment are said to contribute to increases in addiction. For example, in one area, 20,000 young men are employed compared with another 30,000 that are out of work.

Individuals begin to use drugs with varied choices. Some people use drugs to relieve some medical condition but continue to use them after the medical condition is over. Some people who feel depressed begin to use the drug to self-medicate and get addicted to it. Sometimes a traumatized event or a relationship issue lead a person to drugs. Some other people use the drug to escape from the pressures of life or to experience the pleasure of drugs or to compliance with the peer group compatibility to have a different view of the world around them. This voluntary initiation into the world of addictive drugs has strongly influenced society's view of drug abuse and drug addiction and their treatment.

➤ **Effects of drug abuse and addiction**

Drugs are chemicals that affect the body and brain. Different drugs can have different effects. Some effects of drugs include health consequences that are long-lasting and permanent. They can even continue after a person has stopped taking the substance.

There are a few ways a person can take drugs, including injection, inhalation and ingestion. The effects of the drug on the body can depend on how the drug is delivered. For example, the injection of drugs directly into the bloodstream has an immediate impact, while ingestion has a delayed effect. But all misused drugs affect the brain. They cause large amounts of dopamine, a neurotransmitter that helps regulate our emotions, motivation and feelings of pleasure, to flood the brain and produce a "high." Eventually, drugs can change how the brain works and interfere with a person's ability to make choices, leading to intense cravings and compulsive drug use. Over time, this behavior can turn into a substance dependency, or drug addiction.

Today, more than 7 million people suffer from an illicit drug disorder, and one in four deaths results from illicit drug use. In fact, more deaths, illnesses and disabilities are associated with drug abuse than any other preventable health condition. People suffering from drug and alcohol addiction also have a higher risk of unintentional injuries, accidents and domestic violence incidents.

Infectious diseases

Anecdotal reports from Germany, France, Ireland and the UK suggest that there is some concern that HIV and hepatitis B infection are increasing among some female drug users. Although no hard data exist to support this concern, it has been suggested that it is the result of riskier injecting behavior by women, or of unprotected sex. Female drug users commit less property crimes than men and more often support their drug habits through the sex industry — sex work is an established source of income for up to 60 % of drug-using women. Rising HIV infection among European women and their new-born babies led to routine screening programmed for HIV and, in some cases, hepatitis B and C, in antenatal services in Germany, France, Ireland and the UK in the 1980s and 1990s. The potential of women to spread infectious.

Diseases to their clients has always caused concern and the connection between female drug use and sex work has almost certainly contributed to the growth in harm reduction services for female sex workers and treatment services for female drug users. A number of outreach work and low-threshold facilities for women have been established providing shelter, information and practical advice on safer sex and safer drug use. Self-help groups, such as Mainline in Amsterdam, offer services for women including hair-dressing, self-defense and drama.

Pregnancy and women with children

Pregnant opiate users are increasingly seen as requiring a particularly high level of intervention and support. Most EU countries recognize that children born to these women may also need specific medical care. In all States, pregnant women are offered a ‘fast track’ into drug-treatment services, and in Belgium, Denmark, France, Ireland, Austria, Portugal and Sweden specialist services have been developed specifically for them. Detoxification is not generally recommended for pregnant women and substitution treatment options are under scientific review. For many of these women, however, regular maternity care is incompatible with their lifestyle or they fear stigmatization if they attend. The growing number of children born to drug users run a high risk of developing drug problems themselves and how children are affected by parental drug use and dependence is an emerging concern. Studies vary in both their methods and results. Some imply that the problems facing children of drug-using mothers are both inevitable and multiple, while others reveal no differences in the emotional, behavioral and learning problems of children of drug-using mothers and children of non-drug users in similar social settings. Other research points to similarities between children of drug-using and alcohol dependent women. Mediating effects have been identified, such as modifying living arrangements, increasing social support and providing treatment facilities. The extent to which children remain living with drug using mothers varies widely in the EU and clear policies on removing children from drug-dependent mothers are either not yet developed or not standardized in practice. In Denmark and Sweden, which operate foster schemes, there appears to be a shift towards providing support to enable drug-dependent mothers to remain with their children, or at least to stabilize the relationship between children and parents. The more southern European countries — such as Greece, Spain, Italy and Portugal — tend to rely instead on traditional extended family structures to arrange appropriate childcare.

Social Issues of the Alzheimer's Patient and Family

Alzheimer's worsens over time. Alzheimer's is a progressive disease, Alzheimer's is a progressive brain disorder damages and eventually destroys brain cells, leading to a loss of memory, thinking and other brain functions, where dementia symptoms gradually worsen over a number of years. In its early stages, memory loss is mild, but with late-stage Alzheimer's, individuals lose the ability to carry on a conversation and respond to their environment. Alzheimer's is the sixth leading cause of death in the United States. On average, a person with Alzheimer's lives four to eight years after diagnosis, but can live as long as 20 years, depending on other factors.

The prevalence of dementia in Egypt compared with other countries in North Africa and Middle East region is quite different. In a study conducted in Wadi Ara, the prevalence rate was reported as 20.46% for those aging \geq 65.

Families caring for a person with Alzheimer's disease (AD) soon discover that it is unlike any other illness. Coping with a degenerative brain disease is much different than dealing with a physical disability.

AD is more disruptive to, and has greater impact on, the family than other chronic diseases. AD caregiving carries with it a high financial, social, and emotional price.

Families must work toward effectively coping with the disease, decreasing the harmful effects on the family, and keeping family conflicts to a minimum.

Support groups can provide families with much-needed information on the disease, emotional and practical support, and an expressive or advocacy outlet.

Formal services can help relieve some of the burden of caring for an AD patient.

Family members must remember that there is no "right" way to care for a person with AD, and each family must determine, with the help of the appropriate professionals and services, how to best meet its own needs.

Given the burdens of care, however, even small interventions may translate into improvements in the quality of life or confidence of the caregiver.



Figure 14

In addition to the human suffering caused by the disease, Alzheimer's is creating an enormous strain on the health care system, families and the federal budget.

Ultimately, Alzheimer's is fatal. Currently, Alzheimer's is the sixth leading cause of death in Egypt and the only one of the top ten without a means to prevent, cure or slow its progression. While deaths from other major diseases, including heart disease, stroke and HIV continue to experience significant declines, those from Alzheimer's have increased 68 percent between 2000 and 2010. Although Alzheimer's is not normal aging, age is the biggest risk factor for the disease.

Caring for people with Alzheimer's will cost all payers - Medicare, Medicaid, individuals, private insurance and HMOs -- \$20 trillion over the next 40 years, enough to pay off the national debt and still send a \$10,000 check to every man, woman and child.

Average per person Medicare costs for those with Alzheimer's and other dementias are three times higher than those without these conditions. Average per senior Medicaid spending is 19 times higher.

A primary reason for these costs is that Alzheimer's makes treating other diseases more expensive, as most individuals with Alzheimer's have one or more co-morbidity that complicate the management of the condition(s) and increase costs. For example, a senior with diabetes and Alzheimer's costs Medicare 81 percent more than a senior who only has diabetes. Nearly 30 percent of people with Alzheimer's or another dementia who have Medicare also have Medicaid coverage, compared with 11 percent of individuals without Alzheimer's or dementia.

Alzheimer's disease is also extremely prevalent in nursing homes, where 64 percent of Medicare residents live with the disease.

Costs to Medicare and Medicaid will increase nearly 500 percent and there will be a 400 percent increase in out of pocket costs. With Alzheimer's, it is not just those with the disease who suffer - it is also their caregivers and families.

Caring for a person with Alzheimer's takes longer, lasts longer, is more personal and intrusive, and takes a heavy toll on the health of the caregivers themselves.



Figure 15

More than 60 percent of Alzheimer's and dementia caregivers rate the emotional stress of caregiving as high or very high, with one-third reporting symptoms of depression. Caregiving may also have a negative impact on health, employment, income and family finances. Due to the physical and emotional toll of caregiving on their own health, Alzheimer's and dementia caregivers had \$8.7 billion in additional health costs in 2011.

Issues related to the mental health problem:

The world is suffering from an increasing burden of mental disorders and a widening treatment gap: about 450 million people suffer from a mental or behavioral disorder, yet only a small minority receives even the most basic treatment. Mental disorder cases are likely to increase due to ageing of the population and deterioration in infrastructure and public health services. Mental

Disorders are known to have a greater negative effect on role functioning than many serious chronic physical illnesses. In the original global estimates drawn up for 1990, mental and neurological disorders accounted for 10.5% (projected to increase to 15% in the year 2020) of the total disability-adjusted life years (DALYs) lost due to all diseases and injuries. It ranked in the top 20 leading causes of DALYs for all ages and in the top 6 in the age group 15–44 years. The world is suffering from an increasing burden of mental disorders and a widening treatment gap: about 450 million people suffer from a mental or behavioral disorder, yet only a small minority receives even the most basic treatment. Mental disorder cases are likely to increase due to ageing of the population and deterioration in infrastructure and public health services. Mental disorders are known to have a greater negative effect on role functioning than many serious chronic physical illnesses. In the original global estimates drawn up for 1990, mental and neurological disorders accounted for 10.5% (projected to increase to 15% in the year 2020) of the total disability adjusted life years (DALYs) lost due to all diseases and injuries. It ranked in the top 20 leading causes of DALYs for all ages and in the top 6 in the age group 15–44 years.

The world is suffering from an increasing burden of mental disorders and a widening treatment gap: about 450 million people suffer from a mental or behavioral disorder, yet only a small minority receives even the most basic treatment. This ratio has been increased in Egypt significantly over the past years.



Figure 16

Mental disorder cases are likely to increase due to ageing of the population and deterioration in infrastructure and public health services. Mental disorders are known to have a greater negative effect on role functioning than many serious chronic physical illnesses. In the original global estimates drawn up for 1990, mental and neurological disorders accounted for 10.5% (projected to increase to 15% in the year2020) of the total disability-adjusted life years (DALYs) lost due to all diseases and injuries. It ranked in the top 20 leading causes of DALYs for all ages and in the top 6 in the age group 15–44 years.

The General Secretariat of Egypt's Mental Health and Addiction Treatment, which is affiliated to the Ministry of Health, declared recently the results of the national survey on mental health nationwide.

The results showed that 7 percent of Egyptians suffer from ‘psychological disorders’, with people from the Minya governorate being most depressed.

The results were declared during a conference held at the training department of the Health Ministry, where researchers responsible for the survey said that they used a random sample of adults for the survey through home visits in order to identify the spread of psychological issues and mental disorders, abiding by the international diagnostic criteria.

The survey used a random sample from 22,000 families, covering all Egyptian provinces, and involved the participation of the Central Agency for Public Mobilization and Statistics (CAPMAS), as well as professors from public health and statistics departments across universities.

In 2017, Egypt's Health Ministry launched a campaign dubbed ‘Al Saraya Al Safra’ on World Mental Health Day, aiming to raise awareness on mental health services provided throughout the country.

The campaign started in four hospitals in Cairo – which included Abbasiya Hospital, Al Khanka and Helwan Hospital – before extending to the remaining hospitals.

Mental illness remains a taboo in Egyptian society. Ashamed and embarrassed, those who seek help are subjected to routine scrutiny and abuse from society, causing the stigma to catalyze the plight of countless Egyptians who shun the prospect of receiving care altogether.

According to another nationwide survey recently conducted also by the Ministry of Health, 25 percent of the population is found to be suffering from mental health-related problems.

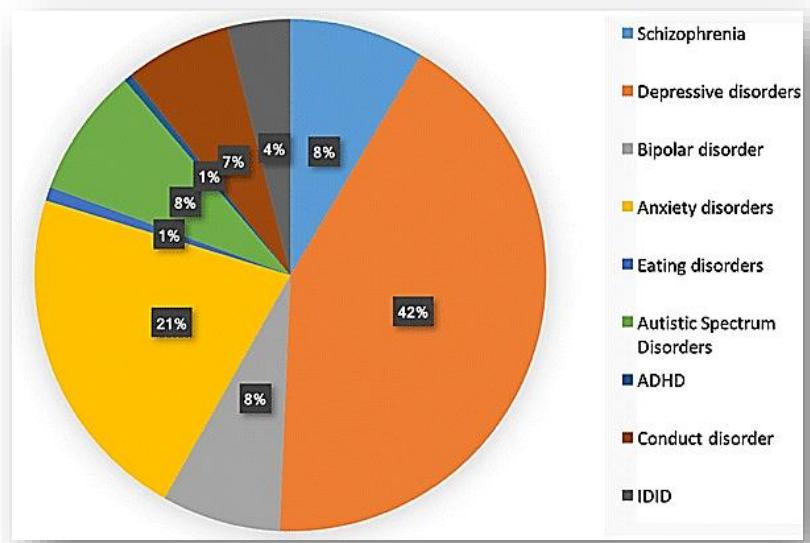


Figure 17

The study showed the prevalence of anxiety and depression disorders among that quarter of the respondents, with approximately 43.7 percent suffering from anxiety disorders, while 30.1 percent are suffering from depression that is linked to substance abuse.

Overall prevalence was estimated at 16.93% of the studied adult population. The main problems were mood disorders, 6.43%, anxiety disorders, 4.75%, and multiple disorders, 4.72%. Mental disorders were associated with sociodemographic factors (e.g. being female, being unemployed, being divorced) and physical illness (e.g. heart disease, kidney disease, hypertension).

Issues related to the energy consumption in Egypt:

Egypt's Electricity Consumption data was reported at 11,819.000 kWh in 2019. The data reached an all-time high of 39,385.000 kWh this year than the past three years according to the active status of CEIC and the Ministry of Electricity and Energy in Egypt.

Therefore, the problem of the energy consumption in Egypt is increasing year by year which led us to mention one of the most important issues regarding this which is the energy consumption behaviors and habits in Egypt that must be improved in order to decrease our consumption and consequently reducing the forms of pollution results due to this. This is

because conserving energy is not just about saving on our electricity costs. The Organization for Economic Co-operation and Development (OECD) warns that, given the current trends, energy-related emissions will increase by 70 percent by 2050. This can accelerate the negative consequences of climate change, including higher temperatures and a rise in the frequency of extreme weather events.

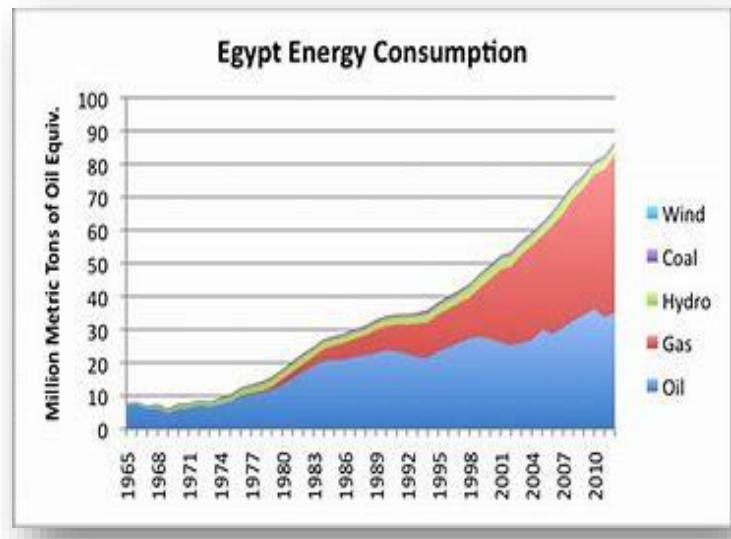


Figure 18

➤ Increased Carbon Footprint

The primary environmental effect of energy overuse is an increase in your carbon footprint, but there are simple changes you can make at home to avoid this. For example, if you keep devices plugged in and running when they're not in use, the result is an increase in electrical use and, consequently, a bump in the amount of greenhouse gases that enter the atmosphere. Leaving your laptop plugged in all the time will use nearly 300 kilowatt hours (kWh) of electricity each year, and a desktop computer left to idle will use more than 600 kW of electricity annually. Even leaving your fully charged cellphone attached to its charger can waste almost 20 kWh a year, explains the Lawrence Berkeley National Laboratory.

➤ Increased Risk of Climate Change

Coal and natural gas supplied more than two-thirds of the energy in the U.S. in 2011. Each energy form contributes to total greenhouse gas emissions. According to the U.S. Environmental Protection Agency (EPA), fossil fuel combustion accounted for more than 5,200 million metric tons of carbon dioxide equivalents (MMT CO₂ Eq.) in 2009. This figure is a 10 percent increase from 1990. In addition, methane emissions from natural gas increased during the same period by 17 percent. Part of this increase is due to the careless use of electricity. The United States wastes more than \$2 billion worth of energy each year from inefficient outdoor lighting alone.

➤ Reduction in Supply

In areas with heavy population densities as Egypt, the price which is paid for home electricity is determined by supply and demand. Some power plants charge consumers more during peak hours. Your overuse will contribute to a scarcity in this energy supply and thus an increase in overall electricity costs. Over the long term, the rise in demand may place additional burdens on threatened environmental areas -- such as coastal areas or wildlife refuges -- to ensure adequate resources. Drilling for natural gas or mining for coal to meet excessive energy demands will negatively impact the environment.

➤ Higher Energy Costs

A natural consequence of overusing energy is increased costs. This can come in the form of fuel and energy bills; you will be paying more without an appreciable return on your investment. You may also risk lowering the expected lifespan of appliances and other electronics. When you have to replace spent devices, you further impact the environment by generating waste and purchasing replacement equipment. Your wise use of electricity, therefore, can translate into long-term savings in energy bills and also reduce the need for other purchases.

The emergence of the smart grid, smart meters and smart appliances provide consumers of electricity with new means to observe their energy consumption more closely and to have the option to change their consumption habits to improve on their savings. With increased awareness of the possibilities of decreasing electricity consumption and the possibility of saving money on their electricity bill residents of existing homes should be looking for solutions.

In order to reach the goal of optimizing electricity usage (even out the electricity usage and only use the electricity needed).

Industry problems in Egypt

Foregoing analysis shows that India has made sufficient achievement in industrial development during the last five decades and has emerged as the tenth largest industrialized country of the world. But considering the size of the country this development is far from satisfactory.

There are many areas where despite requisite facilities industrial development is either insufficient or completely absent. The pace of industrial progress has been very slow and the growth has always lagged behind the target (except in 7th Five Year Plan). Despite industrial progress self-sufficiency is a distant dream and import substitution a major problem. Underutilization of existing capacity is another major problem which is due to lack of power, raw material and demand.

Industry has developed elite oriented pattern. Concentration of economic power in the hands of few, regional imbalances, sickness of industries, loss in public sector industries, unsatisfactory labor relations, lack of capital and industrial raw materials, changing policy of the government, and defective licensing policy are some of the problems which are hindering the overall industrial development in the country. In following paragraphs an attempt has been made to highlight some of these problems.

➤ Unbalanced Industrial Structure

Despite all efforts India has not been able to attain self-sufficiency in respect of industrial material. India is still dependent on foreign imports for transport equipment, machineries (electrical and non-electrical), iron and steel, paper, chemicals and fertilizers, plastic material etc. In the total industrial production consumer goods contribute 38 per cent. In newly industrialized countries like Singapore, South Korea and Malaysia this percentage is 52, 29 and 28 respectively. This shows that import substitution is still a distant goal for the country.

➤ Low Demand

There is low demand for industrial products in the country due to low consumption level, weak purchasing power and poor standard of living. The domestic market is chronically underdeveloped through lack of enthusiasm generated by the middle- and upper-class segment who do not wish to raise their standard and improve their living conditions.

➤ Regional Concentration

In India most of the industries are located in few selected areas leaving out vast expanse of the country devoid of industrial establishments. Most of the industries are located in and around metropolitan cities like Mumbai, Kolkata, Delhi etc. Tables 18.1 and 18.11 present uneven concentration of industries. While the states like Maharashtra, Gujarat, Tamil Nadu etc are well ahead in industrial development others like Meghalaya, Manipur, Jammu and Kashmir, Himachal Pradesh, Tripura, Orissa, Assam etc. are far behind. This has not only created regional imbalance and regional disparity but has encouraged fissiparous tendency including unrest, violence and terrorism.

➤ Loss in Public Sector Industries

Owing to focus on socialistic pattern of development investment under public sector industries increased phenomenally during early five-year plans. But due to defective policy of the government characterized by redtops and inefficiency and strained labor-management relations most of these public sector enterprises are running in loss. Every year the government has to incur huge expenditure to cover up this loss and meet obligations of paying wages to the employees.

This hardly leaves surplus money to go for new industrial ventures and launch schemes for social development. To avoid this burden on exchequer the government is promoting privatization and disinvestment of shares of public sector undertakings. This goes against the Peruvian model of development initiated during the fifties of the last century.

➤ Industrial Sickness

In the private industrial sector, a growing number of industrial units are becoming sick. Widespread sickness has, indeed, become a major problem of this sector. The causal factors for this sickness are: deficient management, underutilization of capacity due to shortage of raw materials, coal and power and transport, obsolete machinery, equipment and production techniques, uneconomical scale of production, faulty choice of products and processes, difficulties in selling the products, diversion of funds to new units under same ownership, and conflict between different interest groups among the owners. As at the end of March 1999 there were 3, 09,013 sick/weak units (3, 06,221 in SSI and 2,792 in non-SSI sectors). A total of Rs. 19,464 crores of bank credit were locked up in these sick units. Sometimes, the government takes over sick units which further worsen the problem.

In order to provide a focal point for the revival of sick units, the Industrial Reconstruction Corporation was reconstituted in 1985 as the Industrial Reconstruction Bank. It is now the principal agency for reconstruction and rehabilitation of sick units. The Central Government set up in 1986 two Funds, the Textile Modernization Fund (TMF) and the Jute Modernization Fund (JMF) to provide assistance on concessional terms to healthy as well as sick units for modernization. These two Funds are being administered by the IDBI and the IFCI respectively. There is also a need for constant monitoring and deterrent penalties to the parties responsible for sickness.

➤ Lack of Infrastructure

An inadequate infrastructural facility is another major problem faced by the Indian industries. Energy crisis has a great bearing on the industrial development and production. Although the installed capacity of electricity increased from 66.08 million km in 1990-91 to 85.79 million km in 1996-97 but it is much short of the actual demand.

It leads to power cut and rostering which hampers the industrial production. Most of the State Electricity Boards are running in loss and are in deplorable condition. Rail transport is overburdened while road transport is plagued with many problems. Even national highways in many places are in bad shape. Telecommunication facilities are mainly confined to big cities.

➤ Improper Location Base

Industrial locations, in several instances, were established without reference to cost-effective points. Each state clamors for the establishment of major industries in the public sector within its boundaries, and the location decisions are often politically motivated.

➤ Lack of Capital

Indian industrial development is facing acute shortage of capital. The short-term and long-term loans from international agencies like World Bank and Asian Development Bank etc have done more harm to the economy than taking it out from the crisis. A lot of foreign exchange is being utilized in the payment of these loans.

The situation becomes acute when fresh loans are taken to pay the installments of the old loans. Due to liberalization, the foreign exchange reserve position has improved in recent years and flow of foreign capital has started in industrial sector. These foreign investors also do not like to invest in such industries which require large capital, need long gestation period and where recovery is slow or more risk is involved. Instead of depending on foreign capital we have to place more reliance on indigenous capital with greater emphasis on the development of priority industries.

➤ **Shortage of Industrial Raw Material**

Indian Agricore, the major source of industrial raw material, is still dependent on the monsoon. Natural calamities like drought, famine, flood etc. badly affect agricultural production as well the supply of industrial raw material. Failure of monsoon even affects the purchasing power of the people and also the demand for industrial products. It sometimes creates glut in the market and industrial plumpness. Cement industry is recently facing such crisis.

Drought like situation even affects hydel generation, leading to energy crisis, more pressure on railways to transport coal and on thermal power sector for higher output. This leads to a chain of crises which have interlinking effect.

➤ **Higher Cost of Production and Low Quality of Goods**

Indian industries mostly survive on home demands. These have been given a number of concessions and even protection from foreign industries. Here most of the work is done by hand on old and obsolete machines.

This increases the cost of production and brings down the quality of products produced. Since these industries have virtual monopoly they hardly bother to improve their quality. Public sector units, under direct control of the government, frequently increase the prices which provide golden opportunity to private industrialists also to increase the prices. Our industrial products are not able to make wide market abroad.

The low purchasing power of the people even reduces home demand. The situation is likely to change during globalization when there is apprehension of wide spread closure of these industries due to stiff competition offered by multinational companies. This is also not good for the country and the Indian industries.

➤ License Policy

The license policy approving the site, capacity, type and expansion of industries is a typical example of excessive state interference and red tapes which hinder the industrial development. Recently some examples of political vendetta have come to surface whereby central government over delayed the approval of industries from such states where hostile political party is in power. Ministers and influential political leaders are pressurizing industrialists to install industries in their electoral area so as to approve their licenses. With the introduction of liberalization policy many of the shortcomings of the license policy have been removed.

➤ Lack of Institutional Organization

A major development thrust during the Five-Year Plans was toward the establishment of a vigorous public sector developed hastily without the creation of a base of administrative machinery capable of undertaking this enormous task. Preparatory work for such tremendous institutional reorganization was poor. High performance was rarely insisted on even after the construction of an administrative base. The result was non-achievement of targets. During the Fourth, Fifth and Sixth Plans, achievement levels fell short of targets by 15-18 per cent. This malady is still persisting even after liberalization. There is no clear-cut planning at state level to attract foreign capital and promote industrialization.

Industrialization started in India roughly a century later than in the developed countries. That is why, when it was in mature stage in the Western countries it was in infantile stage in India. Hence, India had to perform dual task of promoting industrialization as well as to equip herself with latest technology in the field of electronics, nuclear science, space research etc.

This slowed down the pace of industrial progress. Frequent change in the approach-sometimes emphasis on rural industrialization, sometimes on urban-nucleated industrialization or rural led employment-oriented strategy or creation of employment-oriented agro-based industries-confuse the situation. Indian industrialization has passed through great odds. Besides being victim of ‘economics of scarcity’ it has been mauled by political indecision, prejudices and confusion.

Agricultural problems in Egypt

Some of the environmental issues that are related to agriculture are climate change, deforestation, genetic engineering, irrigation problems, pollutants, soil degradation, and waste.

➤ FOOD, POPULATION, FAMINE AND HISTORY

Ever since agriculture was developed around 12,000 years ago agricultural advancements such as the domestication of animals, irrigation and rice production have lead to corresponding increases of population. By the same token when agricultural productivity plateaued so too did population. Arab and Chinese writers made note of the relationship.

Thomas Malthus (1766-1834) is the father of the idea that human population is doomed by overpopulation and the limitations of what the Earth can provide in terms of food. Malthus wrote that if unchecked population increases geometrically---doubling every 25 years or so---while agriculture advances more slowly at an arithmetic pace. "The power of population is indefinitely greater than the power in the earth to produce subsistence for man," he wrote in *Essay in the Principle of Population* in 1798. "This implies a strong and constantly operating check on population from the difficulty of subsistence." Among the checks he mentioned were birth control, abstinence, delayed marriage, war, famine and disease.

Traditionally as long leaders were able to keep their populations fed, they remained in power but had problems if they couldn't. The Ming dynasty was ousted in China after a famine. Revolutionaries that ousted Marie Antoinette and the French king were motivated by hunger as much as anything else. One of the primary reasons the British decided to leave India was they realized they could not cope with the consequences of famine there.



Figure 19

Felipe Fernandez-Armesto, author of Food: A History , wrote in the Times of London, “The Natufians of Syria---the first sedentary civilization in the world, whose people once enjoyed such abundance that they could build permanent settlements while living on wild grains and products of the hunt---ran out of food 14,000 years ago. The graves of Minoan Crete, where oil and grain once filled the great palace labyrinths are full of malnourished bones. Environmental overkill helped to exhaust the soil and empty the cities of the Maya lowlands...A couple of centuries later, food failure wiped out the civilizations in the south-west of North America...The Aztec Empire collapsed when invaders cut off its supplies. Famines checked growth repeatedly in Europe until new crop varieties solved perennial food shortages in the 18th century.”

➤ Hunger

Chad Despite all the advances that have been made with the Green Revolution and improvements with agriculture, hunger remains as much of a problem as it ever was. More people are hungry today than ever. In 2008 and 2009, the economic crisis and high food prices pushed the number of hungry people over 1 billion according to United Nations food officials. In some cases, families cut back on school clothes and basic medical care so their children could have a meal according to a Food and Agriculture Organization (FAO) report.

Why do hunger and food shortages exist in some places while people grow fat from too much food in other places? The answer is complex and involves many things: food prices, weather, depletion of soils, corruption in African countries, American farm politics, war, poverty, global warming, among other things. Many blame neglects and a lack of political will for not effectively tackling the problem.

Norman Borlaug, the father of the Green Revolution, said in 2007 that “the battle to ensure food security for hundreds of millions of miserably poor people is far from won...World peace will not be built of empty stomachs. It is within America's technical and financial power to help end this human tragedy and injustice, if we set our hearts and minds to it.”

The success of the Green Revolution has also been blamed. Andrew Martin wrote in the New York Times, “So much grain was being produced so cheaply that Western leaders encouraged poor nations to buy grain on the world market rather than grow it themselves.

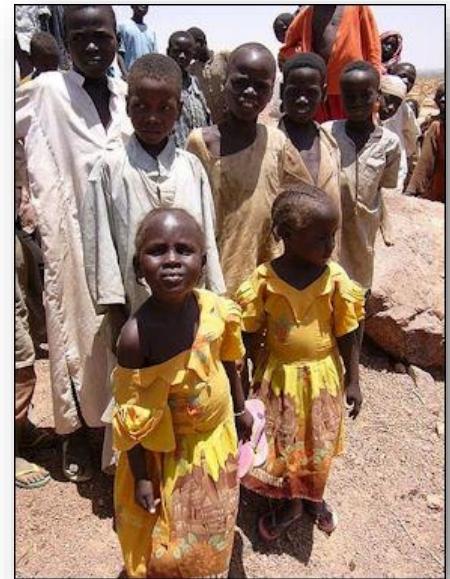


Figure 20

Surplus was shipped to poor countries as food aid. But that aid system has often been ineffective in alleviating hunger in a timely way and in dressing broader agricultural problems facing impoverished countries. Support for agricultural research in developing countries was also cut back for other priorities. The result? While the food supply grew faster than the world's population from 1970 to 1990, as the Green Revolution's gains took hold, the situation has now reversed itself. Productivity gains in agriculture have slowed, and since 1990, the growth rate of food production has fallen below population growth."

A food summit at the United Nations' Food and Agriculture Organization (FAO) in Rome was held in November 2009. It was quickly labeled a failure even before it really got going as the delegates for 192 countries failed to commit themselves to \$44 billion in annual agricultural development aid. To show sympathy for and solidarity with the world's 1 billion poorest people on the eve of the meeting, the head of the Food and Agriculture Organization, Jacques Diouf, called for global day of fasting.

➤ **Small Land Owners in the Developing World**

A typical subsistence farm contains a vegetable plot, a mango or banana grove, and larger plots with maize, cassava, rice or sorghum. A farmer may own a few chickens or some pigs. If he is lucky or relatively well off he may have a water buffalo or a cow.

Poor farmers eat most of what they grow. With the help of fertilizer and erosion control, they can raise enough to feed their families and have a little left to sell but remain poor. Sharecroppers working for landowners generally have to fork over a large share of grain or a cash crop to pay their landlords for rents. Local official may demand high taxes.

Villagers need money for improved seeds, tools, machinery, fertilizer and pesticides. They can't afford tractors or often even plow animals and fertilizer is so precious it is carefully dispensed a handful at a time. Villagers have to be careful about borrowing money to buy animals or fertilizer. Money is often borrowed at high interest and one bad harvest can mean the loss of their land.



Figure 21

Some farmers have traditionally divided their land equally among their oldest sons. But often the land has been subdivided so many times that individual plots do not produce enough food to feed a family. Others have been kicked off their land so that cash crops can be grown for export to earn money to pay off government debts.

➤ Large Land Owners in the Developing World

In some countries cash crops have traditionally been raised on plantations with production concentrated into the hands of so few landowners that one percent of plantations raise 45 percent of the country's sugar and coffee. Money from these crops provides the financial base of the oligarchy, the country's wealthiest families.

Although most of the money from African exports during the colonial period came from mining, agricultural exports also increased. The land was cultivated one of three ways: 1) by peasant farmers on small plots of land; 2) black laborers on farms owned by white settlers; or 3) on large plantations run by big companies. Peanuts, cocoa and palm oil were the major export products.

White plantations often failed because the farmers were ignorant of tropical agriculture and their specialized farms were vulnerable to pests and disease. There was a shortage of labor so new plantations had a hard time attracting labor cheap enough to make their enterprises profitable.

"The development of the [cocoa] industry," wrote Nigerian governor Hugh Clifford, "has been practically spontaneous on the part of the inhabitants. The inevitable result of the rapid increase of the people's wealth has been to bring about what almost amounts to a revolution. The commensal ownership of the land is being largely repudiated for individual ownership." the sale of the land , and almost unheard of practice has become a matter of everyday life; a tendency for the maker of a cocoa plantation to leave his property to his son rather than his sister's son has brought about a change from matrilineal to patrilineal descent."



Figure 22

➤ Higher Food Prices

Some see higher food prices as a long-term good thing in that they would make food more precious and valuable and the resources needed to produce them would be better appreciated. Plus, more money could flow to farmers and this would hopefully improve the lives of farmers in developing countries by giving them more money for their crops.

Improving the agricultural sector is perhaps the best way to generate economic growth in poor countries. According to the World Bank, the very poor get three times as much extra income from an increase in farm productivity as from the same gain in industry or services.

The Economist reported: "Dearer food has the capacity to do enormous good and enormous harm. It will hurt urban consumers, especially in poor countries, by increasing the price of what already is the most expensive item in their household budgets. It will benefit farmers and agricultural communities by increasing the rewards of their labor, in many poor rural places it will boost the most important source of jobs and economic growth...If politicians do nothing, or wrong things, the world faces more misery, especially among the urban poor. If they get policy right, they can help increase the wealth of the poorest nations, aid the rural poor, rescue farming from subsidies and neglect---and minimize the harm to the slum dwellers and landless laborers."

➤ Roads, Food Distribution, Logistics and Crop Prices

Republic The fortunes of farmers who grow cash crops like coffee, sugar and cacao rise and fall with the fluctuated world prices of these commodities. Before they make decisions about what they are going to grow farmers must calculate if the world price or government subsidized price for their crop is enough to justify the expenses for new seeds, fertilizer and pesticide.

Explaining how her village markets its harvest one Chinese villager told Nature Conservancy magazine: "Our Jiyu Village is an administrative village that has the most croplands in the Lashi Township. So, we grow and harvest more grain and cash crops here. Naturally more cropland means more hard work in the fields. During harvest time, crop dealers come to buy farm crops like flour, corn and beans, because the people in Tai'an only grow potatoes, we sometimes go there to sell our grain crops or exchange with people there for their potatoes."



Figure 23

Hunger today is often more the result of inadequate distribution and lack of infrastructure than lack of food or crops. Many villagers have difficulty getting their crops to market before they rot because of poor roads. Some remote areas have been greatly helped by the completion of roads that link fields and farms to major roads.

➤ Commodity Prices and the Negative

Affects of Globalization

More than 2 billion people worldwide make a living producing agricultural commodities. The dependence on income from these commodities is especially pronounced in the 50 least developed countries, or LDCs. More than 85 developing countries depend on commodities for more than half their export earnings. High commodity prices can help farmers in these countries climb out of poverty. Low commodity prices can make the poor farmers even poorer and saddle them with crushing debts. The market is notoriously cyclical. For every high there is a crash.



Figure 24

While demand for commodities such as coffee, tea, cocoa, cotton and sugar has risen in recent years and prices for these goods has risen and consumers pay more for them at supermarkets and malls the money that farmers receive is often relatively less than what they received before. Robusta coffee producers in Ivory Coast, for example, received 17.5 percent of each consumer dollar spent on their product in 1980-88 but only 7.2 percent in 1999-2003. For coffee growers in Cambodia and Indonesia the decline was from 19.2 percent to 7 percent.

[Source: Kemal Dervis]

As demand for commodities has increased production has increased to meet the demand. The production of rice increased by 67.5 percent between 1993-95 and 2003-05. In the same period cotton production increased by 48.8 percent, fresh and chilled vegetables was up 69.7 percent and flowers were up 72.9 percent.

Kemal Dervis, an administrator with the United National Development Program wrote: "The complexities of the "value chain" between production and the supermarket shelf do not work to the advantage of low-income, smallholder farmers. The process may be global, but the benefits do not reach the poorest. The higher end, where and natural textiles are "differentiated" processed in ways that appeal, packaged attractively, branded and advertised---is where most of the money concentrated."

"Part of the problem is that developing world governments are still learning how best to benefit from the globalization. During the 1990s, when the international financial mantra was that governments should keep their hands off and let the free market work, many developing country governments were told to stop negotiating prices and organizing transport and marketing for thousands of small farmers...A number of them, especially in Africa and Latin America, did stop, but private substitutes for these services did not appear and thousands of small producers with very limited access to market information, transport and credit were left to fend for themselves against very large, very sophisticated international buyers such as supermarket chains. And these farmers continue to compete with colleagues in developed countries who receive generous subsidies while home markets are protected by high tariffs."

"Investment...has been lacking in roads and ports. If delivery is uncertain and slow, major international customers are less interested and pay less...Both public and private investment is vital: warehouses for groups of rural farmers, for example, makes a huge difference. If prices are low, they store their coffee or cocoa, and sell it when prices are up. Too often now they can only sell it when they have to. And higher end stuff--grinding, grading, standardizing, packaging---might happen in-country instead of far away, if the facilities could be built and expertise acquired." In May 2007 a conference on these issues entitled "Global Initiative on Commodities: Building on Shared Interests" was held.

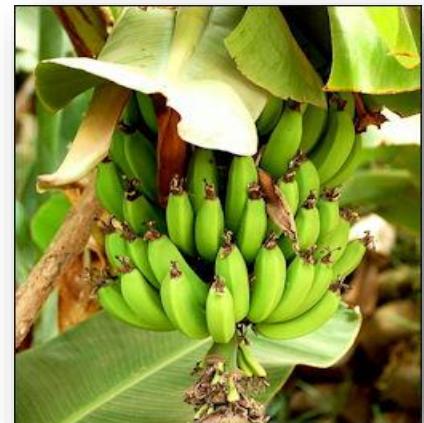


Figure 25

➤ Empowering Women Farmers

In the developing world, much of the agricultural work is done by women. Female farmers grow around 80 percent of the crops grown for food consumption in Africa. In Africa and Asia, women have traditionally focused on the food production side of agriculture while men have traditionally grown cash crops or migrated to the cities for work. Despite this women own only a tiny percentage of the world's land---estimates are generally less than 2 percent.

Former United Nations Secretary General Kofi Annan has called for women to be the heart of a "policy revolution" to improve small-scale farming in Africa. Annan said, "Today the African farmer is the only farmer who takes all the risk herself. No capital, no insurance, no price supports, and little help---if any---from governments. These women are tough and daring...but they need help."

A 2008 FAO report highlighted the benefits of improving women's access to technology, land and finance. The report said that providing equal land rights for women in Ghana could double the use of fertilizer and profits. It also said that elsewhere in Africa if entrepreneurial women were given the same education and inputs as men agriculture revenues would increase by 20 percent. A study in Ivory Coast found that increasing a woman's income by \$10 brings improvements to children's health and nutrition that would require a \$110 increase in men's income.

Many countries have equal rights laws on their books but these are often poorly enforced and often they clash with customs that give property and ownership rights to men. In many cases if a woman's husband dies, she has to marry her husband's brother to keep farming the family plot of land. Marcela Villareal of FAO's gender equality division told Reuters, "People continue to think that doing things for women is part of a welfare program, and doing things for men---big investments or credit---that is agriculture, that is GDP-related. Women continue not to be seen as part of the productive potential of a country."

In Malawi, the FAO is working with government leaders and village chiefs to inform women of their legal rights and provide them with wind up radios so they can listen to radio shows in their own language that gives them tips on farming and things like writing wills. Among those involved in improving the conditions of women farmers is Rwanda's agriculture minister Agnes Kalibata, , who has helped set up micro-financing for female farmers and given them access to markets and co-operatives, and the Bill and Melinda Gates Foundation, which has attached conditions on improving women's farming to their grants.

Blood donation

Blood donation is becoming a critical national demand of emergency especially after Egypt's revolution on the 25th of January 2011, and should be a high priority for the Ministry of Health (MOH) officials in order to save patients in need. This thesis investigated current barriers and possible incentives that would motivate more citizens to donate their blood. It explored factors that influence educated Egyptians' decisions to donate blood, such as guidelines set before donating, efficiency of donation centers' personnel, awareness regarding health gains, and the opportunity to rescue others. As a result of a qualitative and quantitative research, recommendations were formulated that could guide the MOH such as adjusting policies, equipping blood donation centers more appropriately, and promoting campaigns to increase willingness to donate blood in Egypt. Results in brief showed that face-to-face communication proved to be the most successful publicity measure. In addition, when doing campaigns, the government and the ministry have to be transparent regarding the phases of blood donation process and should take care to approach people coming from different social and educational backgrounds through proper methods.

The most common barriers were fear of: pain, lack of hygiene and fear of getting infected, but lack of donations is also because of recent governmental policies: forbidding paid blood donation and monopolizing blood donation. The survey findings to an extent supported a conclusion that confidence in personal physical capabilities as well as trust in the blood donation staff efficiency and the process as a whole would lead to a rise in the willingness to donate blood.

Blood donation is the act of accepting that one's blood gets withdrawn with the intention of preserving it to be transfused to a patient in need. The ultimate recipient is usually in an emergency and critical health situation either undergoing a surgery or is suffering from serious wounds in pressing need for blood, which "in traditional Chinese medical theories,... is the vital life source that carries the Qi (life energy) throughout the body" (Zaller et al., 2005, p. 281). The blood donated could also be utilized for other medical purposes (e.g. extracting blood components like platelets for treatments requiring them) or be banked; recognizing that the "blood supply must be replaced regularly to keep a



Figure 26

current inventory of fresh blood and blood products” (Canadian Blood Services, December 2011). The donor must be a healthy person and is expected to remain so after donation. This is determined by conducting a confidential interview before approving volunteer donation to investigate the donor’s health history and countries traveled to so as to assure the nonexistence of any transmitted diseases to the recipient. Also required is to check the donor’s temperature, level of hemoglobin, blood pressure and pulse for his/her health safety. Sound donation practice requires the staff to consider various precautions among which are: to “insert a brand new sterile needle for the blood draw” (American Red Cross, December 2011) to assure that the donor will not get infected or harmed while donating in addition to “hand cleaning is an essential preventative measure to avoid contamination of blood donated” (Armstrong, 2008b, p.135).

Although transfusion of human blood can be lifesaving, it is not without risks. Transfusion-transmitted infections (TTI) can be transmitted through blood transfusions. The TTI problem is directly proportional to the prevalence of infections among blood donors. Hepatitis B virus (HBV), hepatitis C virus (HCV), Human immune deficiency virus (HIV) and syphilis are the most important lethal agents in TTIs. The incidence rates of these infections are hard to calculate due to the asymptomatic and the latent nature of these diseases. Blood safety presents a serious challenge in Egypt, having the highest recorded prevalence of HCV antibodies in the world. Prevalence of HCV was reported to be 13.9% among healthy populations. Adults have higher HCV prevalence (15.7%) than children (4.0%). Geographically, HCV prevailed more in the Nile delta (15.8%) than in Upper Egypt (9.02%). The route of transmission of hepatitis C virus is still controversial and complicated. Transmission of blood or blood products leads to infection in the majority of cases. While the majority of intravenous drug users become infected by repetitive exposure to shared contaminated injection equipment’s, Needle-stick injuries in health-care settings represent another high risk category. HCV is less commonly transmitted through; having sex with an infected person, being born to an HCV-infected mother, or sharing of personal items contaminated with infectious blood. Given the constrained economy which limits the implementation of sensitive screening techniques as nucleic acid amplification technology (NAT), proper recruitment of blood donors becomes of paramount importance. In an attempt to evaluate the effectiveness of blood donor recruitment strategies, the

seroprevalence of positive infectious markers among volunteer donors (VD) and family replacement donors (RD) at Cairo University Hospital Blood Bank was studied.

Of 308,762 donors, 63.4% were VD with male predominance (256,272) representing 83% of the total donors. The prevalence of positive infectious markers among RD and VD during the period of the study is presented in Table 1. After stratification for age and gender, The total prevalence rates of HBV, HCV and syphilis markers for 6-year study period among RD was significantly higher as compared to VD ($p=0.03$, $p<0.001$ and $p+0.02$, respectively). A consistent significant steady decline in the seropositivity for HCV antibodies was observed in both RD and VD from 8.9% and 4.2% in 2007/2008 to 3.8% and

Table 1

Year	Total donors No RD/VD (%)	HCV Ab No RD/VD (%)	HBs Ag No RD/VD (%)	HIVAb No RD/VD (%)	Syphilis Ab No RD/VD (%)	All markers No RD/VD (%)
2006-2007	16,425/40,165 (29 / 71)	1,455 / 1,606 (8.8 / 4)	279 / 441 (1.7 / 1.1)	4 / 8 (0.02/0.02)	18 / 20 (0.1 / 0.05)	1756/2075 (10.7/5.2)
2007-2008	14,628/34,972 (29.5/70.5)	1,305 / 1,500 (8.9 / 4.2)	268 / 429 (1.8 / 1.2)	2 / 6 (0.01 / 0.02)	17 / 31 (0.1 / 0.09)	1592/1966 (10.9/5.6)
2008-2009	15,979/35,873 (30.8/69.2)	1,154 / 1244 (7.2 / 3.5)	263 / 422 (1.6 / 1.1)	8 / 36 (0.05/0.1)	26 / 57 (0.2 / 0.16)	1451/1759 (9.1/4.9)
2009-2010	19,878/29,158 (40.5/59.5)	1098 / 928 (5.5 / 3.2)	325 / 252 (1.6 / 0.9)	31 / 49 (0.15/0.168)	57 / 65 (0.28 / 0.2)	1511/1249 (7.6/4.3)
2010-2011	20,960/31,582 (39.9/60.1)	1018 / 787 (4.8 / 2.5)	356 / 278 (1.7 / 0.9)	22 / 32 (0.1 / 0.1)	49 / 42 (0.23/0.13)	1445/1139 (6.9/3.6)
2011-2012	25,257 / 23,885 (51.4/48.6)	960 / 359 (3.8 / 1.5)	316/127 (1.25/0.53)	15 / 7 (0.06/0.03)	23/4 (0.09 / 0.017)	1314/497 (5.2/2.08)
Total	113,127 / 195,635 (36.6/63.4)	6990 / 6424 (6.2 / 3.3)	1807 / 1949 (1.7 / 1.1)	82 / 138 (0.07/0.07)	190 / 219 (0.2 / 0.1)	9069/8730 (8.4/5.5)

1.5% in 2011/2012, respectively ($P=0.0001$). A steady significant decrease in HBs antigen was demonstrated in VD from 1.2% in 2007/2008 to 0.53% in 2011/2012 ($P=0.004$). A significant decline of HBs antigen was observed in RD, only during 2011-2012, when compared to the previous years ($P=0.02$). During the period between 2007- 2011, increasing trends for HIV and syphilis reactivity rates were noted among both RD and VD (Table 1). The overall prevalence's of anti HCV antibodies, HBs antigen, HIV antibody and syphilis antibody were 4.3%, 1.22%, 0.07%, and 0.13%, respectively

Climate change problem:

It is a reality that extreme weather events, resulted from climate change, have increased in numbers and severity in recent years, which largely contributes to forced migration, conflicts, hunger, and destroyed infrastructure across the world. Not all countries face the same risk; countries like Bangladesh, Egypt, and other developing countries are more exposed to the possibility of severe hunger due to climate change. It is noticed that the countries with the lowest carbon dioxide emissions are the most vulnerable to climate change, and vice-versa. However, it is our responsibility to protect vulnerable communities and equip them with the tools that will enable them to face the risks of climate change.

During recent decades, changes in the climate parameters have been observed and recorded. A study by Al-Sharawy (2007) confirmed that there has been an increase in the mean maximum and minimum air temperatures of + 0.34°C per decade. This increase is also observed in the mean air temperature and mean atmospheric pressure of + 0.017 Celsius (°C) per decade and + 0.026 hectopascal (hPa) per year respectively; Hectopascal is a pressure measurement unit (Al-Sharawy, 2007).

The potential increase in atmospheric pressure suggests an increase in the quantity of misty and hazy days, and it will also increase the turbidity of the atmosphere. The country has already started to suffer from an increased severity and frequency of floods, dense haze, and most importantly, sandstorms (National Communication Report, 2010). These observations have several consequences for nearly all sectors in Egypt, among them energy, industry, agriculture, health, electricity, transport, and tourism. Furthermore, the Mediterranean coast has already experienced an increase in the amount of annual rainfall. As reported in the Egyptian media, the governorates of Alexandria and Al-Beheira have recently witnessed an unprecedented amount of rainfall, which has caused massive damage in these regions. At that time, the local media broadcast images of flooded buildings and cars. Agricultural Research Center (ARC)'s specialist has confirmed that climate change was one of the main elements that increased the severity of the situation in Alexandria, besides poor infrastructure and weak local governance.

UNDP published a report in 2013 on the potential impact of climate change on Egypt's economic performance (UNDP, 2013). The report used two scenarios to estimate the impact, one pessimistic and one optimistic. Since the impact of climate change depends on many uncertain variables such as population and economic growth, this study will rely on the same approach used by UNDP in 2013 to project potential impacts. In both scenarios, the Egyptian population will be exposed to difficulty in securing the basic food supply. Moreover, the budgetary constrain increases the obligations of the Egyptian government despite its limited resources and it is relatively slow economic growth. These implications are expected to increase the population's needs in housing, education, transportation, roads, electricity and energy.

UNDP's 2013 report selected two years for projections: 2030 and 2060. The optimistic scenarios was based on the assumption of population increase and income increase per capita, while the pessimistic scenario was based on the assumption of population increase and a decrease in the income per capita. The researches of UNDP report avoided assuming that the population decreases because there is no indication that the population will decrease. Based on the assumption that in 2010 there was 82 million Egyptians and has been increasing by 2.3 percent per year (IPCC, 2013). There are two scenarios; the optimistic scenarios are the population will reach 104 million by 2030 and 113 million by 2060. The pessimistic scenario projected to reach 117 million by 2030 and to reach 162 million by 2060 (IPCC, 2013). Cairo city is stressing because of the high pollution and population residing in it. The below table projects the population increase in Cairo. It is noted in the report that the United Nations

Table 2

	2009	2020	2030	2040	2050	2060
Optimis- tic	80	92	104	110	112	113
Pessimis- tic	80	98	117	134	149	162

projected high rates for Egypt.

Similar to the population scenarios, the IPCC developed scenarios for the expected income for the Egyptian population. The IPCC provided a wide range in both scenarios (Kotb et al, 2000). The IPCC projected the per capita income for three years: 1990, 2050, and 2100. These data were based on the exchange rate of 2016, which 8.878 EGP per 1 USD (World Bank, 2016).

Environmental problems:

Environment, generally, is meant to be all the surroundings of human, which includes all aspects whether corporeal or incorporeal, and whether human or not human, it is the framework in which human lives with other organisms whether living or not living in interaction according to an accurate system.

The concept of Pollution is always associated with the concept of environment, since we cannot mention the concept of pollution in isolation from the environment in which it happens; we also cannot recognize an environment without referring to the pollution in it. Pollution is the result of an imbalance in environment or one of its elements and that leads to the weakness of the environment's ability in giving, as the environment is the place, which contains pollution in its places and airspace.

Man is the main cause of environmental pollution, as environment provides him with all what he needs from food, drink, clothing and housing to take his needs, but he leaves his wastes on it. As a result of versatility and accumulation of consumption, pressures occur on the environment which leads to instability in its balance, and this imbalance is the source of environmental pollution. We cannot say that there is in the whole world a 100% free pollution environment as long as man lives on it and try to provide himself with well living, security and to build a glorious civilization. The problem of environmental pollution is an international problem of life that has been exacerbated as a result of growing economic industrial activities used as sources of energy and becoming a threat to the environment.

The community suffered from the deterioration and destruction of many environmental resources as agricultural lands, the Nile, seashores and other natural resources as well as the spread of environmental pollution phenomenon due to industrial companies or private means of transportation especially cars, other sources of pollution, or different kinds of food contamination which are usually due to the use of pesticides and fertilizers.

We can say that the contamination of agricultural soil is the corruption of soil that affects its characteristics and its physical, chemical or biological properties in a negative way that may affect all the livings on its surface from Man, animals or plants directly or indirectly. The contamination of agricultural soil depends on the type of pollution, land characteristics, climatic conditions, and natural factors, it may happen suddenly due to earthquakes and volcanoes or may happen gradually because of using pesticides, mineral fertilizers, and reusing wastewater in irrigation.

Problem to be Solved

Identification of problem

Though many patients in Egypt are finding it difficult to obtain certain drugs, the Chamber of Pharmaceutical Industries has downplayed the extent of 'a perceived drug shortage'

A doctor buys face masks at a pharmacy in Cairo June 9, 2009. (Photo: Reuters)

It is not easy to be a pharmacist in Egypt, especially nowadays.

People regularly ask pharmacists to suggest medication for a fever, cold or some joint pain.

In a country where millions suffer from heart disease, diabetes and Hepatitis C and where 40 percent of the population live under the poverty line without a decent national healthcare system, it is sometimes difficult for the ill to afford a visit to a doctor, and therefore patients treat local pharmacist as their primary physician.

However, according to pharmacist Nabil El-Degheidi, a drug shortage has made his job helping patients find an appropriate or much needed drug more complicated.

El-Degheidi is now finding himself forced to provide his clients with alternatives for necessary medicines amid what many say is an acute shortage of major drugs in the Egyptian market.

Officials downplay these claims and insist drugs and adequate non-brand names are in supply.

However, a rough list of more than 130 kinds of medicines missing from pharmacies all around in Egypt was provided to Ahram Online by Mohey Ebeid, the head of the Pharmacists Syndicate.

"I never succeed in convincing the patients to take a drug other than the one they are looking for, even though [the substitute] might contain the same active ingredients," says El-Degheidi.



Figure 27

The 65-year-old, who has been working in the field for the past 30 years, says that the drug shortage problem has been increasing. He believes that there are about 1,000 kinds of medicines missing from the Egyptian market.

➤ Real shortage or confusion over efficacy of substitutes?

While interviewing El-Degheidi in his pharmacy which is located in an affluent district, he received a phone call from the Egyptian Pharmaceutical Trading Company, which is one of the largest distributing companies of local and imported drugs.

El-Degheidi asked the company, "do you have Otrivin for adults? For Kids? Do you have any of the drugs that I have been requesting for the past two days?"

The answer which came from the other side in the call to all of his questions was a "No."

He ended the phone call saying, "it seems the issue is not ending anytime soon."

Journalist Mohamed El-Garhy, the founder of the social media campaign #Medicine_isaRight, says, "when I caught a cold I looked for the subscribed medicine in more than three pharmacies in different districts, but I couldn't find it."

The social media initiative, which quickly caught the attention of both pharmacists and patients, aims to help citizens locate any missing drug subscribed for chronic or temporary diseases, and to connect them with officials from the health ministry and the Pharmacists Syndicate to solve the issue.

"It is unlikely that a medicine sold for LE1 or 2 would still be manufactured in Egypt, companies still want to make money," says Pharmacists Syndicate head Ebeid.

Ebeid did stress, however, that every drug in shortage has 12 equivalents with the same active ingredient on the Egyptian pharmaceutical market.

The Egyptian Drug Shortage Organization, which is part of the health ministry, announced that there are 200 missing medicines that have equivalents in the Egyptian market.

However, the organization says there are almost 45 other drugs that are not available and have no equivalents or alternatives.

Some of the missing drugs reportedly include cancer treatments and medications for controlling heart rate.

Meanwhile, Mohamed El-Bahi, board member at the Egyptian Chamber for Pharmaceutical Manufacturing, told Ahram Online that there is no shortage in medicines.

"The problem is that patients go to pharmacies asking for the commercial name of the drug, and when they do not find it, they believe there is a shortage and that the equivalent suggested by the pharmacist is different than the drug they need," said El-Bahi.

El-Bahi insisted that medicines for all diseases, including chronic illnesses, are available.

➤ **Where could the problem lie?**

Pharmaceutical companies are subject to the price ceiling for medicines set by the Egyptian government.

According to the Central Administration for Pharmaceutical Affairs (CAPA), registered medicines are grouped in categories based on their price range.

The categorisation list shows that 35 percent of drugs are priced at less than LE5 (\$0.64), and that 75 percent of all medicines in the market are priced at less than LE20 (\$2.55).

However, these figures do not include some higher-priced medicines used to treat various chronic diseases.

This has been an ongoing friction between investors, companies in the pharmaceutical sector and the Egyptian government.

The Chamber of Pharmaceutical Industries filed a case in 2012 against the Egyptian government calling for a "balance of rights" between the rights of pharmaceutical companies and the rights of consumers.

The health ministry says its priority is to provide drugs at low prices so that they are affordable for all citizens.

On that basis the ministry rejected the complaint, prompting some observers to deduce that say companies might stop manufacturing certain medicines.

"The price of some medicines has remained the same for 25 years," former undersecretary at the Pharmacists Syndicate Mohamed Seoudi told Ahram Online.

"The government says this is to protect citizens, but at the end of the day, it is an investment for companies, who will not continue to operate at a loss," Seoudi said.

Syndicate head Ebeid also points to another problem faced by the industry in Egypt, namely the need to import raw materials for the manufacturing of drugs, which is impacted by a foreign exchange crisis limiting importers' access to dollars.

The value of the Egyptian pound has also weakened against the US dollar, Ebeid says, thus raising the cost of imports.

This has resulted in a shortage of certain drugs best known by their commercial or brand names.

However, El-Bahi says this problem is being addressed through ensuring the availability of foreign currency specifically for the purchase of raw materials for the pharmaceutical sector.

"The new Central Bank governor, Tarek Amer – appointed late October – has taken immediate decisions concerning issues related to medicines," says El-Bahi.

Drug sales this year reached LE36 billion, according to the head of the Pharmacists Syndicate.

➤ Any remedies?

Pharmacists have put forward several recommendations for government measures to address the problems facing the sector.

One such recommendation by the Pharmacists Syndicate involves the building of a factory in Egypt to produce raw materials instead of relying solely on imports.

"The project would cost LE500 million and is currently being reviewed by the presidency," Ebeid told Ahram Online.

Other pharmacists are demanding the sector to be regulated by an independent body instead of remaining under the auspices of the health ministry.

The Pharmacists Syndicate also recommends that medicines be referred to and prescribed by their generic names instead of using commercial brand names marketed to doctors and distributors.

"There is a problem in drug distribution, and this issue should be tackled in order to prevent the black market sale of medicines in Egypt," former syndicate undersecretary Seoudi told Ahram Online.

In 2013, Egypt ranked 149th out of 188 countries in public healthcare expenditure as a percentage of GDP, according to World Bank data.

In 2014, governmental spending on the health sector was LE 42.4 billion (5.4 percent of the total budget).

The 2014 constitution requires the state to increase spending on the health and education sectors.

➤ **Drug shortage crisis hits Egyptian market again**

Chronically ill patients are finding it hard to access essential medication.

Pharmacists and patients interviewed by Al-Ahram Weekly say diabetics are facing problems buying insulin, that penicillin is increasingly hard to find and medications for hypertension, haemophilia, muscular atrophy and Parkinson's disease are in short supply. There is also a lack of infant formula on the market.

"I'm diabetic and have to inject insulin. Lately I've had to trail from pharmacy to pharmacy until I find one that stocks my prescription," Ahmed Ezzat, 53, told the Weekly. "Now I've started to try and stock up on the medicine I need out of worry that one day I will be unable to find it."

Teacher Mona Negm also had to look long and hard for penicillin, prescribed to treat an infection from which her son was suffering. "I had to go to several pharmacies in different neighborhoods before I found it," she says.

Ahmed Kandil has been searching for subsidised infant formula but has been unable to find it. Instead, he says, he is forced to use much more expensive imported formula, though that too is in short supply.

Widespread shortages of essential drugs first hit the headlines before the pound was devalued when difficulty in accessing dollars saw the import of medicines, and of the components needed to produce local alternatives, dry up.

The situation improved after devaluation, when dollars became more available, and following an agreement between the Health Ministry and pharmaceutical companies in January 2017 which saw drug prices rise by up to 20 per cent.

Abdel-Maguid Mamdouh, a pharmacist in downtown Cairo, says the current shortage in drug supplies is particularly problematic because it affects not just medicines in high demand but alternatives to the prescribed brands.

“There has been a shortage in almost all types of insulin since July. Medication to treat Parkinson’s disease, including Sinemet and its imported alternatives, has been in short supply for the best part of a year and now we are having problems obtaining drugs to lower blood pressure for pregnant women,” Mamdouh told the Weekly.

Dina, a pharmacist in Alexandria, reported “a shortage in medicines for chronic diseases like hypertension and diabetes”.

“We’ve asked the pharmaceutical companies to increase supplied but to no avail. When patients come in looking for a specific drug we let them know if there is a shortage before recommending an alternative, when that is possible. The problem is that sometimes the alternatives are not as effective as the prescribed medication,” she says.

Ali Ouf, head of the Pharmaceutical Division at the Federation of Chambers of Commerce, insists supply problems are not comparable to the situation in 2016. Then, he says, more than 1,000 different medicines were affected whereas now there are supply difficulties with 150.

“The problem,” says Ouf, “is developing into a crisis due to a lack of awareness among customers who are in panic buying medicines to store at home.”

“The shortage of insulin was first felt in July and was a result of problems within the distribution companies. It became a crisis as alarmist and misleading reports posted on social media lead to panic buying,” said Rasha Zeyada, head of the Pharmaceutical Affairs Central Administration (PACA), during a telephone interview with MBC Egypt channel.

“Demand increased from 380,000-400,000 injections in June to 580,000 in July and August.”

Ouf said domestic insulin factories have been urged to increase their production and work is underway to establish a hotline linking pharmacies with the PACA so they can report shortages.

Multinational drug companies like Pfizer, Novartis and GlaxoSmithKline supply 40 per cent of Egypt’s drug market, with domestic private producers supplying the remaining 60 per cent. Egypt imports about \$600 million of finished medicines per year and \$1.8 billion of ingredients.

Al-Roushetta Al-Khareya (The Charitable Prescription), a Facebook page started in 2016 to help patients access medicines, currently has 43,519 members. Members of the group are either patients seeking medicines in short supply or volunteers helping to search for the required drugs.

The #Twitter_Pharmacy allows patients to swap medicines they cannot find in pharmacies. Hospitals, too, are taking to social media to advertise their needs.

➤ **Drug shortage problem**

Drug shortage is a worldwide problem, which gained the attention of many authorities in recent years including the Egyptian government. The problem has markedly increased in Egypt during the past few years and has had a significant negative impact on patient care with subsequent costly financial implications. Despite the importance of the drug shortage problem and its consequences on the health of Egyptians and society as a whole, only a few researchers have addressed the topic in Egypt. This qualitative study aims at filling the gap and providing a better understanding of the problem in the Egyptian context. To achieve the study objective, the root causes of the problem and the actions taken by the government to mitigate the problem are explored. In-depth, semi-structured interviews are carried out with different stakeholders including from government, industry, distributors, and pharmacies. The findings of this research revealed that the drug shortage is attributed to a myriad of interlinked causes. The most critical causes of drug shortages are as follows: the drug pricing constraints, the devaluation, economic changes, overdependence on the importation of production inputs, illegal distribution practices, excessive bureaucracy and complicated procedures, manufacturing problems, poor supply chain management, and scarcity of raw materials. The findings also show that although the government has exerted many efforts to tackle drug shortages, there is still a gap to be addressed. Based on experiences of other countries and according to the Egyptian context, solutions are proposed to help in mitigating drug shortages in Egypt which include enhancing the sustainability of the production of medicines by improving companies' profitability, improving collaboration between various stakeholders, developing a system for reporting and communication of drug shortage information, and modifying workflow within MoHP to avoid unnecessary delays.

What will happen if this problem is not solved?

- ✓ Egypt's economy will fall back greatly as employees' health deterioration will affect their work's efficiency, maybe their health problems will lead to death reducing the production, and thus trading with other countries will decline.
- ✓ Infectious diseases will spread between citizens which will require greater supply of medicine and medical attention from hospitals which can be hard to provide.
- ✓ Medicine, when consumed by great masses of patients, will result in shortage of medicine which we would have to import from other countries leading to a huge increment in Egypt's debts.
- ✓ Educational institutions will be affected due to the severe conditions of health deterioration and the fear of the spread of infectious diseases, as students won't be able to communicate with their colleagues so as not to catch diseases.
- ✓ As the number of people affected because of health issues increases, hospital staff might not be able to pay attention to their pills and medication schedules.

What might happen if this problem is solved?

- ✓ Economy: Health performance and economic performance are interlinked. Healthcare performance is strongly dependent on the economy, but also on the health systems themselves. Egypt's economy will flourish with its healthy workforce which will consequently result in increasing the productivity and therefore improving the internal and external trade.
- ✓ Education: Research indicates that healthy students perform better on academic measures than unhealthy students. Therefore, improving the health system will have a positive effect on the education field.
- ✓ Social: The spread of any type of disease will be cut off reducing the number of patients by increasing their chances of getting their medicines anywhere at any time.

Research

Topic related to problem:

- Self-medication problem in Egypt
- Medicine deficiency in Egypt

Topic related to the solution:

- Programming languages
- C# programming language
- Website and applications
- ASP.net frame work
- Location based services

Factors that are related to the problem:

➤ Self-Medication Problem in Egypt:

Self-medication is a common practice in developing countries, including Egypt, but little is known about its epidemiology as well as the future plan needed to overcome this problem. This future perspective article aimed to describe the current situation of this problem in Egypt and the prospective vision of the author about this problem and the future plan needed for its prevention and control. Egyptian literatures in English language about self-medication from 1995 onwards were searched through a web-based medical database during September, 2015 and articles concerned with this issue was retrieved and reviewed. The reviewed literatures, although sparse, showed a considerable high prevalence of medication abuse among Egyptian population in the recent years which was as high as 86.4% in certain Egyptian governorate. Moreover, there has been lack of studies about other epidemiologic aspects of this problem in terms of its distribution and determinants, its health and economic impacts, and its prevention and control strategies. The present article pays the attention of public health personnel, university and medical researchers to carry out more studies and to increase awareness of general population, students, senior physicians, pharmacists, and organizations about this serious public health problem. In addition, the author presented his prospective view to combat this problem through short and long-term preventive and control plan.

Self-medication is defined as the use of medications without consulting a doctor regarding indication, dose and duration of treatment. Self-medication represents an aspect of selfcare behavior in which the person does by himself to establish and maintain health, preventing and dealing with diseases. The public health importance of self-medication increased when in 1980s World Health Organization (WHO) approved switching of some medications to nonprescription status to be sold over-the-counter (OTC) without any prescription in order to reduce the burden on health care professionals. Subsequently, patients can bypass the health care system and purchased most of medications from private pharmacies without prescription.

In Egypt, as in many Middle East countries, medications can easily be obtained over the counter and this is represented a serious public health problem in these countries. The prevalence of medication abuse was progressively increased in Egypt during the last two decades. An earlier study on drug utilization among children in Alexandria in 1995 reported that 21.1% of purchased medications were not prescribed. One year later, the prevalence was 72% in a cross-sectional study including 25 private pharmacies in Alexandria city. Much more recently, in a community-based survey in the same city, however, the prevalence of medication abuse was increased to be as high as 86.4%; the most commonly used drugs were analgesics (96.7%), and cough and cold preparations (81.9%), while antibiotics abuse was 53.9%. In Cairo, a cross-sectional study of antibiotic dispensing was carried out to describe the pattern of antibiotics dispensing in 36 pharmacies in greater Cairo. They found that 23.3% of the recorded antibiotics were dispensed upon pharmacist's recommendation and in the studied pharmacies and 13% upon patient request. Antipyretic misuse was also reported in a recent hospital-based study El-Shataby hospital, Alexandria city, where 140 out of the studied 200 women (70%) reported that they gave un-prescribed antipyretics for their children under 5 years complaining of fever, and common cold. Most common reasons towards self-medication practice in the above-mentioned studies was to avoid long waiting periods in hospitals, minor illness, and reduce cost to save money.

Up till now, however, there is no legislation or restrictions on self-medication, particularly for antibiotics that may lead to the emergence and spread of antibiotic resistance of different types of pathogenic bacteria with a consequent failure of antibiotic therapy and higher mortality and morbidity and prolonged hospital stay. The literature showed

shortcoming of the Egyptian studies concerned with health and economic impacts of self-medication, and in particular antibiotics misuse.

➤ ***Impacts of self-medication:***

The impacts of medication abuse have been globally restricted to the impacts of antibiotics misuse on the microbial resistance and its associated health and economic effects. In Egypt this issue has been reported in only one study. This study has reported a high resistance rate to antimicrobial agents in surgery and intensive care units in Cairo university hospitals, and attributed this to the bad hospital hygiene and misuse of antibiotics. In that study, the highest resistance rate was shown by *Staphylococcus Aureus* (23.8%), *Pseudomonas* (14.9%) and *Escherichia coli* (10.5%).

For other impacts of medication abuse; such as economic impacts, The Egyptian literature showed no studies about this issue. Only one study calculated the mean cost of drugs per encounter which was LE 7.29. Of course, this finding was not actually representing the meaning of economic impacts as result of health-related problems (higher morbidity and mortality and prolonged hospital stay) encountered in medication abuse, particularly with antibiotics misuse.

Antibiotics abuse is known to be associated with bacterial resistance, and the United States has reported at least 2 million people become infected with bacteria that are resistant to antibiotics and at least 23,000 people die each year as a direct result of these infections. The Institute of Medicine has estimated the annual cost of infections caused by antibiotic-resistant bacteria to be US \$4 to \$5 billion, and the misuse of antibiotics increases antibiotic resistance infections and costs the US health care system over \$20 billion each year.

➤ **current issues in Egypt health system:**

The Egyptian health system has some strengths, like an extensive infrastructure of physicians, clinics and hospitals, availability of technology and pharmaceuticals, and excellent physical access to care with 95% of the population being within 5 km reach of a medical facility.

It achieved high immunization rates and a reduction of annual population growth from 2.3% in 1990 to 1.8% in 1999. However, the belief that the lowering of the Egyptian birth rate is a result of the systematic extension of family planning services has been

challenged. Evidence seems to suggest, that it is rather a response to the country's changing economic, social, and political circumstances.

During the period of structural adjustment, there has been continuing concern with the government's policies in the social sector, and there has been some recognition that performance in the health sector both before and during adjustment has been less than adequate. The Egyptian health system has been characterized as having virtually all the problems encountered in former socialist countries, while at the same time possessing few of the advantages and most of the problems of an open-ended, US type system.

❖ ***In particular, the following problems have been identified:***

Health status concerns: Although substantial health improvements have occurred in the 1980s, like a reduction in child mortality and in infectious diseases, these have given way to stagnation of health conditions in the 1990s. Compared to other countries at its income level, Egypt's health indicators were and remain poor.

Inequity: Although in theory, the government guarantees "free health care to all", there is a huge disparity in financial access to care. The burden of households on out-of-pocket spending is greater than in any other country in the MENA region, with the exception of Yemen. The poor pay relatively more (both out-of-pocket and through the tax system) and receive relatively less in benefits than the better-off social strata. Less than 40% of the general population, and only 15% of those over 15 years of age benefit from social insurance coverage. Social insurance with nearly 50% contribution from general revenues resembles more a subsidized public finance scheme than a true insurance, which only benefits formal sector workers, and even excludes spouses and children of employees. There is also an important geographic disparity of service delivery. Utilization rates for ambulatory and hospital care are nearly double in urban compared to rural regions.

Macro-inefficiency: With total health care spending at 3.7% of GDP, Egypt spends on the lower side of what is seen in developing countries, and less than most countries in the MENA region. If government health spending is seen as an indicator for its commitment to improve health conditions, Egypt's commitment is low compared to its regional comparators.

Micro-inefficiency: Financing and management is completely fragmented with 29 public agencies involved. This precludes efficient and equitable risk pooling as well as a consistent policy focus or consistent incentives for efficiency. The low quality of government and public services is generally acknowledged. This is evidenced by an estimated 30-40% of nosocomial infections in hospitals, and 50% of deaths in emergency cases thought to be due to improper case management. Public health provision is poorly targeted, as the focus is on expensive tertiary care. Primary care is mainly left to the private sector. Partly due to an employment guarantee for doctors and nurses there is an oversupply of providers, but their training is often insufficient. More than 80% of physicians conduct private clinics in addition to their public employment. Hospital occupancy rate is below 50%. There are too many specialists vs. primary care physicians, and pharmaceutical consumption and spending is 50% higher than in comparable countries.

Rising health care costs: Due to an epidemiological transition from infectious to non-communicable diseases, a continued high population growth (high birth rate and longer life expectancy), and rising expectations of the population through access to global communication and commerce, an upward pressure on health care costs is expected.

➤ **Medicine deficiency in Egypt:**

There are some burdens and new concerns added to the lives of the Egyptians, namely, it is a disaster, the decrease in the price of medicine, the high price of it, and the lack of control over it, as it is one of many problems facing diabetes and liver patients and other diseases that need medication continuously and urgently. The Pharmacists Syndicate officials explained the reasons why companies cannot do so, stressing that the public sector pharmaceutical companies themselves are victims of economic and material conditions because they suffer from causes beyond their control.

The pharmaceutical production sector in Egypt is witnessing a crisis that negatively affected the citizen's need for the drug during the current days, especially since until now the drug deficiencies have reached nearly 800 medicinal brands that have not been completely absent in the market and some of them have disappeared with all of its alternatives. The number of drug deficiencies has increased in one month Almost to weakness, which caused a major crisis that is threatening the lives of patients who depend completely and daily on these drugs, including important vital medicines such as drugs for heart diseases, diabetes, pressure, neurological diseases, and a number of sera and vaccines "tetanus" and others One of the medications that the Egyptian patient needs on a daily basis, according to Maalou Data confirmed by the Pharmacists Syndicate's.

❖ ***The cause of the crisis***

The crisis started when some pharmaceutical companies became threatened with stopping production and closing their factories due to the Ministry of Health's insistence not to move the price of medicines and medical supplies in proportion to the prices of some imported medicines, until the price of the dollar rose and the matter got worse for manufacturing and production companies due to the inability of all companies On importing raw materials used in the pharmaceutical industry.

The factors that are related to the solution:

➤ Programming languages:

❖ ***DEFINITION OF PROGRAMMING LANGUAGES?***

A programming language is used to control the actions of a machine. Such a language is a properly drafted or constructed language when it is designed in such a way that through instructions can be communicated to a computer system.

Ever since the invention of computers, thousands of programming languages have been created, and more are being created every year.

A programming language is generally split into two components that are the semantics and the syntax. Where on one hand the syntax is the form or type, the semantics are the meaning of that type or form.

Every programming language is different; where on one hand, some may be marked by a specification documents, others may have a dominant implementation or a reference. A programming language thus broadly is a notation that helps to write programs that are identified as an algorithm.

❖ ***Types of programming languages used in web development***

The technology world is expanding immensely with each passing year and months. Various programming languages are now available and each of them has distinct functions. Therefore, to design or build up our website, there are lots of languages that can be used to do this purpose. So, it was a necessity to search well all of these available programming languages to be able to choose which one we will use in order to build up our websites.

❖ ***Some of these programming languages are:***

1. JavaScript
2. Java
3. C#
4. Python
5. Ruby

❖ JavaScript

JavaScript is one of the most popular and dynamic programming languages used for creating and developing websites. This language is capable of achieving several things including controlling the browser, editing content on a document that has been displayed, allowing client-side scripts to communicate with users and also asynchronous communication. It was developed by Netscape and borrows a lot of its syntax from C language. JavaScript is used very widely and effectively in creating desktop applications as well as for developing games.

One of the best things about JavaScript for you as a developer or a website owner is that this is one of the few programming languages that are accepted and supported by all the major browsers without the need of any compilers or plug-ins. It can also be worked with on platforms that are not web-based, for example-desktop widgets and PDF docs. This is a multi-paradigm language which means that it has a combination of features. Also, JavaScript supports functional and object-oriented programming styles.

The features of a language define the way it will work, the way it responds, how easy is its code and what it can achieve. The following are some of the main features of JavaScript programming language for your reference:

- Structured – JavaScript is a highly structured language with a proper and planned syntax that has been derived from C. This language too has a function scoping by it lacks block scoping, unlike C. It too differentiates between statements and expressions, just like the fundamental C web programming platform.
- Dynamic – The types in JavaScript are not related with variables but with values. This is a dynamic programming language that enables you to test the type of an object in many different ways. Also, this programming language is object-oriented where all the objects are associative arrays.
- Functional – All functions in JavaScript are objects and are all first-class. They are associated with their own functions as well as characteristics. For example, a function within a function is called a nested function whereas this language also supports anonymous function.

Advantages of JavaScript

- Simplicity: JavaScript is relatively simple to learn and implement.
- Server Load: Being client-side reduces the demand on the website server.
- Rich interfaces: Drag and drop components or slider may give a rich interface to your website.

Disadvantages of JavaScript

- Client-Side Security: Because the code executes on the users' computer, in some cases it can be exploited for malicious purposes. This is one reason some people choose to disable JavaScript.
- Browser Support: JavaScript is sometimes interpreted differently by different browsers. Whereas server-side scripts will always produce the same output, client-side scripts can be a little unpredictable.

❖ Java

Java is yet another highly popular and widely used language that you can consider for web development. This language is an object-oriented, class-based and concurrent language that was developed by Sun Microsystems in the 1990s.

Since then, the language continues to be the most in-demand language that also acts as a standard platform for enterprises and several mobile and games developers across the world. The app has been designed in such a way that it works across several types of platforms. This means that if a program is written on Mac Operating system then it can also run on Windows based operating systems.

Java, when it was designed originally, was developed for interactive television, but the developers realized that this language and technology was way too forward for this industry. It was only later that it was incorporated into the use it serves today.

Advantages of Java

- Platform Independent: It is one of the biggest merits of java language. When a java program is compiled it is converted into .class file or byte code. The .class file is platform independent and can run on any platform like windows, mac, Linux, etc. This property is known as Write Once Run Anywhere (WORA).

- Simplicity: Java is simple to learn as compared to languages like C++.

Because various complex features like pointers, operator overloading, manual garbage collection, and others are removed from java.

- Object Oriented: Java is object-oriented programming language and this gives ability to write modular programs and reusable code.

Disadvantages of Java

- Performance: Significantly slower and more memory-consuming than natively compiled languages such as C, C++, or C#.
- Look and feel: The default look and feel of GUI applications written in Java using the Swing toolkit is very different from native applications.
- Single-paradigm language: The addition of static imports in Java 5.0 the procedural paradigm is better accommodated than in earlier versions of Java.

❖ C#

C# is an elegant and type-safe object-oriented language that enables developers to build a variety of secure and robust applications that run on the .NET Framework. You can use C# to create Windows client applications, XML Web services, distributed components, client-server applications, database applications, and much, much more. Visual C# provides an advanced code editor, convenient user interface designers, integrated debugger, and many other tools to make it easier to develop applications based on the C# language and the .NET Framework.

Advantages of C#

- Object-oriented: C# programming language is a pure object-oriented language so that it allows you to create modular maintainable applications and reusable codes. This is one of the biggest advantages of C# over C++ languages.
- Cross-Platform: The most important requirement for C# programming is that NET framework. The machine has to install the NET Framework to run your application well.
- Automatic Garbage Collection: In C# programming, a very efficient system installed that collect and erase garbage automatically present on the system. C# language is very efficient in managing the system because it doesn't create a mess in the system, and the system doesn't get hanged during execution.
- Avoid the problem of memory leak: The major benefit of C# language is its strong memory backup. C# programming language contains high memory backup so that memory leakage problem and other such types of problem is not occurring as it happens in the case of C++ language.

- Easy-to-Development: C# language has a rich class of libraries that make many functions easy to be implemented. The C# programming language influences most of the programmers of the world and has a history in the programming world.
- Better Integration: An application written in .NET will have better integration and interpret-ability as compared to other NET Technologies. C# programming runs on C.L.R that making it easy to integrate with components written in other languages.
- Cost-benefit: Maintenance cost is less and is safer to run as compared to other languages. C# language can develop iOS, Android and Windows Phone native apps, with the help of the Xamarin framework.
- Familiar syntax: It is pretty easy to pick up and work productively with a working knowledge of languages like C, C++, Java because its core syntax is similar to C-style languages.
- Programming support: Any support can be bought from the Microsoft in C# programming. If any issue occurs you can solve it with the support of Microsoft.

Disadvantages of C#

- C# is completely based on Microsoft .Net framework this is the reason why this is not a flexible language.
- As any other language, any change in the C# written code has to be compiled first.

❖ Python

Python is a highly used and all-purpose programming language which is dynamic in nature. Being dynamic in nature means that you as a developer can write and run the code without the need of a compiler. The design of the language is such that it supports code readability which means that its syntax is such that only a few lines of codes are needed to express a point or a concept. This concept of code readability is also possible in the case of Java and C++, etc. This is a high-level or advanced language that is considered easy for beginners to understand and learn.

Advantages of Python

- Simple and Easy: Working with Java, you may have to create a class to print ‘Hello World’, but in Python, just a print statement will do. It is also quite easy to learn, understand, and code. This is why when people pick up Python, they have a hard time adjusting to other more verbose languages like Java.

- IOT Opportunities: Since Python forms the basis of new platforms like Raspberry Pi, it finds the future bright for Internet of Things. This is a way to connect the language with the real world.
 - Readable: It is not such a verbose language, reading Python is much like reading English. This is also why it is so easy to learn, understand, and code. It also does not need curly braces to define blocks, and indentation is mandatory. This further aid the readability of the code.
 - Object-Oriented: This language supports both the procedural and object-oriented programming paradigms. While functions help us with code reusability, classes and objects let us model the real world. A class allows the encapsulation of data and functions into one.
 - Interpreted: Since statements are executed one by one, debugging is easier than in compiled languages.

Disadvantages of Python

- Speed Limitations: Python code is executed line by line. But since Python is interpreted, it often results in slow execution. This, however, isn't a problem unless speed is a focal point for the project. In other words, unless high speed is a requirement, the benefits offered by Python are enough to distract us from its speed limitations.
- Weak in Mobile Computing and Browsers: While it serves as an excellent server-side language, Python is much rarely seen on the client-side. Besides that, it is rarely ever used to implement smartphone-based applications. One such application is called Carbonnelle. The reason it is not so famous despite the existence of Brython is that it isn't that secure.
- Design Restrictions: As known, Python is dynamically-typed. This means that you don't need to declare the type of variable while writing the code. It uses duck-typing means that if it looks like a duck, it must be a duck. Although this is easy on the programmers during coding, it can raise run-time errors.

❖ Ruby

Developed in the year 1993, Ruby is a dynamic programming language that is used for the creation or programming of mobile apps and websites. The language successfully balances imperative programming with functional programming and is a highly scalable language. This open source platform is not only simple to understand but also easy to write. Ruby is the perfect programming language in creating small business software.

During its development, the idea was to come up with a language that was more productive in terms of programming and has a concise and simple code. Ruby is mostly used in the web servers where there is a lot of web traffic. Some examples of platforms that make use of this programming language include Hulu, Twitter, and Scribd, etc.

Advantages of Ruby

- Easy and Simple: The code written in Ruby has a fewer number of lines of code. This language allows simple and fast creation of Web application which results in much fewer efforts. Ruby is also a dynamic programming language. It is also very close to spoken languages.
- Open Source: It is an open source programming language which allows the programmers to modify the code as needed.

Disadvantages of Ruby

- Communities and Support: Ruby's support community, unlike PHP and C#, is not as large as PHP support communities. Books about Ruby programming are also not as extensive as those C#. According to msdn.com, a blog from the Microsoft Corporation, as of 2006, only about 400 books about C# are on the market, while Ruby-related books on the market only amount to 50.
- Slow Processing: Several benchmark websites that regularly run and test response times of programming languages often describe Ruby as one of the slower programming languages. Ruby language can be 20 times slower than Java when processing.

❖ ***Factors to be considered when choosing a programming language:***

Since there are so many different types of programming languages, it can be difficult for a web developer to select which one to use and which one to leave. There are certain factors on the basis of a decision can be made, and they are given as follows:

❖ **Targeted platform**

The first thing you need to decide is where the program will be run. Not all languages are capable of running on all kinds of platforms. For example, a program written in C language requires compilers to run on Windows and Linux based systems.

❖ **Language domain match**

The language must be chosen on the basis of the problem domain that you have. One of the better ways to do so is by searching that language others in the same domain or industry are using or by trying to look for a code that resolves the issues that you may have.

❖ **Efficiency**

The compilers that go well with the language you choose must be efficient so as to make the language perform fast.

❖ **Elasticity and Performance**

The language you choose must be flexible enough to let you add more programs or features in it. Also, its overall performance must be to your suitability and liking.

❖ **Availability of libraries**

There must be a library that is capable of solving all your problems with the language that you select for web development.

❖ **Project size**

There are two types of programming's: large and small. You must select a language that can support your cause and suits the project size well.

❖ **Expressiveness & Time to production**

Make sure you pick that language that is highly expressive and the time taken to produce the programs or codes is not very bothersome to you.

❖ Tool support

Buy a tool-oriented language that offers you many elements and ways to edit, control and work.

After doing lots of research to choose which programming language we are going to choose for our website according to these previous factors, we have determined to use the C# programming language for a variety of reasons that will help us meet our design requirements and achieve our goals.

➤ C# programming language?

- C# language is pronounced as C sharp language. It is a modern, general-purpose, object-oriented programming language which is developed by Microsoft within its .Net and initiative led by Andres Hejlsberg.
- The C# programming language is a very easy language to learn. It is entirely based on the C and C++ language.
- Basic knowledge of C and C++ language can help easily understand this language. However, the syntax of C# language is highly expressive, but yet it is also simple and easy to learn. Anyone can recognize the curly-brace syntax of C# instantly who know about the C, C++ or Java language.
- The best side of the C# language as compared to Java and C++ language is that it simplifies many of the complexities of C++ and provides powerful features such as null-able value types, delegates, enumerations, lambda expressions, and direct memory access which are not found in Java.

↘ Properties of C# language

These are some essential properties of C# language:

❖ Safe

There is no type-conversion so that data loss is not possible. That's why the code written is safe, besides this C# language supports null-able and non-nullables types.

❖ Modern and Easy

To develop C#, Microsoft has only an aim to developers can learn easily and can support modern functionality. This programming language also helps in business because we can develop software for various platforms like IOS, android, and window or web.

❖ **Fast and Open Source**

C# language lead by Microsoft instead of this there open source project and tools are available on GitHub and that's why C# is growing fast just because of open source, there are many communities active for language improvement.

❖ ***Evolution of C# Programming Language.***

Microsoft had built this language earlier only for windows application but after that, however, it was begun to use this language for the console, android, and IOSs, besides, C# started to be used with machine learning software.

❖ **History**

In January 1999, Anders Hejlsberg had created a team for developing new programming language, at that time this new language named cool. But because of trademark reason, Anders Hejlsberg changed this language name Cool to C#.

Hejlsberg is a principal designer of C# in Microsoft company also he made various languages like Turbo Pascal, Embarcadero Delphi, and Visual J++. At that time, he said in an interview that C++ and Java Pascal languages don't have fundamentals of the Common Language Run time, that's why we made C# language.

❖ ***Features of C# Language***

There are many important features of C# language that make it more useful and unique compared to other languages.

- Fast Speed
- Simple
- Object-Oriented
- Modern Programming Language
- Type-Safe
- Interoperability
- Scalable and Updateable
- Structured Programming Language
- Rich Library
- Component Oriented

❖ **Fast Speed**

C# language is very fast, its compilation, and execution time is too quick.

❖ Simple

C# is a simple language. It gives a structured approach to breaking the problem into parts. Also, it has a rich set of library functions and data types. C# language code does not require header files. Its code is written inline.

❖ Object-Oriented

C# language is an object-oriented programming language. Similarly, this makes development and maintenance easier as compare to Procedure-oriented programming language. Besides, C# programming supports Data Encapsulation, inheritance, polymorphism, interfaces.

❖ Modern Programming Language

C# language is one of the modern programming languages because it is based upon the current trend. However, it is very simple, powerful for building scalable, inter operable and robust applications.

❖ Type-Safe

C# language is type-safe code that can only access the memory location and has permission to execute. Therefore, it improves the security of the program. In C# language, you can't perform unsafe casts like convert double to a Boolean. Its value types (primitive types) are initialized to zeros and reference types (objects and classes) are initialized to null by the compiler automatically.

❖ Interoperability

Interoperability is the process that enables the C# programs to do almost anything that a native C++ application can do. In brief, language interoperability is the ability of code to interact with code that is written using a different programming language. It can help maximize code reuse and, therefore, improve the efficiency of the development process.

C# language provides support for using COM objects, no matter what language was used to author them. However, it also supports a special feature that enables a program to call out any native API.

❖ Scalable and Updateable

C# language is a computerized scalable and update-able programming language. However, one important thing is, that to update your .Net framework. you have to kill your old files and update them with the new one.

❖ Structured Programming Language

C# language is a structured programming language. However, structured programming languages is a subset of procedural programming that enforces a logical structure on the program being written to make it more efficient and easier to understand and modify.

In other words, to solve large problems C# programming divides the problem into smaller modules called functions or procedures each of which handles a particular responsibility that's why C# language called a structured programming language.

❖ Rich Library

C# language is rich in the library. So that it provides a lot of inbuilt functions that make development fast.

❖ Component Oriented

C# language is a component-oriented programming language and supports component-oriented programming through the concepts of methods, properties, events and attributes (or metadata), allowing self-contained and self-describing components of functionality called assemblies.

➤ **Websites and applications:**

❖ ***Website:***

Definition of website: a group of World Wide Web pages usually containing hyperlinks to each other and made available online by an individual, company, educational institution, government, or organization.

A website is a collection of publicly accessible, interlinked Web pages that share a single domain name. Websites can be created and maintained by an individual, group, business or organization to serve a variety of purposes. Together, all publicly accessible websites constitute the World Wide Web.

A website is also known as a web presence.

❖ **Techopedia explains Website**

Websites come in a nearly endless variety, including educational sites, news sites, porn sites, forums, social media sites, e-commerce sites, and so on. The pages within a website are usually a mix of text and other media. That said, there are no rules dictating the form of a website. A person could create a website of nothing but black and white photos of roses, or the word "cat" linked to another Web page with the word "mouse." However, many sites follow a standard pattern of a homepage that links off to other categories and content within the website. Originally, websites were categorized by their top-level domains. Some examples include: Government agency websites = .gov Educational institutions' websites = .edu Nonprofit organizations' websites = .org Commercial websites = .com Information sites = .info Although these top-level domains extensions still exist, they say little about a website's actual content. In the modern day internet, the ".com" extension is by far the most popular domain, along with many other country-specific extensions.

❖ **Advantages of a Website:**

- Reaching a Wider Audience

The first and perhaps most obvious advantage of a business website is the potential for reaching a wider audience. The internet is used by literally millions of people, all of them are looking for something and some of them might be looking for you!

Building a website for your business will mean you could potentially reach these otherwise unreachable customers. Your business might be local, but you might have the potential to sell your products or services to a wider market, whether it be people in the next town, the nation as a whole or even the international market. Data shows that internet shopping is still on the rise, so taking your business online will potentially allow you to take advantage of the growth and expand your business. Even if you have no intention of using a business website to sell, you still might want to let customers know about your business. People commonly research businesses online before actually visiting the business location. So having a well designed website will help encourage them to come and visit you or be able to find your business in the first place.

- **Anyone, Anywhere & Anytime**

An advantage of having a website is your business information and details about your products and services can be accessed by anyone, no matter where they are on the planet or what time of day it is. The internet is online 24 hours a day, 7 days a week. So even if your business isn't open your website will be!

If you have a contact form or another way for people to be able to contact you – even if it is as simple as your e-mail address on your website, then people can potentially get in contact with you, whether you're in front of a computer or not.

In the modern age, people are using their mobile phones more and more to browse the internet, find out about businesses and even buy products and services (UK Business Going Mobile – M-Commerce). So even if your website is just a short description of your business it might help customers find your location while they are on the move. This is especially important for restaurants, pubs and other eateries, but is also a relevant consideration for most other businesses.

- **Easy Access To Business Information**

With a website, customers can easily access information about your business. They can see what products or services you sell, your prices, your location and much more. Whatever you decide to tell them, they can find it with a few clicks of a mouse.

- Keeping It Fresh

Once a website is designed, you can keep it up-to-date to be relevant to your business and encourage more visitors (and potential sales). More and more people are using a blog to promote their business. In fact, research shows that Businesses That Blog Get More Traffic. So using a blog to keep content fresh and attract attention could mean a big difference to your business.

- Publicity & Advertising

You may think of the advantages of a website in terms of advertising and publicity for your business. The costs of having a business website are actually quite low. You need a suitable domain name and good quality webhosting and you're ready to go. The ongoing costs are minimal, but the potential return on investment could be quite significant. Think of your business website in terms of advertising for your business and you'll be more likely to see the value.

- Links From Others & Viral Marketing

With a website and the current use of social media and marketing, it is quite possible for a good idea, clever product or business service to go “viral”. Word spreads like wildfire across the internet and even the smallest business can get worldwide recognition without any effort on their own part. Viral marketing is a boom in recent years. Our recent article (Old Spice Viral Marketing Boosts Sales By 107%) demonstrated how a simple campaign by Old Spice significantly increased their sales. With a website, you too have the potential to do the same!

- Securing Your Brand Online

Having a website for your business is not just an advantage; it's an essential way to protect your business brand online. Stake your business claim on the internet or someone else will! There is a risk that if you don't have a business website and secure a domain name relevant to your business then someone else will do it for you. The act of Cybersquatting is now less prevalent since the introduction new laws to combat it, but there is still a risk of someone innocently taking your preferred domain name. Others with a gripe against your business might use a website or social media accounts to damage your business reputation. Getting there first will allow you to protect and secure your business brand online.

- Cost Savings

Large organizations can use websites and web pages to make information available to the public that used to require printing or call centers. The Internal Revenue Service, for example, maintains a page of downloadable tax forms, instructions and other publications, as well as numerous tax information pages. Businesses no longer need to publish comprehensive catalogs of products, but instead, make the information available online. Online businesses, particularly those that provide purely electronic products, reduce costs by eliminating the majority of overhead expenses.

- Availability

Barring a power outage or technical failure, websites never stop working. This means a company can take orders at all hours any day of the week. This also opens up foreign markets without requiring a company to operate beyond normal business hours in its home region. Information seekers do not need to wait for a library to open to access materials if they exist in a digital format. Web site can be updated any time it's needed, enabling people with day jobs to run online businesses in their off hours.

- Website Costs

Websites save organizations money, but also come with costs, both in time and money. Most businesses and organizations opt to purchase a specific domain name, rather than operating under the domain name of a free website and hosting service. Like other visual mediums, effective websites require some design work, which means either hiring a web designer or handling design in-house. The first option costs money. The second option requires time and energy away from other organizational concerns. Content development takes time, if handled in-house, or costs money for a third party to write. There are also recurring website hosting fees, annual renewal of domain names and the electronics and software needed to manage the site.

- Visibility

A website no one sees has zero value. Unless a site commands brand name appeal, it must rely on other methods to draw traffic. This generally means achieving a high search engine ranking. In practice, this requires a number of elements. Successful websites maintain quality content and add to it consistently. Ranking well also hinges on search engine optimization, which includes careful keyword selection, appropriate meta- and title-tags, and both incoming and outgoing links. Deploying useful SEO methods takes time or engaging the services of SEO experts. Potential customers who don't use the Internet for shopping and news reading may not find your website at all, so if you don't also use newspapers, direct mail or broadcast media, you may not reach those people with your message.

- Advertising

A website is more environmentally friendly when it comes to advertising and marketing. There are lots of ways to advertise your products or services through the internet. One example is Facebook ads, an advertising feature offered through Facebook. Another one is called SEO. This is a major advantage for your business. Having a good SEO service provider can boost the ranking of your website which quickly results in increased sales and higher profits.

- Satisfaction

Having a website will be more convenient for your customers and leads. Make it easy for your customers to purchase from you! Many will be more likely to visit your website, rather than driving a car to your physical location and browsing for your products. From a customer's point of view, it's better for them if they don't have to ask anything. They can just find what they're looking for on your online site.

- Increase Customers

Most businesses have local popularity, but what about potential customers outside their city? A website can help you generate more customers. Not just outside your city, but worldwide. The internet offers a global community. With a website, your business will be visible around the world.

- Accessibility

Have you ever experienced having to turn customers away because it's closing time?

Well, you don't have to close the doors of your website. An online site can be visited any time of the day or night. People will look to your site instead of going to your shop because it is more accessible. Just make sure to post enough information about your products and services.

- Access to Info

Did you know that if you own a website, you can actually track everything that is happening on it? You can even look for information that will tell you how many people visited your site, or how many people messaged or emailed you. You can access the progress of your website and view all its pages. You can even make an update anytime, making it much less expensive than printed material.

- Fresh

Smart business owners create a blog page for their company. Having a blog to post fresh content will keep your website attractive and fresh.

- Links

Links are very important to viral marketing. If you have many sites linking to you, it is like spreading the word about your company all around the world. If you have a good website with good content related to information, products or services, people are more likely to link your website to theirs. This means they recognize your website as valuable.

- Better Relationship

Having a website can build better relationships with your customers. You can send messages instantly to your customers through email. Also, your customers can review your products online and can also leave feedback for you and your business. It's best to always send your customer a message. This is essential for building a good relationship with them. You can even give them more information about your business through messages or emails.

- Increase Sales

If you are a business owner, more visitors lead to more potential sales. That's how your website will help you. You can drive more people to your site by consistently updating and promoting the contents of your site. The more informative your site is, the greater the possibility of increasing your sales.

- Opportunity

A website gives you the opportunity to prove your credibility. You have to tell your customers why you deserve their trust through your website. This can earn positive feedback for your service and products. Also, your website serves as a place for a potential investor to explore what your business is about and what it can do in the future.

- Long Term Clients

What do you think is the difference between client and a customer? Well, a customer is the one who walks in and buys something and that's it. A client is your regular customer. He is buying your products or services daily or contractually. Having a website gives you a chance to gain more clients that can help your business grow.

❖ **Disadvantages of a Website:**

- Designing a Site

Before a business sets up a Web page, someone has to decide what it's going to look like. Pages with endless blocks of text and no visuals, or with no useful information, may drive people away. Sites that don't offer intuitive, easy navigation frustrate visitors. It's important to work these details out before the page goes live. A Web page perpetually "under construction" alienates customers who expect everything to be ready.

- Programming Pitfalls

Even the best design is useless until a programmer writes the code to create the page. If the code is flawed -- the page doesn't let customers download music or book a vacation, for instance -- it's going to hurt more than help. The Affordable Care Act's website at launch is an example of poor functionality. Programmers rushed and cut corners to meet government deadlines and when the site went live, it didn't work for many people. The negative publicity was intense.

- Staying Up-to-Date

Unlike a Yellow Pages ad, business owners can update a Web page constantly. That's good because if the address, phone number or product prices change, the company can instantly tell the public. If the company doesn't update its site regularly, customers may be angry when they learn the prices listed online aren't accurate. Someone has to keep track of what's posted online and keep it current.

- Display Challenges

Different people access Web pages in different ways. One visitor uses a laptop, another uses a cell phone; one uses the latest version of Firefox, another relies on an older version of Internet Explorer. Web programmers have to code sites to work perfectly, no matter which browser visitors use. The site also has to look good whether the visitor sees it on a 24-inch desktop or a few inches of smartphone screen. (Ref4, #3, ref5)

- Going Down

A newspaper ad doesn't just disappear if a lot of people read it, but a Web page can. Pages that work fine with the site's everyday traffic may not function if there's a spike in visitors. The hosting service may not be set up to handle that many connections, or the bandwidth may be more than the site has authorized. A well-designed page is of no use if nobody gets to see it.

- Customer Service

Businesses should remember that a website should provide information to their clients, but it should not be the only resource to go to if there are problems. Google relies on its online help center and support forums to handle problems. Facebook users who have issues with the service have to contact the company by email. The inability to talk to a person directly can frustrate users. It can also leave them feeling the company has no interest in helping them, and this may cause a business to lose clients.

Application:

General purpose applications and custom software are the two major **types of application software**. General purpose applications, which are sometimes referred to as 'off the shelf' applications are designed as feature-full packages while custom software is tailor-made for a client's specific needs.



Figure 28

Google apps for Chrome browser fall under the general-purpose type of application software

Applications or just apps, are end-user software which contain basic to advanced sets of digital tools, designed for productivity tasks such as arithmetic summation and text editing. They are at the end of the software queue because they enable users to accomplish complex to simple productivity tasks.

Most application software is designed to run on three popular platforms: desktops, mobiles, and browsers.

Applications for Desktops and Mobiles

Up until recently, application software types were meant to be used on the computer desktops. With the extensive adoption of mobile devices and the internet, however, software for mobile and other digital contraptions have also become mainstream.

The trend for developers is thus to create two to three or more versions of applications to install on the desktop, mobile, web platforms, and embedded systems.

Applications on desktops usually have plenty of room and features, while apps for mobiles are trimmed down versions. Browser optimization in mobiles requires that just a minimal of features load, in order not to eat away on resources and battery life.

Except for power users and core professionals, who still need the muscle of traditional computers, smartphones and tablets have become the tools of choice for the majority.

Applications for Web Browsers

Web apps are installed and/or run on web browsers. They are capable of accomplishing tasks that were previously only possible inside native operating systems. Google docs, Word Online, Zoho wiki, Evernote and email clients are popular examples of web apps.

Implementation of web apps is just one of the Web 2.0 features, a kind of second generation of web computing which is all about collaboration, interactivity, and sharing of information between users around the world. The concept has taken off largely due to mass adoption of mobile devices and cloud storage.

Below are popular Web 2.0 platforms and apps:

- Social media communication *e.g.* Facebook, Twitter and LinkedIn.
- Blogs *e.g.* Blogger, WordPress and TechCrunch.
- Wikis *e.g.* Wikimedia, Wikipedia and TermWiki.
- Social media curation *e.g.* Pinterest, Digg and Reddit.
- Cloud storage *e.g.* Google Drive, Dropbox and Sugar Sync.

A plus for web apps is that they are largely free, or cheaper than their native counterparts, but may turn out more expensive in the long run because of app and internet subscriptions.

Apart from Chrome Web Store, other sources of apps are Wiki App Market, Microsoft Store and Clover App Market.

The two types of application software:

- General Purpose Applications
- Custom/Bespoke Software

General Purpose Applications

These are off-the-shelf software types which accomplish broad range of tasks as opposed to custom software which accomplish tasks specific to user requirements. General purpose applications are available in standalone modes or are bundled together to make up application suites.

Application suites such as MS Office, Apache OpenOffice, iWork, Google Docs, WPS Office, CorelDRAW Graphics Suite and Adobe Creative Suite are bundles of applications with different functionality. They complement each other to make complete productive packages for the office, school and home.

A typical suite includes at least a word processor, presentation, database and graphics applications. Corel and Adobe suites, however, favor graphics, and video editing applications, for the latter.

❖ 1. Word Processors

These are types of application software with basic tools to create, edit, format and save text files until they are WSYWIG (*what you see is what you get*). The saved files can then be sent to the printer to produce hard copy output or used for other purposes.

Word processors can be used to create multiple kinds of documents including reports, letters, newsletters, invoices, manuals, and has additional features such as mail merge, email and send to blog.

Besides, they can be tuned to for advanced formatting of graphics for publishing.

Examples of word processing applications: MS Word, WPS Writer and Apple Pages.

WPS Writer is an application software for word processing

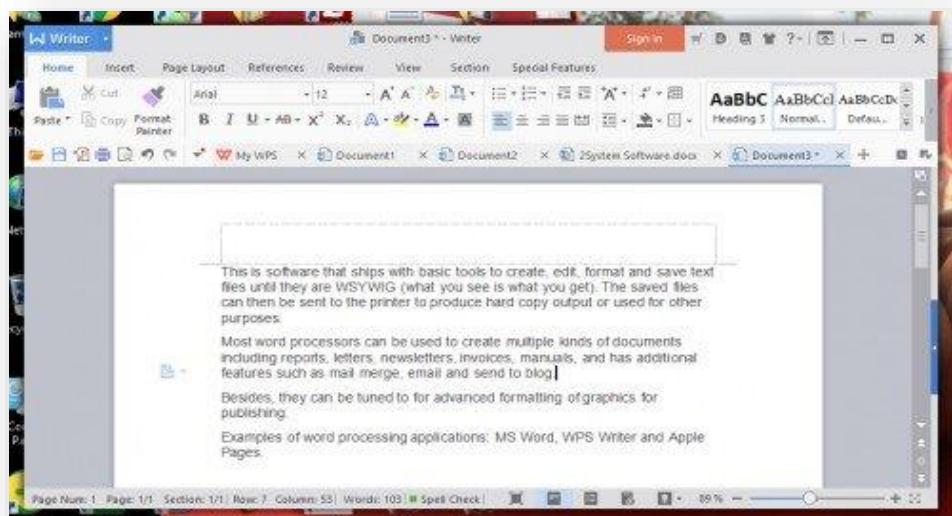


Figure 29

❖ 2. Electronic Spreadsheets

Spreadsheets are used to manipulate large amounts of financial data in business, science or for personal accounting. Numeric or text data are entered in cells of tables to be calculated, compared and analyzed using select formulas.

The information gathered from these calculations are laid out for report preparation and presentation.

Additional features in spreadsheets include the creation of graphs, charts, 3D data maps, pivot tables, forecasting etc.

MS Excel, LibreOffice Calc, and Google Sheets are examples of spreadsheets.

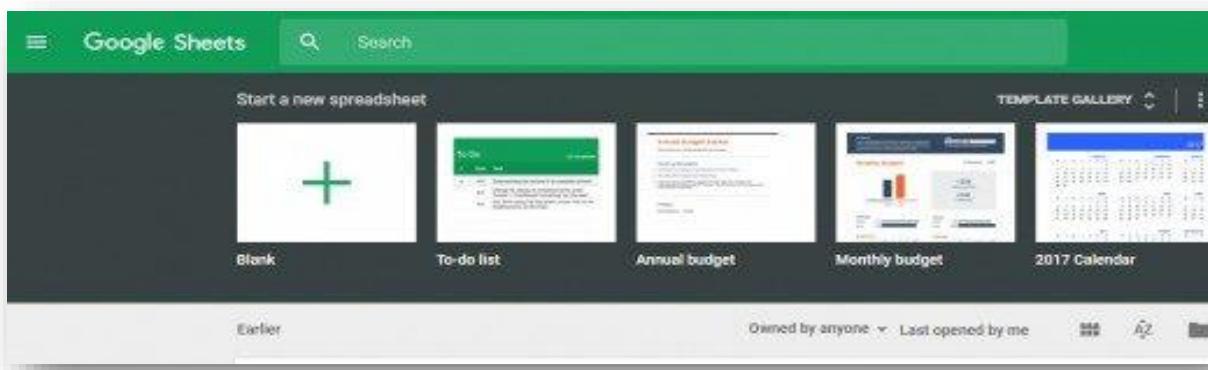


Figure 30

Google Sheets is a spreadsheet app for the browser

❖ 3. Data Management

Database applications are containers of related data for processing, analysis, storage and retrieval. They are comparable to a book library where items are stored in orderly forms, for ease of manipulation and access.

Typical desktop applications like MS Access, Filemaker and dBASE are used for operational assignments to create, organize and update all kinds of related records like inventories, mailing lists, purchases, catalogs, phone numbers etc.

They allow users to query for specific information and generate reports with relative ease.

Relational database management systems like SQL, Cloud SQL and Oracle are used in complex installations to manage vast data and ensure data integrity.

Facebook, Pinterest and Symantec are just a few of complex database systems built on MySQL foundation.

On the other hand, not only SQL (NoSQL) database management implementations have taken shape in recent years giving credence to document-oriented databases. They are based on XML and JSON pages unlike relational databases which rely on tables.

Those favoring NoSQL value them because of their flexible data models and better scalability.



Figure 31

phpMyAdmin is a management tool for MySQL

❖ 4. Accounting

The field of accounting is about communicating financial details in a business by recording, manipulating, sorting, storing, summarizing and retrieving financial transactions in a comprehensive manner.

Ultimately, general-purpose accounting packages will be used to create and present balance sheets, income and financial statements, tax reports, all according to set rules and procedures.

A good accounting setup must also be vetted regularly by external auditing firms to ensure it complies with set standards which govern financial establishments. Besides the eagle eye of auditors, the services of professional accounting firm can be sought to help streamline procedural requirements.

Popular accounting software series for small businesses include Quickbooks, Zoho Books and Sage.

Popular applications for enterprise are Xero, Intacct ERP and Microsoft Dynamics.

Audit management software: Audit Desktop, MetricStream and ECAT.

❖ 5. Presentation

Presentation software are used to display ideas or concepts for business and educational purposes, in a slideshow format. Popular tools like bulleted lists, graphs, charts, animations, texts, audio and video are used in creating slide-shows.

These applications rely on the computer VGA or other output ports, projector or smartboard to display slide contents.

Additional features include screen recording, sharing and collaboration,

Keynote, MS PowerPoint and Corel Presentations are examples of presentation applications.

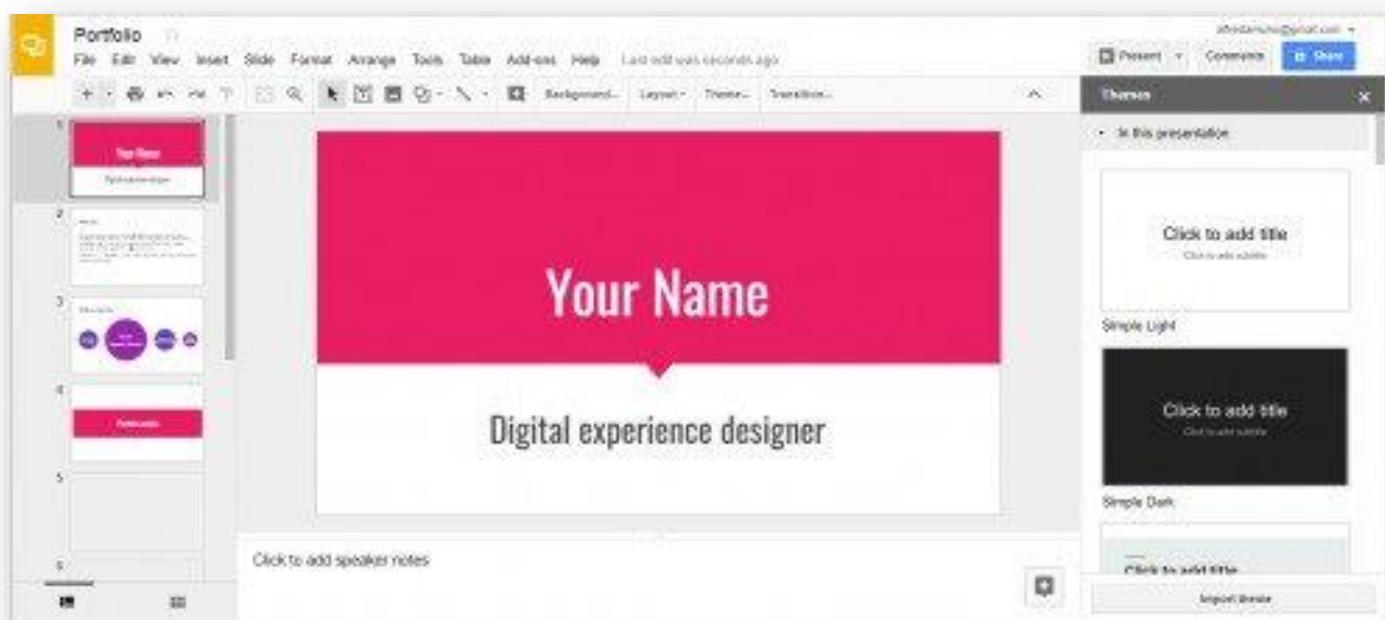


Figure 32

Google Slides is an online presentation app

❖ 6. Desktop Publishing (DTP)

DTPs are used to create illustrations, animations and 3D images using text and graphics embedded within the clipart library. DTP page layout features design tools and other elements with which the user can create quality typographic texts and imaginative graphics.

The end result of work done in DTPs are brochures, newsletters, fliers, logos, magazines, newspapers, business and other cards, 3D models etc, for publishing or printing.

Adobe Illustrator, In-design and Microsoft Publisher are but a few of popular DTPs.

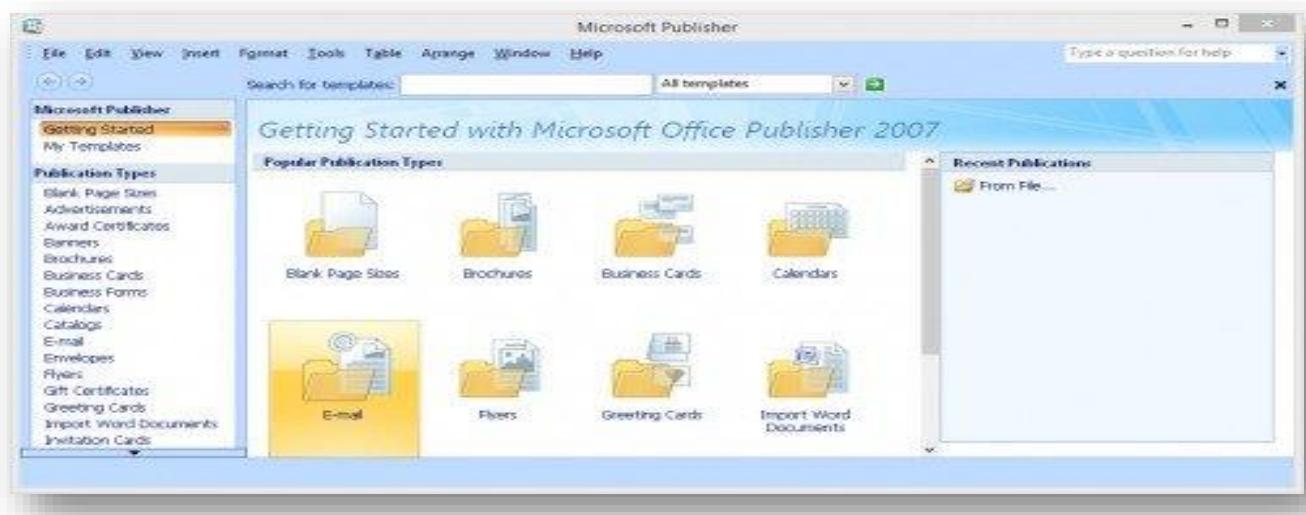


Figure 33
MS Publisher is a DTP application software

❖ 7. Computer Aided Design (CAD) and Computer Aided Manufacturing

CAD and CAM applications are used by artists and engineers to create 2D and 3D drawings, technical drawings of electrical and automotive structures, media and film animation, interior design and 3models, and surveying. They are meant for professionals that have assignments to produce product models on the computer before implementing the final design in the real world.

CAD applications are commonly used to make architectural and construction drawings and used to design cars, ships, planes, weapons and other forms of machinery.

Popular software in this category include AutoCAD, ArchiCAD and Power Shape.



Figure 34
A car drawing using Sketchup | Source

❖ 8. Digital Video Editing

Digital video editing applications are tools used to edit motion video footage and sound recordings by sequencing and trimming clips and adding special effects. The goal is to manipulate recorded events to enhance the quality of presentation.

Edits can be made on recordings made in movie industries, television shows, documentaries, advertisements and in private events.

Adobe Premiere, Pinnacle Studio, and Final Cut studio are examples of editing applications.

❖ 9. Educational Reference

Educational applications help students learn new information and skills through interactive presentations. A computer-aided instruction (CAI) application helps students learn how to fix things, new languages, strengthen math skills *etc.*

Educational simulations of computerized models allow students to simulate experiments which would otherwise be tricky to do in the classroom. Students can also build own computerized models, which they can share with other students locally and globally.

Others are research tools that students use for reference purposes to look up information. They can also interface with the Internet to provide updated material.

Electronic maps, Encarta encyclopedias, Britannica, electronic dictionaries and electronic books are educational applications.



Figure 35

Encarta Encyclopedia

❖ 10. Computer Games

Computer games are probably the most popular form of entertainment with the young users. They are more or less similar to games played on video consoles. Typically, they involve users interacting with avatars and other kinds of characters on the display panels to drive, play card games, solve mysteries, fly simulation planes, engage in virtual warfare etc.

Gamers use all sorts of control tools to interact with select games. popular are keyboards, joysticks, voice and gestures.

Besides games played between two individuals at home, online games are played between different people from anywhere in the world using the internet.

Popular desktop games are Batman, Need for Speed, Dead Rising, Angry Birds, FIFA Football, Pokémon Go etc.

❖ 11. Web Browsers

Browsers are used to accomplish lots of activities on the internet known as world wide web (WWW). They are also used to source for information on local networks or file servers. Browsers allow users to search, upload, read and even download text files, music, videos, images, web pages and other content from millions of resources available online.

Google, Edge, Safari, Opera and Firefox are the most popular browsers in the market.

Besides the browsers listed above, another category is built around the foundation of online anonymity and privacy. At the forefront of this browsers is the Tor network, which primarily blocks third-party snoops from seeing websites visited by a user, as well as preventing visited websites from tracking user location. It also permits a user to access websites that are usually blocked in ordinary browsers.

Tor browser hides user identification by bouncing the transmission between network relays around the world. This way, user search data and other communication are not easily analyzed and monitored.

Epic and Comodo Dragon are other examples of browsers which support anonymous browsing.



Figure 36

❖ 12. Search Engines

Search engines are types of application software which are used to search for information on the internet. They work on top of browsers and use crawling or spider-like scripts to search for user requests from every corner of the world wide web.

When a user types a search query in the browser, search engine algorithms immediately go to work inside web page and directory databases to look for information that best answers user requests.

Popular search engines include Google Search, Baidu, Bing, Wolfram Alpha, Yandex and DuckDuckGo.

❖ 13. Communication Software

These are applications which facilitate remote transmission of information between two or more computer users. Transmission typically happens using internet or intranet and other types of network infrastructure.

These applications facilitate all kinds of transfer ranging from audio, video, text and graphics files to real-time chats.

Communication tools can be grouped under the following:

- Email e.g. Hotmail, Yahoo mail and Gmail.
- Social network e.g. Facebook, WeChat and Twitter.
- Videoconferencing e.g. Chat Blazer, Google Hangout and Got Webinar.
- Instant messaging e.g. WhatsApp, Facebook messenger and QQ International.
- VOIP e.g. Skype, Viber and WhatsApp.
- Private Branch Exchange (PBX) e.g. Asterik, FreePBX and Free SWITCH

❖ 14. Web Development

Web design applications are used to create interactive pages which add up to websites. The pages are usually collections of electronic documents, images, audio/visual files and applications that reside on a web server and are accessible through computers connected to the Internet. A website owner then uses them to advertise, sell or provide educational information about specific products.

Adobe Dreamweaver, Microsoft FrontPage, are examples of web development software.

Wordpress, Joomla and Drupal are dynamic web creation tools which are installed offline on localhosts or online on web server platforms. These applications are designed with easy to use templates, which make web-design a pleasure. A server application like Xampp or Wamp must be installed on a local computer before the aforementioned applications can be installed offline.

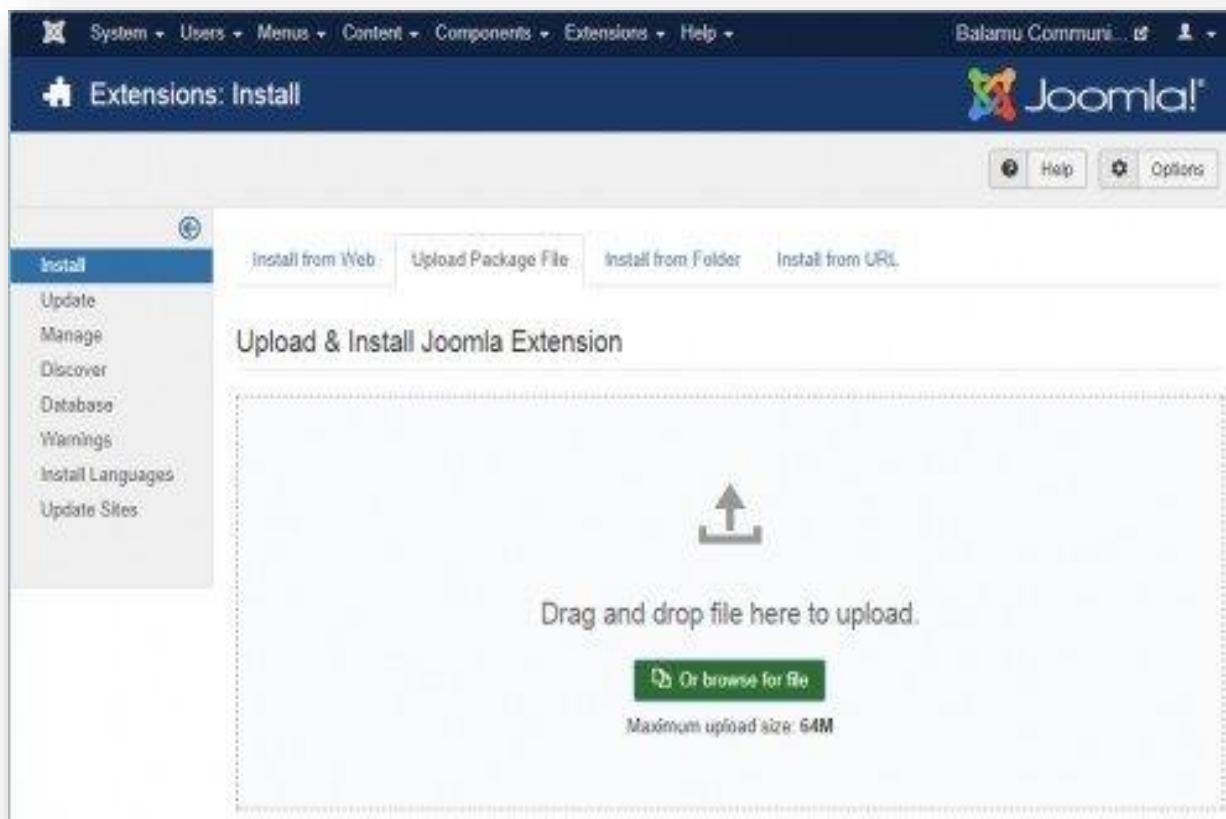


Figure 37

Joomla backend

❖ Other Categories of Application Software

- *Network software*: Cystoscope, Snort and igraph.
- *Data analysis*: SPSS, SAS and Stata.
- *Medical software*: Advanced MD, Free MED and Compulink.
- *Religious software*: e-Sword, OpenLP and Logos Bible Software.
- *Virtual applications*: Virtual Box, VMware and Windows Virtual PC.
- *Multimedia*: Movie Edit Pro, Sony ACID Music Studio and Maya.
- *Media players*: Power DVD, VLC and Windows Media Player.
- *Animation software*: Cinema 4D, Maya and Blender.
- *Simulation software*: Simulink, Enterprise Dynamics and MATLAB.
- *Document viewers*: Adobe Reader, DocX Viewer and FreeFileViewer.
- *File Transfer Protocol (FTP)*: File Zilla, Cyberduck, WinCSP and P2P
- *Remote desktop access*: TeamViewer, AeroAdmin and Windows Remote desktop.
- *Cloud storage*: Google drive, Back Blaze and Sugar Sync.
- *Music production*: Fruity Loops, Logic Pro and Garage band.
- *Photo editing*: Photoshop, Gimp and Affinity Photo.
- *Braille Editors*: DBT Duxbury US, Picture Braille and Lambda.
- *Virtual assistants*: Siri, Google Now and Braina.

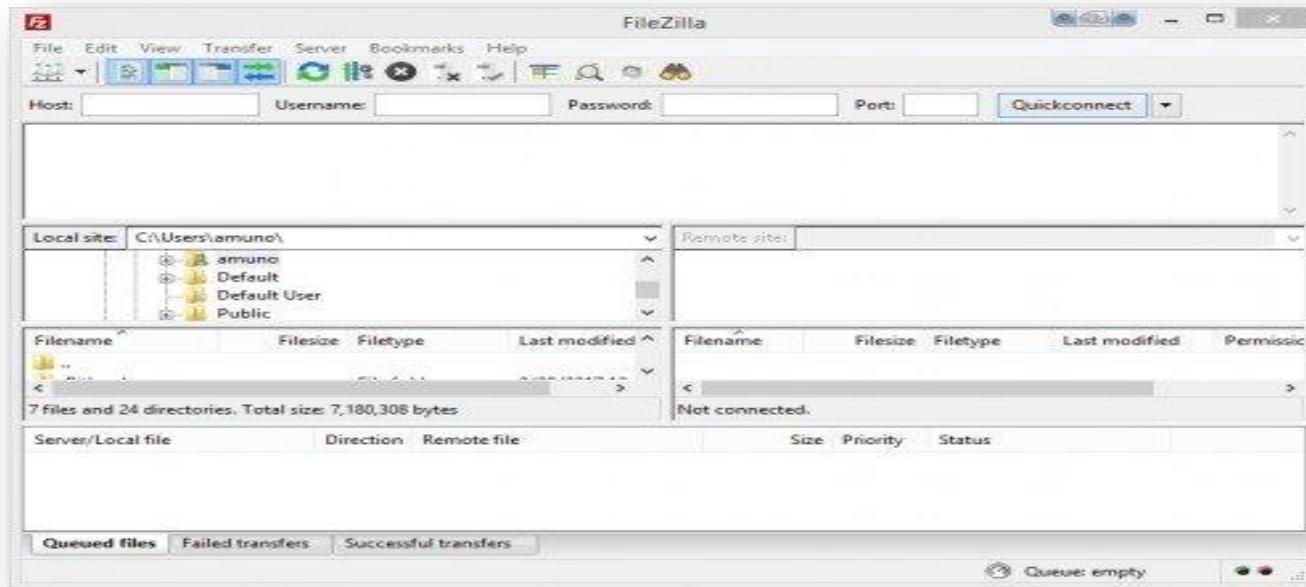


Figure 38

FileZilla for file transfer

Custom Software

Custom software (also bespoke software) are tailor-made to provide specific features and tools. They perform only requested functions and may as well contain borrowed features from off-the-shelf applications. Overall, however, they are meant to maximize productivity and provide cordial interfaces for users: this while cutting out the excesses that are integral to general purpose software.

Custom applications are tweaked to suit the changing demands of the client organization. Tweaks may include adaptations to evolving business trends and removal of obsolete features.

Custom software can be customized to create;

- Security and client identification systems.
- Consumer application portals.
- Attendance rosters.
- Custom receipts and invoices.
- Stock management applications.
- Student enrollment, performance and records tools.

Organizations and schools tend to favor custom applications because they work with multiple users and attend to multiple clients.

The ownership rights of a bespoke application also remain with the client, giving him/her absolute authority to use or sell the application.

A bespoke application can be customized to run on traditional computing setups or inside browsers. Popular examples of bespoke software fall under these categories:

- School Management Information System (SMIS).
- Point of Sale (POS).
- Electronic registration software for schools.

❖ The Pros

There are many advantages to creating a mobile app and using it as a channel to promote your business.

These advantages include the following:

1. More features, more fun!

Mobile apps are software specifically developed to run exclusively on a smartphone or a tablet. App developers wield more control over how content is displayed and can make the most out of the smartphone's existing functions. This can impress prospective customers. For example, an app can utilize the phone's camera to take pictures of the customer with the product; or use a GPS location function to offer location-based rewards.

2. A more convenient user experience.

The smartphone market is growing exponentially and with it comes an evolution in online consumer behavior. By having an app developed you can deliver both an improved user experience that can point a prospective customer to accomplish a specific action. This may mean getting them to sign up and create an account or subscribe to a service.

That better user experience even extends offline. Unlike a website, some apps offer offline access for their users enabling consumers to access data or use specific features even if they don't have Internet access.

This is perfect for those who live in areas where wireless connectivity is problematic.

3. You can generate revenue through your app.

It's not cheap to have an app made. However, the cost of developing an app may be offset through various means.

For example, customers may be asked to pay a small fee to download an app. Mobile ad can be also added to the app with other non-competitor businesses paying for the chance to be advertised on it.

The app itself can be linked to an online payment platform to allow customers to purchase products or services through the app. This can lead to faster transactions and higher conversion rates.

4. In-app search and the app store.

Mobile apps make your business easily accessible to clients. Other than the ease of use that an app promises, it also allows you access to an online space frequented by younger users: the app store.

Whether on iOS or Android, app stores allow people to stumble on your business when they're using that store's search. This Moz article quotes two studies—one by Nielsen and one by Forrester—showing that around 61% of consumers find apps through the app store search.

App store listings also appear as separate entries on Google's search rankings, allowing more people to see your business.

In-app searches also provide substantial results. According to a 2013 Google report, 26% of smartphone users start their online searches using a branded app.

5. Build your brand and get recognized faster through social media.

You can help increase awareness of your brand through an app. Other than being featured in the app store as suggested earlier, apps can be also linked to social media platforms.

Through apps, your customers can easily post, share, or tweet about your services. You can also design social media contests specifically for the users of your app.

6. Stand out from the competition and propel growth.

According to the “The Mobile Revolution: How Mobile Technologies Drive a Trillion-Dollar Impact” study by The Boston Consulting Group and Qualcomm, the fastest-growing small and medium-sized businesses are those that continually adopt advanced mobile technologies.

SMEs that use mobile services more intensively account for 25 percent of the market, with their revenues growing up to two times faster than their competitors.

7. Additional security for your customers.

Mobile apps go through a stringent approval system before they're placed in the app store.

This assures customers that their personal data is secure; that their smartphones won't get infected by viruses or malware if they download your app. Consumers may also download updates for the app safely if done through the app store.

❖ The Cons

Despite the list of advantages, not all businesses or organizations need a mobile app.

Before rushing out to have one developed, first assess the following:

1. The high cost of developing an app.

Mobile apps take more time and money to develop than a website. For starters, you need to have at least two versions developed—one for iOS and one for Android. Then you also have to take into account that you may need to hire a separate team to have the app developed since web development is different from app development.

According to a 2012 Mashable article, the minimum cost to develop an app would be around \$10,000. And that is for a very simple app. For apps that have more features, the price would be around \$20,000.

If your business cannot spare the resources for this project it is best to optimize your website for mobile instead.

2. The complex app development process.

The kind of OS—whether iOS or Android—isn't the only thing that developers have to consider when having an app made. Developers also have to account for different screen sizes across devices for both platforms. And it gets more complicated for Android app development since there are many versions of Android currently out on the market.

And even when they're done, developers must be able to secure the approval of the app stores before the app becomes available for download. If their app is rejected it's back to the drawing board.

3. Complex maintenance.

It's not done even when the app has been launched in the app store. Mobile apps require a long-term investment due to the need for updates, especially critical ones such as repairing security vulnerabilities or to ensure compliance with new iOS or Android releases.

Not providing updates may cause the app to malfunction or be rendered unusable when a customer updates his or her phone to the newest OS.

Since code cannot be simply reused across different devices, developers may have to rewrite parts of the app for an update.

4. Profit-sharing with the app store.

If you are considering using your app to drive revenue, either through paid downloads of the app itself or via the purchase of services through the app, then be aware that app stores get a substantial cut of the pie. According to a Cnet article the Apple app store gets around 30% of revenue if you use Apple iTunes as the payment method for your app.

And that's on top of sales tax.

5. Additional requirements for marketing.

You will still need to promote it so that your previous customers and the general public can download the app.

You may need to update your marketing collaterals online and in print. Some businesses even create on-ground events revolving around the launch of an app. And the standard SEO for websites would not work for an app.

You may need to think about app store optimization with a whole new set of tools that you can use to promote your app.

6. Challenges in tracking and fetching data.

The same security that an app may provide regarding a consumer's data can be a challenge for businesses as well. For starters, fetching data from the app to track metrics and get data is a different matter.

For example, getting Google Analytics to work on an app is different from the website. Developers should integrate the Google Analytics SDK for Android and iOS for this platform to be able to fetch data.

Then you would also have to set up a different set of goals, events, etc. While in the long run all these data are beneficial, it does require a lot of time and effort to set up.

7. Customer impatience.

Mobile apps may offer an engaging user experience for customers, but in turn customers end up expecting more from any app out in the market.

❖ Comparison between website and application:

In 2017, about 64% of the Earth's population owns a mobile phone, and according to Statista, this percentage keeps increasing. Statista suggests that by 2020 the number of mobile phone users worldwide will reach 5.07 billion.

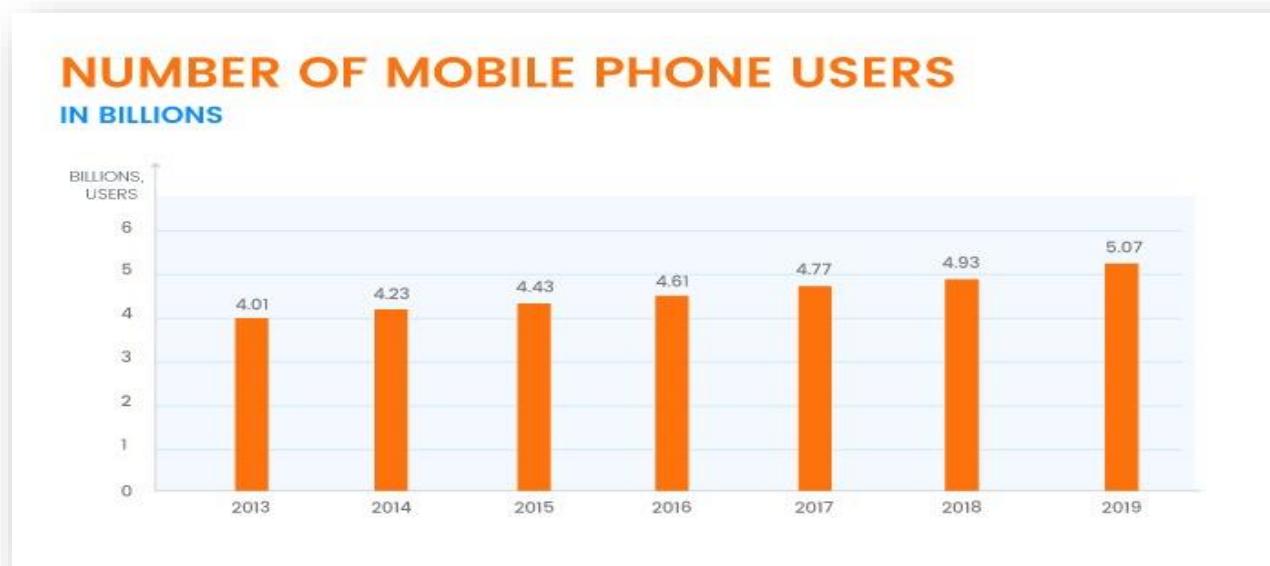


Figure 39

As a business owner or CEO, you certainly have thought about how to win this audience and what mobile strategy to apply: whether to build a mobile website or application. There's no single answer, as the option you choose depends on a number of factors including your business plans, your resources, and the web properties you might need.

At Ruby Garage, we've built a number of projects based either on mobile website or a native app (or both). To help you in choosing the best solution for your business, we'd like to share our experience in this matter and bring out the benefits of mobile website and app as well as limitations of each approach.

❖ Mobile Website

As with any other website, a mobile website is a browser-based way of accessing internet content. Unlike regular websites, it's designed specifically for mobile devices, and therefore is not displayed perfectly on desktop.

Along with mobile, there's another broader concept of optimizing websites for smaller screens: we're talking about a website with responsive design.

A responsive website contains HTML pages linked together, which are viewed in browsers over the internet. Here you won't find anything out of the ordinary. However, unlike regular websites, this particular type is geared to displaying correctly on all sizes of screens.

It works well not only with mobile-friendly websites and desktop versions of them, but also properly scales down for smartphones and tablets with touchscreen interfaces. Therefore, a responsive web design goes perfect with mobile device just as much as a mobile website.

Responsive, or mobile websites work perfectly for implementing outreach strategies and supporting marketing or PR campaigns. As a mobile website is superior to a mobile application in matters of compatibility, accessibility, and maintenance, it is a great first step to boost and support your mobile marketing campaign.

To evaluate your choice between a mobile website and a mobile app precisely, though, let's touch upon the benefits of mobile website as well as its limitations.

The Pros

- Compatibility. A website enhances the user experience across different types of mobile devices. In contrast, a mobile application requires developing a separate version for each operating system and device type. Users who own devices of different types may especially appreciate the benefits of compatibility that responsive websites provide. Besides, they support easy integration with other mobile features like QR codes and text messaging.
- Broader Reach. Due to the multi-device support that responsive web design provides across various platforms, it's becoming easy to reach a broader audience than a mobile app can reach. In the "app vs website" debate, the website definitely wins in terms of potential audience.

- Support and Maintenance. Websites also cost less to upgrade. You need to maintain just a single version of them. Compared to mobile apps, which require downloading of every single update, responsive/mobile websites let you change the content or design just by editing them once, and allow you to do that efficiently and flexibly. After implementing, updates become active and visible immediately across all types of devices.

The Cons

Mobile websites have a wider reach, better compatibility, and require less money than mobile applications. Still, they have their limitations.

- Convenience. Unlike an application, a responsive/mobile website can't leverage all smartphone features as efficiently. Cameras, GPS, phone dialing, and other features integrated into mobile devices aren't always well developed for responsive/mobile websites, even though APIs and libraries aimed to help solve these issues have been appearing lately.

Another limitation to user benefits is a device's screen size. Of course, portability is the key reason why users enjoy having smaller devices on the go. However, mobile devices display a lot less content compared to a computer monitor or laptop screen. Both responsive design and mobile website don't fully access to all the content available on the desktop.

Even though responsive web design adjusts to the screen size dynamically, still it doesn't make it completely convenient for users to surf the content on a mobile device. The same thing is with mobile website which actually reduces and rearranges the content available on the desktop.

- User Experience. Since mobile experiences significantly differ from desktop experiences, implementing the same interface for both platforms may harm your UX strategy. This mostly relates to the single-window restriction. The single-window restriction says that a user shouldn't have to leave their current page to access all the content they're looking for; however, with mobile sites it's often impossible to fit everything onto one page.
- Offline Access. Even if you design your mobile website in the lightest and most informative way possible, it still may work offline with only limited functionality using cached pages. Unlike a mobile application, which can run locally, a mobile website requires a good internet connection to operate fully.

❖ Mobile App

- Unlike responsive/mobile websites, which you can reach via browsers, mobile applications must be downloaded from specific portals such as the Google Play Market, App Store, or other market depending on the type of operation system.
- Mobile apps offer faster access to content and smoother interactions. Several recent statistics support the convenience of using mobile apps. According to Flurry Analytics' 2016 survey measuring time that mobile users are spending surfing the internet, 90% of users prefer using applications to mobile websites.
- Another line of research by comScore affirms that from 2013 to 2016, the amount of time that mobile users spend surfing the web has grown more than 50%. Significantly, 90% of this growth relates to mobile applications.

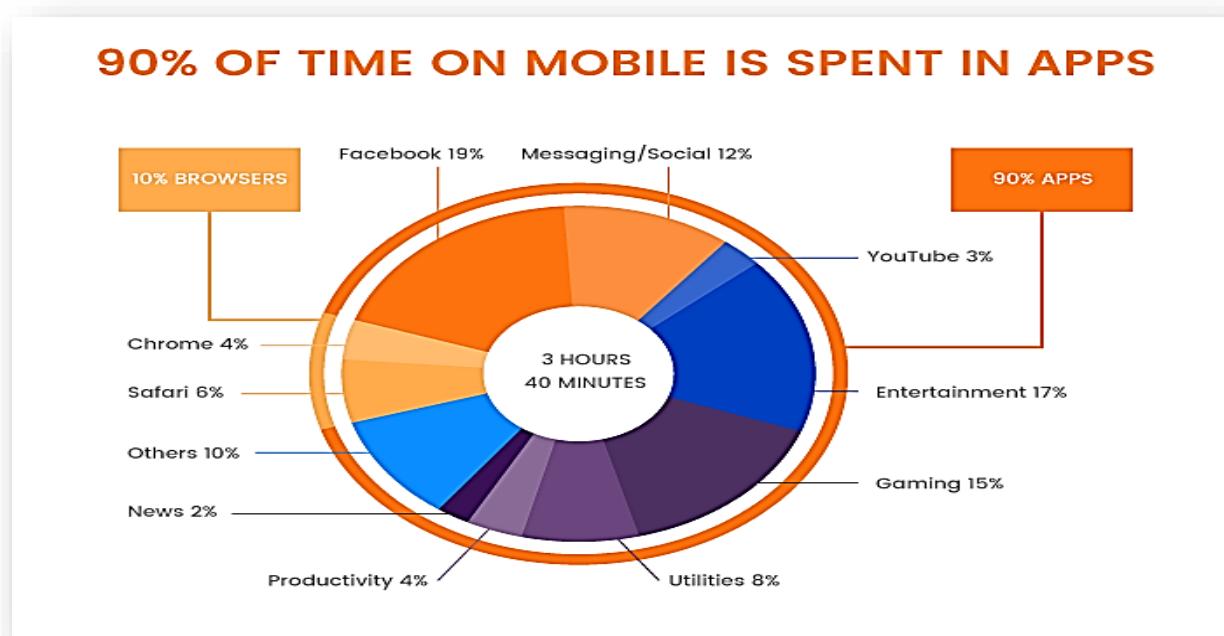


Figure 40

- Despite the pros of responsive web design, mobile apps seem to be way more popular. Before going through the pros and cons of mobile apps, however, let's first figure out when it makes sense to build a mobile app.

The Best Cases to Build a Mobile App

- When it comes to specific business needs, there are common scenarios when building an application is the best solution. For instance, if you plan on setting up features linked to native device functionality, like GPS, click-to-call, cameras, or scanners, then an application will be more effective than a mobile website.
- Another good time to choose an application is when you're building a platform such as a content marketplace or a social network that requires access to various types of content (images, texts, music, and YouTube videos) and nee An application is also perfect for interactive games (Angry Birds), tools for daily using (Evernote), and services that allow you to train and track real-time progress and that send regular reminders (Fitbit, Duolingo).
- Additionally, a mobile application is a reasonable solution for manipulating data. When you need to process complex calculations and build reports, such as in investment and banking, then it's also better to use an app.
- For banking operations and services, a mobile app may work as a great addition to a complete website. Banks (Bank of America, Raiffeisen) nail this idea by picking out the most popular desktop web features, which are vital to use on-the-go, and putting only those features into their applications, making them easy and convenient to use.
- Of course, to decide whether you need to build an application, it's important to investigate the key advantages of mobile apps as well as their drawbacks.

The Pros

- **Convenience.** Analysis shows that the applications are more popular than equivalent websites, as they're more convenient. Mobile apps provide better user experiences, load content faster, and are easier to use. Besides, unlike websites, apps have push notifications. Sharing updates, special features, and reminders within an app increases customer loyalty and retention. Also, the design of mobile apps fits different screen sizes more elegantly than websites.
- **Personalization.** Mobile apps are a great solution for services that require regular use. An application allows users to set preferences, create personal accounts, and keep vital information at hand. From a business point of view, mobile apps provide better support for targeting an audience and therefore building marketing campaigns for different groups of users.

- **Working offline.** Another crucial advantage related to mobile apps is the opportunity to use them offline. As apps are installed on a mobile device, they can keep providing access to content and features even without an internet connection.

The Cons

- **Compatibility.** To ensure proper functioning, a mobile application should meet the requirements of the particular operating system. This means that every platform – iOS, Android, and Windows – requires a separate app version.
- Of course, it's possible to develop a cross-platform solution that's supposed to fit every operating system and device.
- However, cross-platform application frameworks don't provide full support for every module and feature of each operating system. For instance, a cross-platform framework may not support 3D graphics, which in turn may lead to limitations in creating and displaying app designs. Restrictions like these may have an impact on the stability of app features, and may lead to sub-optimal functionality.
- **Support and Maintenance.** When an application is developed for several different platforms, supporting it also takes more time and money. Indeed, you need to provide upgrades and fix compatibility issues for every type of device – and do so regularly. Besides, you have to inform your users about these updates and push them to download the updated version of the app. Another issue related to maintaining an application is the time and effort needed to get approval from the markets where the app is placed.

❖ Comparison Summary

- The "mobile app vs mobile website" issue will remain topical for business owners. While considering if it's better to choose a mobile website or an app for your project, you may refer to the following table where we have summarized the benefits and limitations of both approaches.

• Criteria	• Responsive/Mobile Website	• Mobile App
• Compatibility	• Displays equally well on all types of devices	• Requires development of separate version for each platform
• Reach	• Reaches wider audience; covers all devices (mobile, desktop, laptop)	• Accessible for smartphone and tablet users only
• Working Offline	• Limited offline functionality	• Works well offline
• Ongoing Maintenance	• Supporting and updating across all mobile devices is easier; flexible; requires less effort	• Requires extra time and cost for regular updating, including time for approval from app markets
• Convenience	• Provides limited convenience due to screen size and inability to keep all needed info on one page	• Provides better experience in regular use; loads content faster; has push notifications
• Personalization	• Provides average opportunities to personalize settings	• Provides wider options for personalization

- Every company in every business sphere must make its own choice depending on its business strategy, marketing goals, and brand positioning. The choice is not about picking one of the two, but rather about finding the right solution that will provide the best results for your business. Besides, a mobile strategy can reasonably include both a mobile website and an app.
- ds to keep all these elements functional and dynamic.

➤ **ASP.NET Framework:**

ASP.NET is a web development platform, which provides a programming model, a comprehensive software infrastructure and various services required to build up robust web applications for PC, as well as mobile devices.

ASP.NET works on top of the HTTP protocol, and uses the HTTP commands and policies to set a browser-to-server bilateral communication and cooperation.

ASP.NET is a part of Microsoft .Net platform. ASP.NET applications are compiled codes, written using the extensible and reusable components or objects present in .Net framework. These codes can use the entire hierarchy of classes in .Net framework.

The ASP.NET application codes can be written in any of the following languages:

- C#
- Visual Basic.Net
- Jscript
- J#

ASP.NET is used to produce interactive, data-driven web applications over the internet. It consists of a large number of controls such as text boxes, buttons, and labels for assembling, configuring, and manipulating code to create HTML pages.

❖ ***The ASP.NET Component Model***

The ASP.NET component model provides various building blocks of ASP.NET pages. Basically, it is an object model, which describes:

- Server-side counterparts of almost all HTML elements or tags, such as <form> and <input>.
- Server controls, which help in developing complex user-interface. For example, the Calendar control or the Grid view control.

ASP.NET is a technology, which works on the .Net framework that contains all web-related functionalities. The .Net framework is made of an object-oriented hierarchy. An ASP.NET web application is made of pages. When a user requests an ASP.NET page, the IIS delegates the processing of the page to the ASP.NET runtime system.

The ASP.NET runtime transforms the .aspx page into an instance of a class, which inherits from the base class page of the .Net framework. Therefore, each ASP.NET page is an object and all its components i.e., the server-side controls are also objects.

❖ ***Components of .Net Framework***

The .NET Framework is a managed execution environment that provides a variety of services to its running applications. It consists of these major components:

1. The common language runtime (CLR): which is the execution engine that handles running applications.
2. The .NET Framework Class Library: which provides a library of tested, reusable code that developers can call from their own applications.
3. Common Language Specification: it contains the specifications for the .Net supported languages and implementation of language integration.
4. Common Type System: it provides guidelines for declaring, using, and managing types at runtime, and cross-language communication.

❖ ***Benefits of .Net Framework***

There are a number of benefits provided by .Net framework, some of which are mentioned below.

❖ **Memory Management:**

In .NET Framework applications, the CLR provides these services on behalf of the application, rather than the other programming languages in which programmers are responsible for allocating and releasing memory and for handling object lifetimes.

❖ **Common Type System:**

In traditional programming languages, basic types are defined by the compiler, which complicates cross-language interoperability. In the .NET Framework, basic types are defined by the .NET Framework type system and are common to all languages that target the .NET Framework.

❖ **Extensive Class Library:**

Instead of having to write vast amounts of code to handle common low-level programming operations, programmers can use a readily accessible library of types and their members from the .NET Framework Class Library.

❖ **Development Frameworks and Technologies:**

The .NET Framework includes libraries for specific areas of application development, such as ASP.NET for web applications, ADO.NET for data access, and Windows Communication Foundation for service-oriented applications.

❖ **Language Interoperability:**

Language compilers that target the .NET Framework emit an intermediate code named Common Intermediate Language (CIL), which, in turn, is compiled at run time by the common language runtime. With this feature, routines written in one language are accessible to other languages, and programmers can focus on creating applications in their preferred language or languages.

❖ **Version Compatibility:**

With rare exceptions, applications that are developed by using a particular version of the .NET Framework can run without modification on a later version.

❖ **Side-by-side execution:**

The .NET Framework helps resolve version conflicts by allowing multiple versions of the common language runtime to exist on the same computer. This means that multiple versions of applications can also coexist, and that an application can run on the version of the .NET Framework with which it was built.

❖ **Multitargeting:**

By targeting the .NET Framework Portable Class Library, developers can create assemblies that work on multiple .NET Framework platforms, such as Windows 7, Windows 8, Windows 8.1, Windows 10, Windows Phone, and Xbox 360.

➤ Location Based Services (LBS)

Location Based Services (LBS) require us to know where we are to differing degrees of accuracy, so how can we best obtain this information electronically in different scenarios? Below is a list of common technologies we can use today to help determine our location:

1. Point Of Interest (accuracy of points of interest database and identification by human).

We can enter a known point of interest, e.g. a church to let an algorithm search through a database of known places and thus find where we are.

2. Traditional Maps (accuracy dependent on reading of map).

If we know where we are on a map, we can enter a latitude/longitude by reading scales along the side of the map or ordinance survey grid coordinates.

3. WiFi Positioning (accuracy <100m).

Many mobile devices now have WiFi built in, by reading the SSID or MAC Address of a WiFi hotspot, we can search through a database of hotspots with known locations to find out where we are by virtue of WiFi hotspots having a range of $\approx 100\text{m}$.

4. Cell Tower ID (accuracy 200m – 32km).

Using a similar method to WiFi positioning a mobile phone will be connected to one GSM cell transceiver at any one time by knowing the ID of the transceiver and comparing that with a database of known locations we can obtain a location with varying degrees of accuracy. Within urban areas where transceiver density is high, we can expect accuracy in the order of hundreds of meters. Whereas further out in the countryside where there are less users and fewer black spots accuracy will be in the order of kilometers.

5. Cell Tower Triangulation (accuracy – unreliable).

As GSM mobile phones are designed to be able to hop between different cell transceivers as the user moves across the land/air, they must be looking out for other transceivers that they may be able to jump to in case they lose signal with the cell they are currently connected to. Because of this the phone will keep a regularly updated list of cell towers it can ‘see’, the relative signal strength of each and their IDs. By comparing the signal strengths of known cell towers, it is possible to triangulate the position of the user. This method is rarely used due to the extremely difficult nature of comparing signals with confidence, for example transmitter A may have a signal which is 10dB weaker than

transmitter B and therefore we may deduce that transmitter B is closer to us. However, it may be that transmitter A is actually much closer to us, but is hidden behind a hill and thus displays a lower signal than B which has direct line of sight to us but is further.

6. Inertial Navigation Systems (accuracy losses of > 0.6 nautical miles per hour).

An Inertial system comprises of motion-sensing devices (often gyroscopes or accelerometers) which are used to determine forces exerted on the moving object over a period of time. By measuring these forces, we are able to determine that the object has moved a certain distance. Inertial systems therefore require the user to calibrate the system prior to it being used and thus are not particularly practical for personal navigation. However, for personal applications it can be used in conjunction with a different positioning method to provide a backup in case the primary method fails. For example, this is sometimes used on high-end car GPS based navigation systems where it is used to keep a ‘lock’ on the vehicle’s position when inside a tunnel. Inertial Navigation Systems have been used predominantly on aircraft but are being replaced by GPS systems in the US and similarly will be the world over when Europe’s Galileo and China’s Compass are launched.

7. GPS – Global Positioning System (accuracy $\approx 10m$).

GPS was established in the early nineties, although it was not until the middle of the year 2000 when the accurate positioning channels of the system were available for civilian use. Since then, there has been an explosion in satellite navigation options and devices for consumer use which has helped spur growth in LBS. In simple terms, GPS consists of a constellation of around thirty satellites, each orbiting the earth twice a day. Each of these satellites transmits the time according to its on-board atomic clock. Your GPS device receives these time signals and compares the time sent on each signal. The difference in time between each of the signals lets us calculate our relative distance to each satellite (the time signal will be delayed according to the distance between the satellite and the receiver according to the speed of light). By knowing the distances of the known locations of the satellites we can triangulate our location. For best accuracy GPS requires that the receiver have an open, unobstructed view of the sky as it is easily susceptible to various distorting effects e.g. obstructions in direct line of sight, ‘urban canyon’ effect, ionospheric disturbances etc.

We chose the GPS Global Positioning System, as the accuracy (accuracy $\approx 10\text{m}$)

In simple terms, GPS consists of a constellation of around thirty satellites, each orbiting the earth twice a day. Each of these satellites transmits the time according to its on-board atomic clock. For best accuracy GPS requires that the receiver have an open, unobstructed view of the sky as it is easily susceptible to various distorting effects e.g. obstructions in direct line of sight, ‘urban canyon’ effect, ionospheric disturbances etc.

❖ ***Global Positioning System:***

GPS or Global Positioning System is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also. The system gives critical abilities to military and civilian users around the globe. GPS provides continuous real time, 3-dimensional positioning, navigation and timing worldwide.

The Global Positioning System (GPS) is a network of about 30 satellites orbiting the Earth at an altitude of 20,000 km. The system was originally developed by the US government for military navigation but now anyone with a GPS device, be it a SatNav, mobile phone or handheld GPS unit, can receive the radio signals that the satellites broadcast.

Wherever you are on the planet, at least four GPS satellites are ‘visible’ at any time. Each one transmits information about its position and the current time at regular intervals. These signals, travelling at the speed of light, are intercepted by your GPS receiver, which calculates how far away each satellite is based on how long it took for the messages to arrive.

Once it has information on how far away at least three satellites are, your GPS receiver can pinpoint your location using a process called trilateration.

❖ Trilateration

Imagine you are standing somewhere on Earth with three satellites in the sky above you. If you know how far away you are from satellite A, then you know you must be located somewhere on the red circle. If you do the same for satellites B and C, you can work out your location by seeing where the three circles intersect. This is just what your GPS receiver does, although it uses overlapping spheres rather than circles.

The more satellites there are above the horizon the more accurately your GPS unit can determine where you are.

❖ GPS and Relativity

GPS satellites have atomic clocks on board to keep accurate time. General and Special Relativity however predict that differences will appear between these clocks and an identical clock on Earth.

General Relativity predicts that time will appear to run slower under stronger gravitational pull – the clocks on board the satellites will therefore seem to run faster than a clock on Earth.

Furthermore, Special Relativity predicts that because the satellites' clocks are moving relative to a clock on Earth, they will appear to run slower.

The whole GPS network has to make allowances for these effects – proof that Relativity has a real impact.

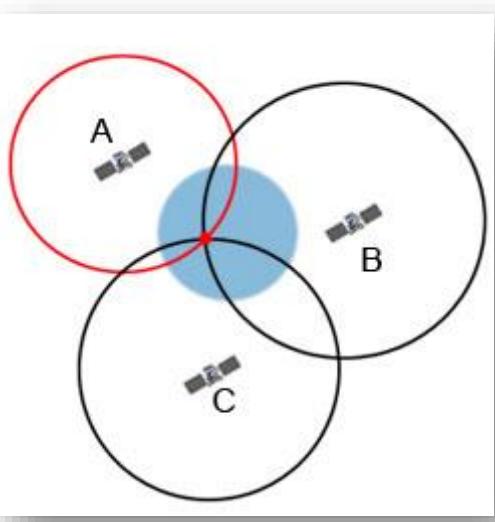


Figure 41

❖ **The GPS system consists of three segments:**

- 1) **The space segment**, the GPS satellites
- 2) **The control system**, operated by the U.S. military,
- 3) **The user segment**, which includes both military and civilian users and their GPS equipment.

Space Segment:

The space segment is the number of satellites in the constellation. It comprises of 29 satellites circling the earth every 12 hours at 12,000 miles in altitude. The function of the space segment is utilized to route/navigation signals and to store and retransmit the route/navigation message sent by the control segment. These transmissions are controlled by highly stable atomic clocks on the satellites. The GPS Space Segment is formed by a satellite constellation with enough satellites to ensure that the users will have, at least, 4 simultaneous satellites in view from any point at the Earth surface at any time.

Control Segment:

The control segment comprises of a master control station and five monitor stations outfitted with atomic clocks that are spread around the globe. The five monitor stations monitor the GPS satellite signals and then send that qualified information to the master control station where abnormalities are revised and sent back to the GPS satellites through ground antennas. Control segment also referred as monitor station.

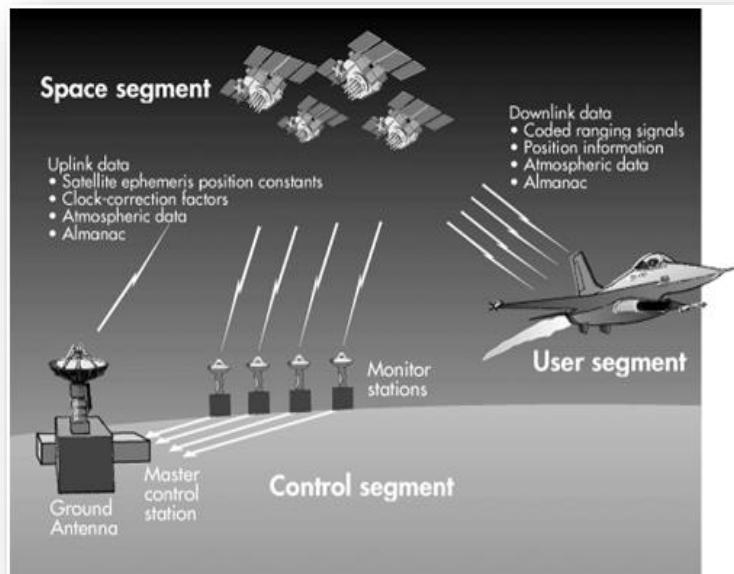


Figure 42



Figure 43

User Segment:

The user segment comprises of the GPS receiver, which receives the signals from the GPS satellites and determine how far away it is from each satellite. Mainly this segment is used for the U.S military, missile guidance systems, civilian applications for GPS in almost every field. Most of the civilian uses this from survey to transportation to natural resources and from there to agriculture purpose and mapping too.



Figure 44

❖ How GPS Determines a Position:

The working/operation of Global positioning system is based on the ‘trilateration’ mathematical principle. The position is determined from the distance measurements to satellites. From the figure, the four satellites are used to determine the position of the receiver on the earth. The target location is confirmed by the 4th satellite. And three satellites are used to trace the location place. A fourth satellite is used to confirm the target location of each of those space vehicles. Global positioning system consists of satellite, control station and monitor station and receiver. The GPS receiver takes the information from the satellite and uses the method of triangulation to determine a user’s exact position.

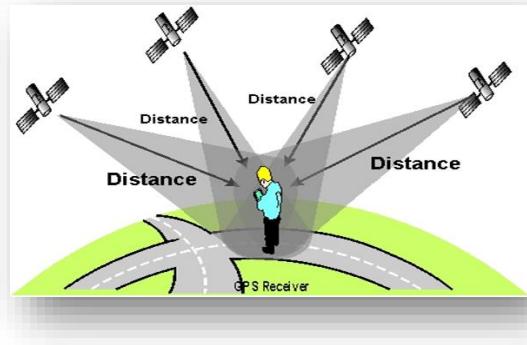


Figure 45

❖ GPS is used on some incidents in several ways, such as:

- To determine position locations; for example, you need to radio a helicopter pilot the coordinates of your position location so the pilot can pick you up.
- To navigate from one location to another; for example, you need to travel from a lookout to the fire perimeter.
- To create digitized maps; for example, you are assigned to plot the fire perimeter and hot spots.
- To determine distance between two different points.

❖ **Advantages of GPS:**

- GPS satellite-based navigation system is an important tool for military, civil and commercial users
- Vehicle tracking systems GPS-based navigation systems can provide us with turn by turn directions
- Very high speed

❖ **Disadvantages of GPS:**

- GPS satellite signals are too weak when compared to phone signals, so it doesn't work as well indoors, underwater, under trees, etc.
- The highest accuracy requires line-of-sight from the receiver to the satellite, this is why GPS doesn't work very well in an urban environment.

❖ **Using a GPS Receiver:**

There are several different models and types of GPS receivers. While working with a GPS receiver it is important to have:

- A compass and a map.
- A downloaded GPS cables.
- Some extra batteries.
- Knowledge about the memory capacity of the GPS receiver to prevent loss of data, decrease in accuracy of data, or other problems.
- An external antenna whenever possible, especially under tree canopy, in canyons, or while driving.
- A set up GPS receiver according to incident or agency standard regulation; coordinate system.
- Notes that describe what you are saving in the receiver.

❖ GPS Error

There are many sources of possible errors that will degrade the accuracy of positions computed by a GPS receiver. The travel time taken by the GPS satellite signals can be changed by atmospheric effects; when a GPS signal passes through the ionosphere and troposphere it is refracted, causing the speed of the signal to be different from the speed of a GPS signal in space. Another source of error is noise, or distortion of the signal which causes electrical interference or errors inherent in the GPS receiver itself. The information about satellite orbits will also cause errors in determining the positions, because the satellites are not really where the GPS receiver “thought” based on the information it received when it determines the positions. Small variations in the atomic clocks on board the satellites can translate to large position errors; a clock error of 1 nanosecond translates to 1 foot or .3 meters user error on the ground. A multipath effect occurs when signals transmitted from the satellites bounce off a reflective surface before getting to the receiver antenna. During this process, the receiver gets the signal in straight line path as well as delayed path (multiple paths). The effect is similar to a ghost or double image on a TV set.

❖ Geometric Dilution of Precision (GDOP)

Satellite geometry can also affect the accuracy of GPS positioning. This effect is referred to as Geometric Dilution of Precision (GDOP). Which refers to where the satellites are in relation to one another, and is a measure of the quality of the satellite configuration. It can be able to modify other GPS errors. Most GPS receivers select the satellite constellation that will give the least uncertainty, the best satellite geometry.

GPS receivers usually report the quality of satellite geometry in terms of Position Dilution of Precision, or PDOP. PDOP are of two types, horizontal (HDOP) and vertical (VDOP) measurements (latitude, longitude and altitude). We can check the quality of the satellite positioning the receiver is currently available by the PDOP value. A low DOP indicates a higher probability of accuracy, and a high DOP indicates a lower probability of accuracy. Another term of PDOP is TDOP (Time Dilution of Precision). TDOP refers to satellite clock offset. On a GPS receiver can set a parameter known as the PDOP mask. This will cause the receiver to ignore satellite configurations that have a PDOP higher than the limit specified.

❖ **Selective Availability (SA):**

Selective Availability occurs when the DOD intentionally degraded the accuracy of GPS signals by introducing artificial clock and ephemeris errors. During the implementation of SA, it was the largest component of GPS error, causing error of up to 100 meters. SA is a component of the Standard Positioning Service (SPS).

Other Solutions Already Tried:

Practco

Practco is a ‘Health and Fitness’ app which can be used to search doctors and clinics in your city and book appointments on the go. It’s available for free on both Android and iOS platforms.



Figure 46

Practo has got a decent UI with many functions to fiddle with. Once you login, you will have 22 cities in India to search for doctors and clinics. Strangely, it added a couple of other countries as well (Philippines and Singapore). The navigation is pretty convenient in this app. Once you are on the home dashboard, every other tab or option is just a click back and forth. The app says it lists around ‘120,000+ verified doctors and clinical profiles’ which is not that hard to believe once you start searching .

The three tabs on home screen is all the app has got for you. Even the arrangement of tabs goes with the basic classification.

Specialty: That’s the specialty and the most important feature of this app. You can select from around 200 specialties around your city. This feature has a decent number of search results showing up under most of the cities and you can see a counter at the top right corner of the window. This screen is appealing as the search is quite refined with scrolling cards of docs with various fields like experience, consultation fee, pictures (for some), address, like button, customers feedback.

Once you click on a card, you will be directed to another screen which gives the complete details of the doctor, the appointment slots available and info about other hospitals where the doctor practices.

The second and third tabs more or less let you search for doctors or clinics which you know or want to know about. In addition to this, Practo also provides a personalized dashboard to keep a track of your appointments.

Now for the USP of this app, the filter. Personally, this feature is really helpful as it lets you tailor your search with options to set consultation fee (yes, free consultation docs are also available), types of booking, days, time and gender preference of the doctor.

Another hallmark feature for the Android app (sorry, not for iOS) is its ability to hook up with Google Maps to provide excellent navigation experience. Once you turn on the GPS in your Android smartphone, the app will let you search for doctors near your current location.

The app is based on a great concept and if it could improve on the nuances and add more options, it can seriously tap the 30-billion-dollar health industry. But for now, the free service is more than rewarding.

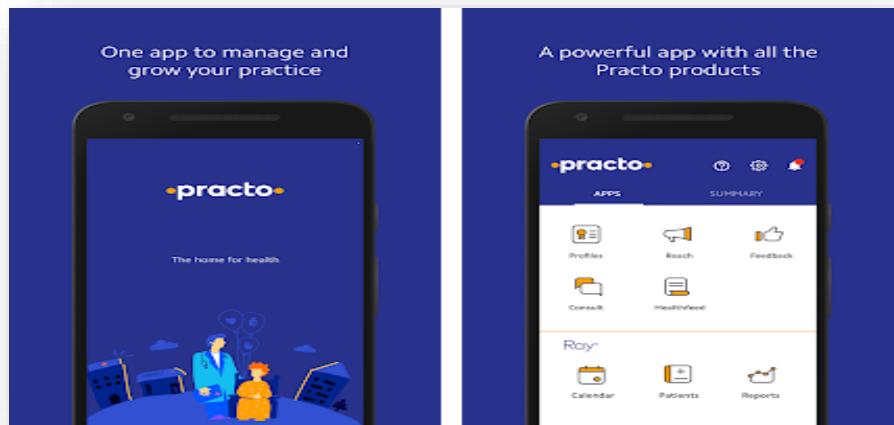


Figure 47

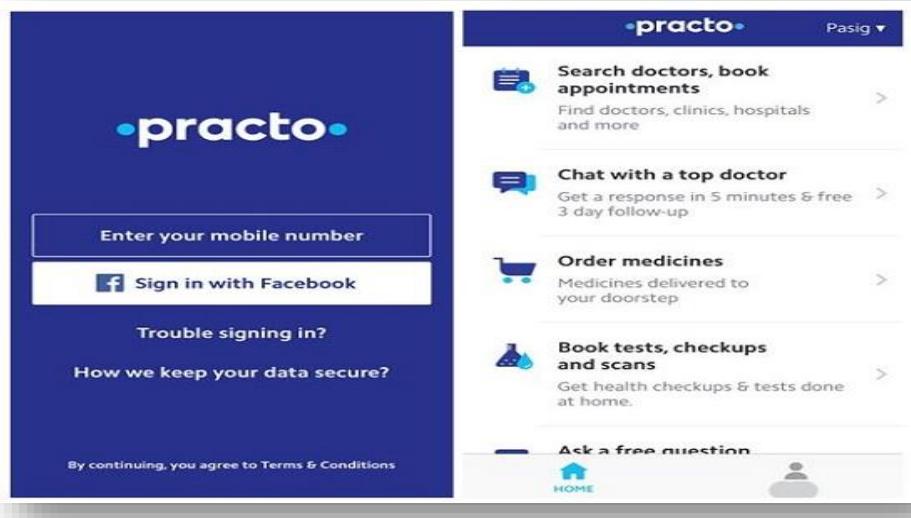


Figure 48

➤ Advantages:

1. Booking doctors' appointments online
2. Chat with online doctors

➤ Disadvantages:

1. use lots of online cookies and cranes.
2. have only limited features without the ability of ordering medicine online.

1mg

The 1mg app lets you order medicine online, book lab tests and search for nearest doctors. The app is quite similar to Lybrate and features popular health related articles on its home page. 1mg offers discounts on lab tests such as Vitamin Profile test by Thyrocare Labs will cost you Rs 12,000 after 25 per cent discount and a pre-marital profile test will cost you Rs 1239 on the app right now. All you need to do is enter your details for pick-up of samples.

However, this app too is not very useful in finding doctors in your vicinity as it does not show you many options which are close. Although it does list a couple of clinics in your neighborhood, it doesn't come with up many options.

Ordering medicines on 1mg was quite hassle-free as it did not require a prescription. The app has an option of 'Send Later' for prescription wherein one gets the required medicines delivered but can mail the prescription later. But keeping in mind the fact that we do not have a proper guideline or regulation to control the sale of drugs online till date, this can be termed as both an advantage and a disadvantage of the app.

While it is simple and convenient especially for elderly and bedridden patients, there are high chances of drugs being mixed up or misused. Also, the drugs delivered online do not come with instructions or an assurance of quality.

1mg is India's leading online chemist with over 2 lakh medicines available at the best prices. We are your one-stop destination for other healthcare products as well, such as over the counter pharmaceuticals, healthcare devices and homeopathy and ayurveda medicines.

With 1mg, you can buy medicines online and get them delivered at your doorstep anywhere in India! But, is ordering medicines online a difficult process? Not at all! Simply search for the products you want to buy, add to cart and checkout. Now all you need to do is sit back as we get your order delivered to you.

In case you need assistance, just give us a call and we will help you complete your order.

Don't want to go through the hassle of adding each medicine separately? You can simply upload your prescription and we will place your order for you. And there is more! At 1mg, you can buy health products and medicines online at best discounts.



Figure 49

Now, isn't that easy? Why go all the way to the medicine store and wait in line, when you have 1mg Pharmacy at your service.

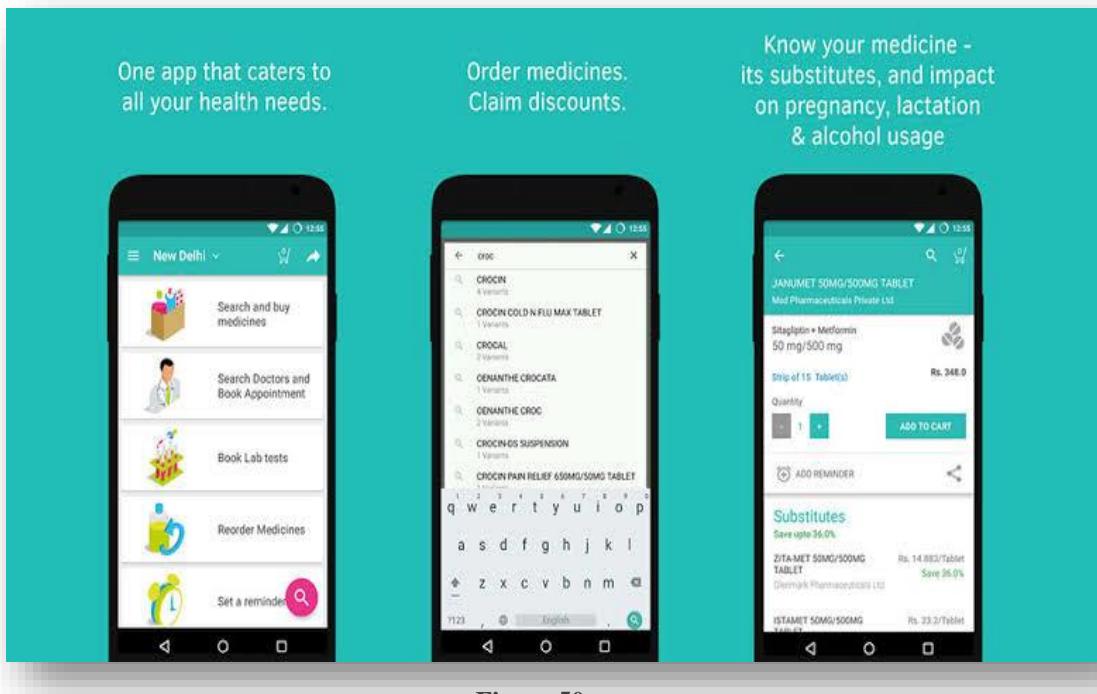


Figure 50

➤ **Advantages:**

1. Reserving lab tests online
2. ask for online consultations

➤ **Disadvantages:**

1. long loading times
2. the use of the website is complicated

NetMeds:

NetMeds medicine ordering app is operated by Dadha Company which is operating in India since 1914. The online pharmacy lets you order from anywhere in the world while deliveries are made to locations in India only.

You can upload your prescription and place your order in minutes using the app. A discount of 15% is applicable on all types of medicines and the deliveries are made within 2 to 3 days. You can also avail cash on delivery service across locations in India.

Payments can be made through debit and credit cards.



Figure 51

➤ Advantages:

- 1) delivery area is bigger means covers vast pin codes of India than any other site.
- 2) Dispatch the order mostly within 24 hours.
- 3) good site for buying prescription medicines.
- 4) Now days delivery is improving.

➤ Disadvantages:

- 1) Lack in offers.
- 2) Previously it provides free delivery over 1000 rupees order but now whatever the order amount charging 49 rupees delivery charges if you use 20% off code and for free delivery you have to use 15% off code, this is the biggest disadvantage of netmeds.
- 3) No good offer for OTC / Nonprescription medicines
- 4) mostly time split the orders into parts
- 5) Appropriate information about medicine is not available on the site means the salt composition in the medicines and their advantages and disadvantages.
- 6) One biggest error on the site is some nonprescription medicines are also showing in prescription area.
- 7) Now in days they also do one more big issue that 20% discount is not available on every medicine, some medicine you found that they have written that: ONLY 10% DISCOUNT IS GIVEN BY PHARMACIST

SmartMedics:

SmartMedics can be used for ordering medicines and consulting doctors from different branches of medicine. You can order medicines online across different cities in pharmacy will collect the prescription from your home or you can also upload a picture through the app. The app promises a discount of 22% on all healthcare products and delivers the medicines within 48 hours. There are no delivery charges and the minimum order is Rs 100.

You can pay either by card or through cash on delivery.

➤ **Advantages:**

1. Ordering medicine online
2. Fast delivery of medicine

➤ **Disadvantages:**

1. Reliability as this website is not updated regularly
2. lots of crashes and uptime.

Solution and Design Requirements

A well-designed website is a pleasure to use. It captures the attention of users, conveys the information that they might need and convinces them to connect with the service.

we will look at 15 principles that are required for making a website good from the design perspective. Good communication is required to set, meet, and maintain expectations. Our proposal and project plan should align all expectations regarding the website design project.

Website Functionality requirements:

1. Determine medicine availability

The website has the ability to show the medicine availability in the pharmacy as live data in the form of in stock or out of stock. In order to facilitate the effort for user to get medicine instead of searching directly in all pharmacies.

2. Uploading medical prescriptions

The user can upload a photo which can be send to the chosen pharmacy by the user.

3. Personal user account

The user has to sign up for an account to order medicine online, to ensure that the pharmacy have all information needed from the user to facilitate the delivery services. but if he is just searching for medicine and pharmacy this process will not be necessarily.

4. Pharmacy domain account

Each pharmacy has to sign up for an account in order to be shown to user as choice. And to be able to show offer and sell through our website. This process is done by the super admin and then send the details of the account to pharmacy in order to begin adding its database, selling and showing offers.

5. Order medicine online

The user will be able to order medicine online through our website and the pharmacy then deliver the medicine directly to the user.

6. reserve medicine online

the user can reserve medicine from the pharmacy if the pharmacy does not have the delivery services. After reservation the user can go and get her/his medicine directly from the pharmacy in 24 hours.

7. Uploading medical prescriptions

The user can upload a photo of his/her medical prescriptions and send it directly to chosen pharmacy. And he/ she can ask for any medical advice through the filling form of ordering through uploading photo.

Website design requirements

1. Communicate Effectively

Our website is a visual communication tool between the patient and the pharmacy. Checking the content and design for the essentials that need to be communicated and the clarity with which it is communicated. The website should communicate the patient with the pharmacy needed in effective way to make buying the medicine much and much easier.

2. Easy user interface

Make the webpage obvious. It should not require detailed explanations for it to work. Keep the navigation structure of the website intuitive and visible. In order to be used by different levels of people.

Cognitive load is typically increased when unnecessary demands are imposed on a user, making the task of processing information overly complex, making it difficult for society of people to use it.

Reduces the demands on users, so that they use more often and easier.

3. Don't Waste User's Time

When you need a user to sign up for a service, keep the process as simple as possible. 3-4 steps on a single page is usually the limit in terms of the number of steps a user is willing to put up with to sign up for your service. In order to be easy in ordering medicine and reserving online. And people can use website easily without any need to help in navigation.

4. Showcase the Website's Features Effectively

Our site offers 6 divisions that provide access to other pages, making sure that all 6 major headers are easily visible. There are a major panel to gather all division of website. Using the white space in our website to differentiate categories is an effective design strategy. All in all, get useful of all divisions for showing information and exhibit content.

5. Well formatted content

Try to write the content of our website in simple language that is broken down category-wise and which has headers that are easy for a user to scan through. Keeping it simple as possible. In order for different people to be able use the website easy and smooth.

6. Use familiar formats

Little things like placing the search box in places where users would expect it, using familiar terms like sign-up and log-in and placing the major links in familiar places will help in reducing the user's learning curve for your website.

7. Browser configuration

the website to be able to open on different websites as Internet Explorer, Google Chrome, Mozilla Firefox, Safari, Opera, Konqueror, Lynx. In order to be suitable for user interface.

8. Fast load times

Try to reduce time taken for website to perform specific process. In order to save time and effort for the user or the pharmacy. And facilitate the problem of communication.

All of the determined design requirements were tested using different ways according to the demands of the users who tested the website. The sample of these users were exactly 20 people of different ages, jobs, criteria, and even different social levels.

These ways were in the form of:

- Online form
- Offline survey

This is all to ensure that the website will be suitable and useable by a wide range of users.

Selection of Solution:

After doing lots of research, the necessity of working to solve and cut off the problems regarding the Health field has dominated over all of the others due to huge number of critical issues concerning health sector. That is why eradicating the public health issues in Egypt was found to be one of the vital challenges needed to be solved.

In particular, the problem being solved by our project is related to the inability of the patients or any ordinary customer to find and get their medicine easily, especially if they are strangers or there is a shortage of some types of medicines. This problem has markedly increased in Egypt during the past few years. That is way communication in a healthcare setting is one of the most important tools that have to be existed for providing a great care for patients and enhancing the health field. The main obstacles that may occur in communication between pharmacies and patients are: language, cost of medication or the most challenging obstacle which is the inability of the patients to get their medicine easily especially if there is a shortage of some kind of medicine or the pharmacies are far apart from the users that they will not be able to reach them searching for their medicine. All of these obstacles combine to form a kind of a catastrophe that eventually lead to death of patients as they will not be able to get their medication on time which will cause health deterioration and more hard complications and finally death. That is why enhancing the communication between the patients and the pharmacies is an effective tool that saves the patients' life.

After searching lots of prior solutions related to that problem and evaluating their advantages and disadvantages, we have determined that the solution we are going to pursue will be simply a website that will easily connect any patient searching for a medicine to all the pharmacies in his determined location enabling him to reach to the required medicine through many ways provided by “pharmadology” website.

The ways provided by “pharmadology” website will be discussed in details with as follows:

- Search medicine online, the user can order medicine online through selecting a city as “Giza”, area as “6-october” and the required medicine.
- upload a medical prescription to a chosen pharmacy and order it online.
- Enables the user to search using different parameters and filters such as: searching using specific medicine, searching using a specific pharmacy, or even searching using a specific location.
- Reserve medicine online as the user can reserve medicine from a specific pharmacy and then go to buy it directly.
- Provide all the data needed to connect the user with the pharmacy chosen in order if the user want to ask for help in using a specific medicine.

This way “Pharmadology” website developed a strong communication between the patients and the pharmacies.

Selection of prototype:

After a lot of research and discussion, the prototype is determined to be simply a website called “PHARMADOLOGY” which will be developed using the C# programming language with the ASP.NET framework. The model-view-controller (MVC) software design pattern will be followed to develop the user interface as it allows for code reusing and parallel development.

According to the project scientific base, identifying its design requirement is a main principle to reach its success. Thus, the website will be tested according to some specific design requirements to make sure it met all of them. These design requirements were classified into two main categories: functionality requirements through which all of the functions of the website will be tested and website design requirements through which the simplicity of the user interface will be tested.

Functionality:

- **Determine medicine availability**, it will be tested if the website has the ability to show the medicine available in the pharmacies, its quantities and prices to inform the user if it is available to be ordered or not.
- **Order medicine online**, this function will be tested ensuring that the medicine will be delivered by the pharmacy to the user’s location determined in the online-ordering form.
- **Reserve medicine online**, the ability of the website to reserve an order and update in database of available medicine will be tested ensuring that the user will be able to get the medicine during the validity days.
- **Uploading medical prescriptions effectively**, which will test whether or not the user is able to upload a photo of a medical prescription and if the photo was sent to the chosen pharmacy and approved by it or not.

Website design requirements

- **Easy user interface**, as it will be tested whether or not the user is able to easily deal with the website without help to ensure that it is suitable and easy-used by a wide range of users from different social levels.
- **Showcase the website's features effectively**, as it will be tested if the content of the website is clear and obvious or not and whether or not there is a difficulty in viewing its features.

All of the determined design requirements were tested using different ways according to the demands of the users who tested the website. The sample of these users were exactly 20 people of different ages, jobs, criteria, and even different social levels. These ways were in the form of: an offline survey, and an online form. This is all to ensure that the website will be suitable and useable by a wide range of users.

All in all, combination of all the previous requirements including the functionality and the website design requirements lead us to achieve an ideal solution to solve the huge problem we are addressing which is the “**COMMUNICATION OF THE PATIENT AND PHARMACIES**”. There are many functions and features provided by “**PHARMADOLOGY**” website and the main ones of them will be discussed in details with their codes shown as follows:

➤ Search medicine online

```
[HttpGet]
0 references | 0 changes | 0 authors, 0 changes | 0 requests | 0 exceptions
public ActionResult List(string ProductName, string LocationName)
{
    _context.Configuration.ProxyCreationEnabled = false;

    var product = _context.products.Where(p => p.Name == ProductName);
    var locationId = _context.Locations.Where(l => l.Name == LocationName).Select(l=>l.Id).ToList();

    var Pharmicies = _context.Locations.Include(p => p.Pharmacy)
        .Where(p => p.Name == LocationName).Select(p => new PharmacyDto
    {
        Id = p.Pharmacy.Id,
        Name = p.Pharmacy.Name,
        Text = p.Pharmacy.Text,
        Email = p.Pharmacy.Email,
        PhoneNumber = p.Pharmacy.PhoneNumber,
        Products = product.Select(r=> new ProductDto
        {
            Id=r.Id,
            Name=r.Name,
            Count=r.Count,
            Price=r.Price
        }).ToList(),
    }).ToList();

    return View(Pharmicies);
}
```

Figure 52

Fig.52, Showing the code part related to the function of searching medicine online

As shown in the figure (52), the user can order medicine online through selecting a city, area and the required medicine. After that, a list of pharmacies in this area at which the medicine is available will appear to the user to choose the suitable one. This will be done by getting two inputs from the user: the medicine name stored in the variable of string datatype named “PRODUCTNAME” and the location that is stored in another variable of the same datatype named “LOCATIONNAME”. After that, some built-in functions were used as the “SELECT ()” function which was used in a loop to filter out the other pharmacies and select only the ones that match with the “PRODUCTNAME”. Another function named “TOLIST ()” was also used in a loop to list all of the matched pharmacies. Finally, the “VIEW ()” function was then used to help view and show the list done.

➤ Order medicine online

```
[HttpPost]
0 references | 0 changes | 0 authors, 0 changes | 0 requests | 0 exceptions
public ActionResult Order(String userName, String productName, string Count, DateTime Datetime
{
    order order = new order();
    order.productName = productName;
    order.userName = userName;
    order.dateTime = DateTime.Now;

    _context.Orders.Add(order);

    _context.SaveChanges();
    return RedirectToAction("Index", "Home");
}
```

Figure 53

Fig.53, Showing the code part related to the ordering medicine online function

As shown in the figure (53), the user can order medicine online if the pharmacy has this service. A receipt of all the details will then be appeared for the user immediately. This will be done by getting two inputs from the user: the user name stored in the variable “USERNAME” and the medicine name stored in the variable “PRODUCTNAME”. A function called is included in the code to add order of the user then the function “RETURN[]” will redirect the user to home page.

➤ Uploaded medical prescriptions

```
[HttpPost]
[AllowAnonymous]
0 references | 0 changes | 0 authors, 0 changes | 0 requests | 0 exceptions
public ActionResult Create(String Name, String prescriptionBody, string PhoneNumber
    ,string PharmacyName , HttpPostedFileBase ImagePath)
{
    string pic = "";
    string imagelink = "";
    if (ImagePath != null)
    {
        pic = System.IO.Path.GetFileName(ImagePath.FileName/*+ DateTime.Now.ToString("yymmssfff")*/);
        string path = System.IO.Path.Combine(Server.MapPath("~/Images/"), pic);
        ImagePath.SaveAs(path);
        imagelink = "/Images/" + pic;
    }

    Prescription prescription = new Prescription();
    prescription.Name = Name;
    prescription.PrescriptionBody = prescriptionBody;
    prescription.PharmacyId = Convert.ToInt32(PharmacyName);
    prescription.PhoneNumber = PhoneNumber;
    prescription.PhoneNumber = PhoneNumber;
    prescription.ImagePath = imagelink;

    _context.Prescriptions.Add(prescription);
    _context.SaveChanges();
    ViewBag.message = "your prescriptions is Added Successfully.";
    return RedirectToAction("Index", "Home");
    //var data = true;
    //return Json(data, JsonRequestBehavior.AllowGet);
}
}
```

Figure 54

Fig.54, Showing code part related to the uploading medicine prescription function

As shown in the figure (54), the user can upload a medical prescription and choose the pharmacy he wants to order from then he will have to add his home address and phone number to complete the process. This will be done by getting four inputs from the user: the user name stored in the variable “NAME”, the description stored in the variable “PRESCRIPTION BODY”, the phone number stored in the variable “PHONE NUMBER”, and the uploaded photo stored in the variable “IMAGEPATH” of data type “HTTPPOSTEDFILEBASE”. Then an “IF” condition was put to ensure that the user will not submit the ordering form without an uploaded photo and that the type of the uploaded photo is only in a jpg format to be stored in the database, through this line: prescription. Imagepath=image link:

➤ Reserve medicine online

Here, the user can reserve medicine online if the pharmacy does not have the delivery services. This way the user orders the medicine required and then gets a receipt by all the details as time, price, ID for the order, and the validity day of the reservation as the user will have only 24 hours available to go and get the medicine from the pharmacy otherwise the reserved order will be canceled automatically.

All of these functions are related to the front-end users of the website. However, there are also other important functions regarding the back-end users (pharmacies) that will be able through “PHARMATOLOGY” website to add their branches and fill in their medicine databases providing their offers to be showed to front-end users.

Materials and Methods:

Materials:

- 1- C# programming language
- 2- HTML, CSS, Javascript
- 3- SQL
- 4- Visual Studio program
- 5- Model View Controller (MVC) software design framework
- 6- Entity Framework

Methods:

After determining our solution, we have gone through some specific consecutive steps in order to build up our website.

➤ **First: The type of the application (mobile app, web site, desktop app)**

In the selection of the prototype process, we have chosen our prototype to be a website rather than a mobile or a desktop application so as not to take much huge storage space.

➤ **Second: The website functionality, design, and database**

We have divided the work on the website into three main parts which are:

1. Website functionality, in which we have determined the programming language and the technology with which will be used to build the website. We have decided to use the:

- C# programming language as it is suitable for writing applications for both hosted and embedded systems, ranging from the very large that use sophisticated operating systems, down to the very small having dedicated functions.
- Model View Controller (MVC) software design framework
- Entity framework which works as ORM (Object Relation Mapper) between Models (classes) and Database (tables).

2. Website design, in which we used the HTML for creating the structures, the CSS for styling the selected tags of HTML, and the JavaScript language for building up the functionality of the website.

3. Website database, in which we used the SQL server with its primary function of storing and retrieving data as requested by other software applications which can run on any computer across a network (including the internet).

➤ **Third: Analyzing the project**

In this step, we have analyzed our project and its back-end and front-end users.

- For the back-end, there are two users: the super domain (our team), and the domain (the pharmacies).
- For the front-end, there is another different user which is any customer using the website.

➤ **Fourth: Designing the website**

In this step, we have used some sketching, models and diagrams in order to use them after that in building up the functionality code of the website.

For example:

- Online Website sketching
- Activity Diagram
- Use Case Diagram
- Class Diagram
- ERD (Entity Relation Diagram)

❖ The ERD (Entity Relation Diagram)

Visual Paradigm Online Diagrams Express Edition

Text

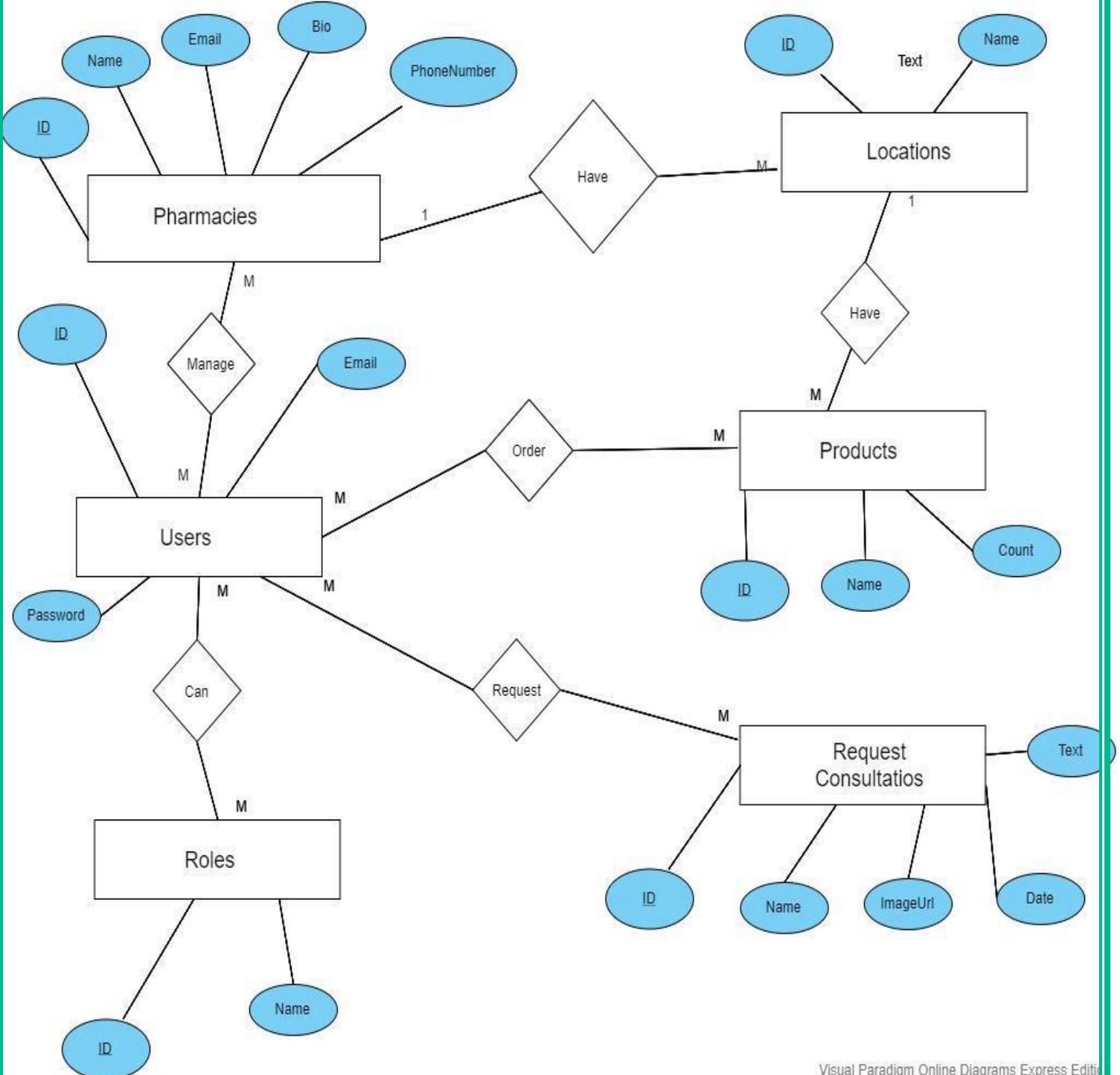


Diagram 1

Visual Paradigm Online Diagrams Express Edition

The Class Diagram

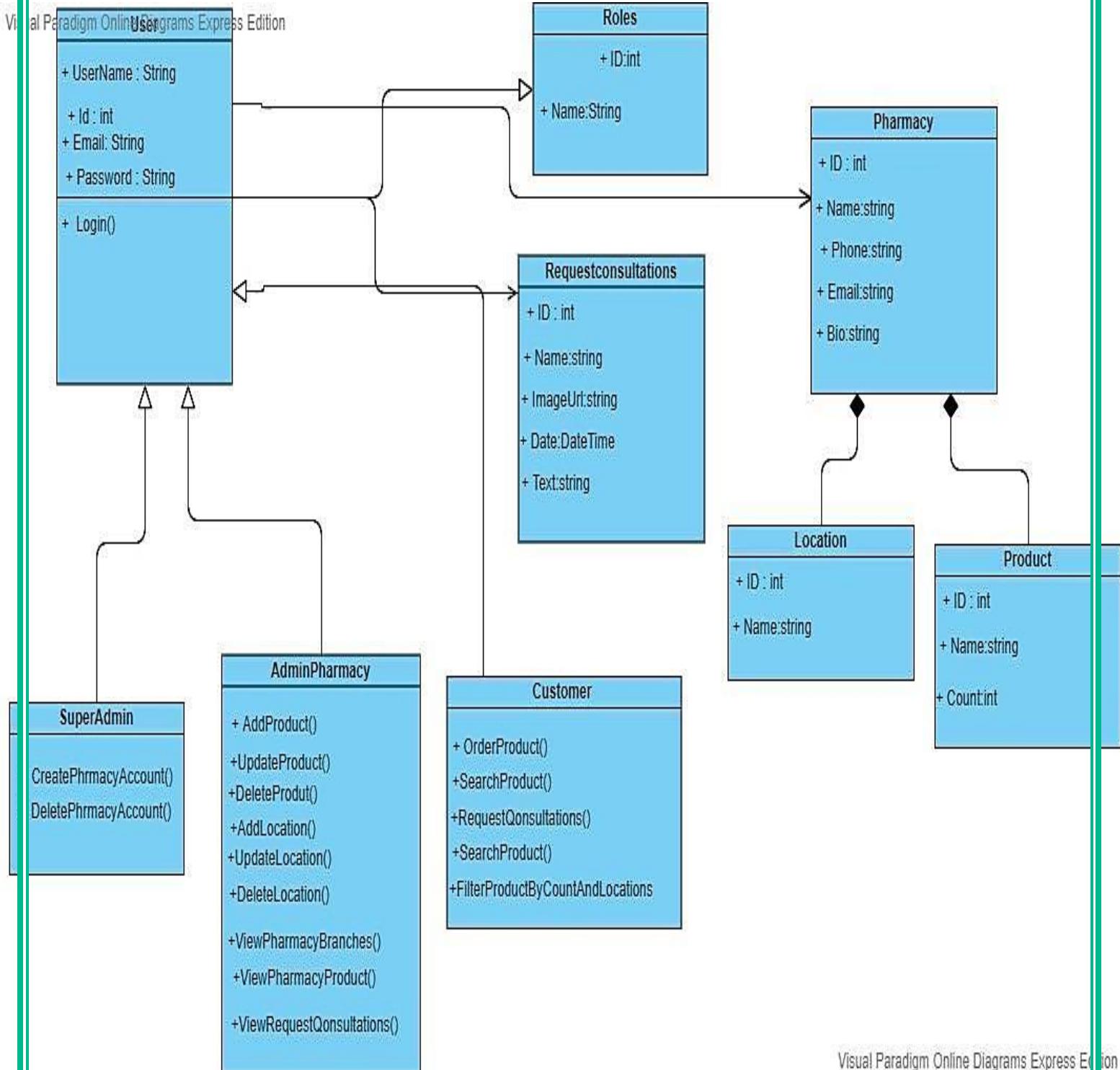
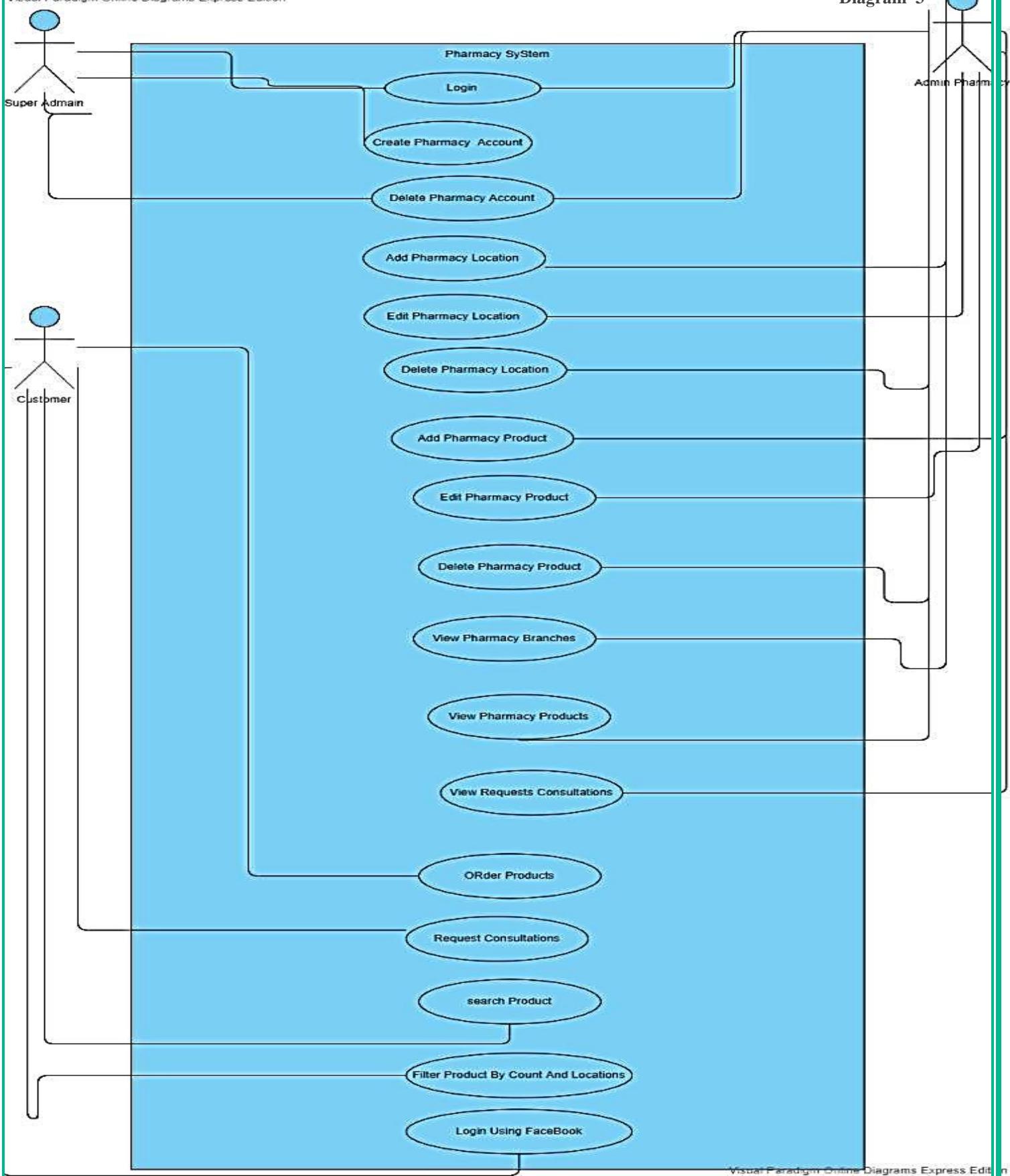


Diagram 2

❖ The Use Case Diagram

Visual Paradigm Online Diagrams Express Edition

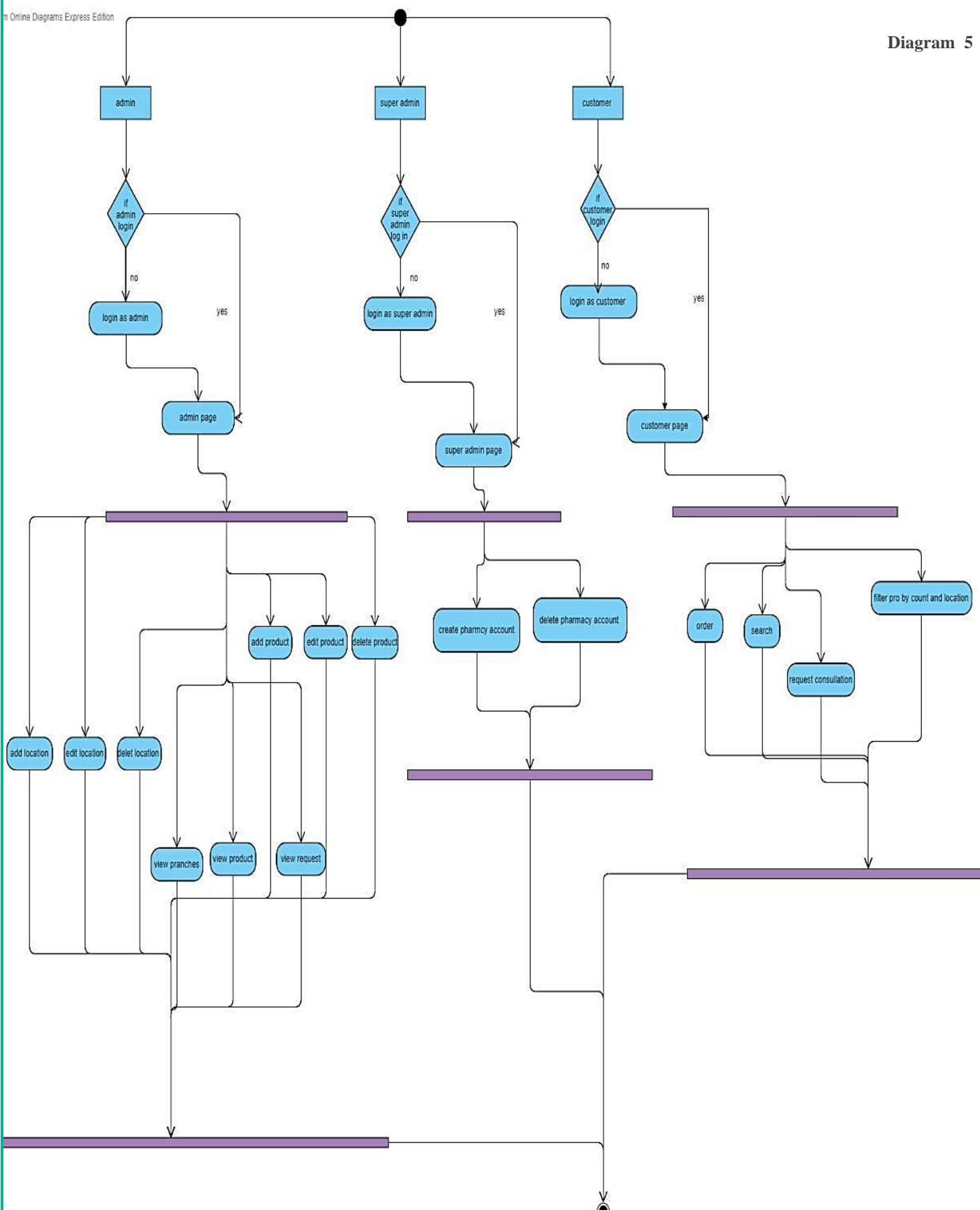
Diagram 3



The Activity Diagram

Visual Paradigm Online Diagrams Express Edition

Diagram 5



❖ *Online website sketching:*



Figure 55

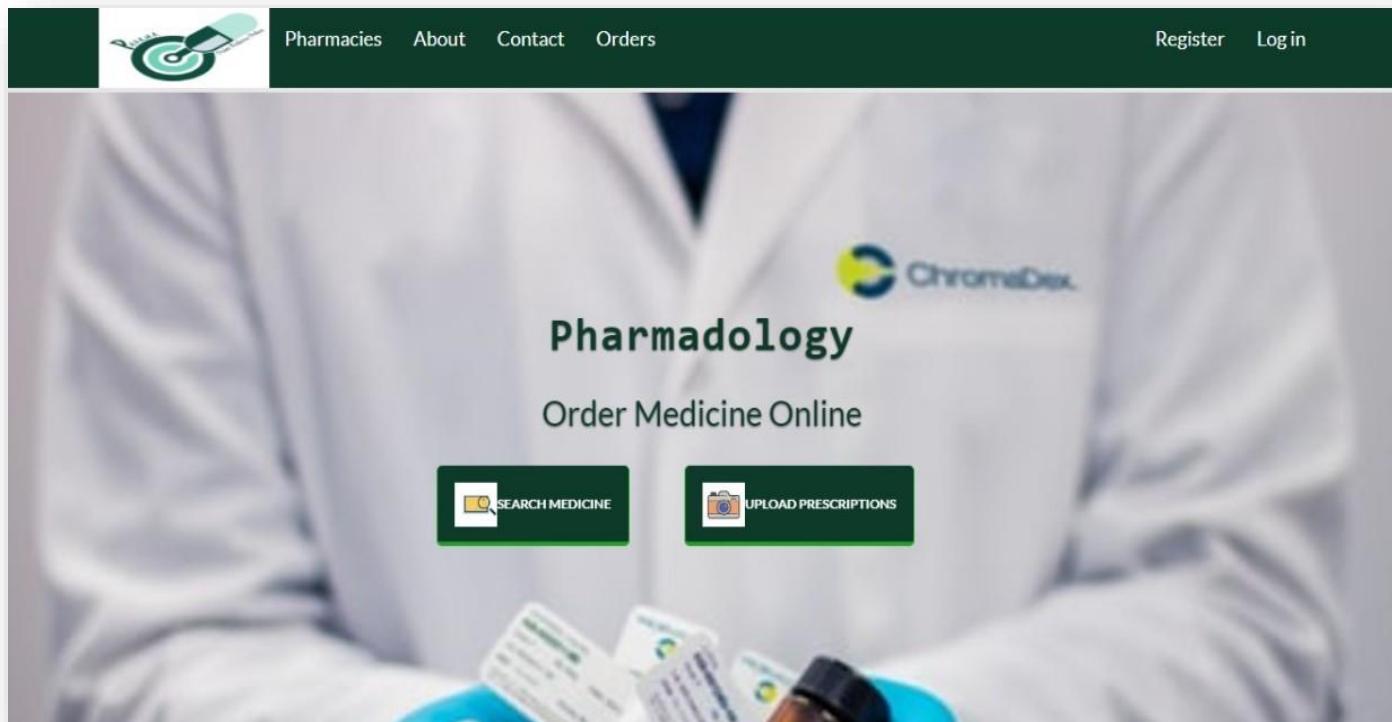


Figure 56

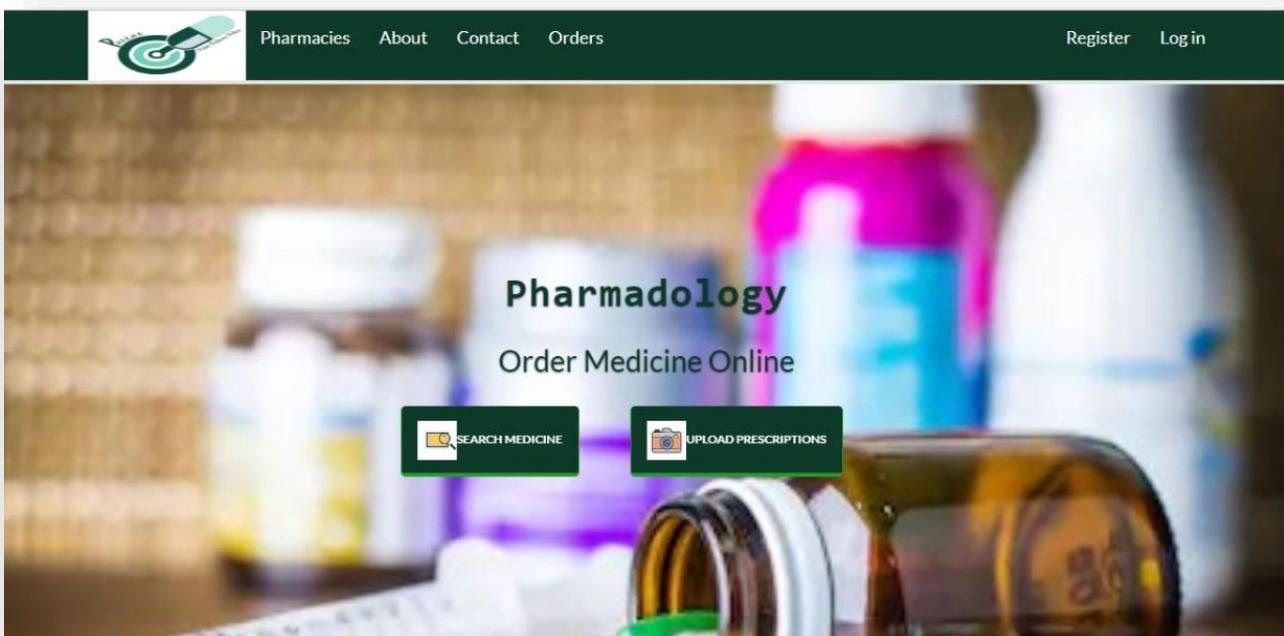


Figure 57

➤ Fifth: Developing the functionality code

Finally, using the Visual Studio application and the C# programming language, we have written the functionality code of the website applying the functions and the relations in the constructed diagrams shown in the previous step.

Safety:

Using the C# programming language and the ASP.NET framework to develop “Pharmadology” website, we have followed some precautions in order to make sure that the code will not be missed at any time.

For example:

1. Smarter debuggers embedded in the visual studio application were used in order to help debug errors in the codes before running without difficulty.
2. Parameterized queries were used with the standard Transact SQL in order to prevent any attacker to gain access to the website database.
3. Some specific lines of codes were written in order to make sure that the uploaded files are in the required formats so as to prevent any online attacks to the website and its database using the uploaded files.

Test plan:

Design requirements

A well-designed website is a pleasure to use. It captures the attention of users, conveys the information that they might need and convinces them to connect with the service.

we will look at 15 principles that are required for making a website good from the design perspective. Good communication is required to set, meet, and maintain expectations. Our proposal and project plan should align all expectations regarding the website design project.

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4. Pharmacy domain account

Each pharmacy has to sign up for an account in order to be shown to user as choice. And to be able to show offer and sell through our website. This process is done by the super admin and then send the details of the account to pharmacy in order to begin adding its database, selling and showing offers.

5. Order medicine online

The user will be able to order medicine online through our website and the pharmacy then deliver the medicine directly to the user.

6. reserve medicine online

the user can reserve medicine from the pharmacy if the pharmacy does not have the delivery services. After reservation the user can go and get her/his medicine directly from the pharmacy in 24 hours.

7. Uploading medical prescriptions

The user can upload a photo of his/her medical prescriptions and send it directly to chosen pharmacy. And he/ she can ask for any medical advice through the filling form of ordering through uploading photo.

➤ **Website design requirements**

1. Communicate Effectively

Our website is a visual communication tool between the patient and the pharmacy. Checking the content and design for the essentials that need to be communicated and the clarity with which it is communicated. The website should communicate the patient with the pharmacy needed in effective way to make buying the medicine much and much easier.

2. Easy user interface

Make the webpage obvious. It should not require detailed explanations for it to work. Keep the navigation structure of the website intuitive and visible. In order to be used by different levels of people.

Cognitive load is typically increased when unnecessary demands are imposed on a user, making the task of processing information overly complex, making it difficult for society of people to use it.

Reduces the demands on users, so that they use more often and easier.

3. Don't Waste User's Time

When you need a user to sign up for a service, keep the process as simple as possible. 3-4 steps on a single page is usually the limit in terms of the number of steps a user is willing to put up with to sign up for your service. In order to be easy in ordering medicine and reserving online. And people can use website easily without any need to help in navigation.

4. Showcase the Website's Features Effectively

Our site offers 6 divisions that provide access to other pages, making sure that all 6 major headers are easily visible. There are a major panel to gather all division of website. Using the white space in our website to differentiate categories is an effective design strategy. All in all, get useful of all divisions for showing information and exhibit content.

5. Well formatted content

Try to write the content of our website in simple language that is broken down category-wise and which has headers that are easy for a user to scan through. Keeping it simple as possible. In order for different people to be able use the website easy and smooth.

6. Use familiar formats

Little things like placing the search box in places where users would expect it, using familiar terms like sign-up and log-in and placing the major links in familiar places will help in reducing the user's learning curve for your website.

7. Browser configuration

the website to be able to open on different websites as Internet Explorer, Google Chrome, Mozilla Firefox, Safari, Opera, Konqueror, Lynx. In order to be suitable for user interface.

8. Fast load times

Try to reduce time taken for website to perform specific process. In order to save time and effort for the user or the pharmacy. And facilitate the problem of communication.

Testing steps:

All of the determined design requirements were tested using different ways according to the demands of the users who tested the website. The sample of these users were exactly 20 people of different ages, jobs, criteria, and even different social levels. These ways were in the form of:

- Online form
- Offline survey

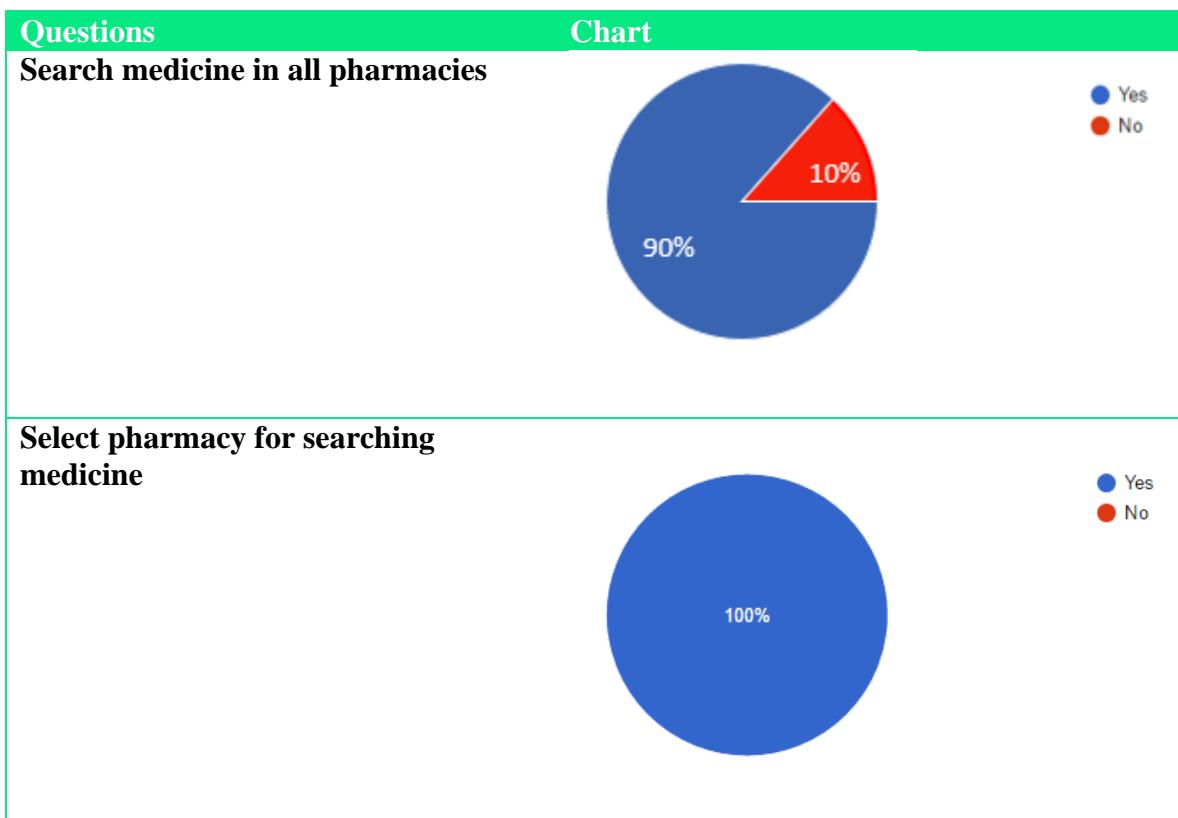
This is all to ensure that the website will be suitable and useable by a wide range of users.

Data collection:

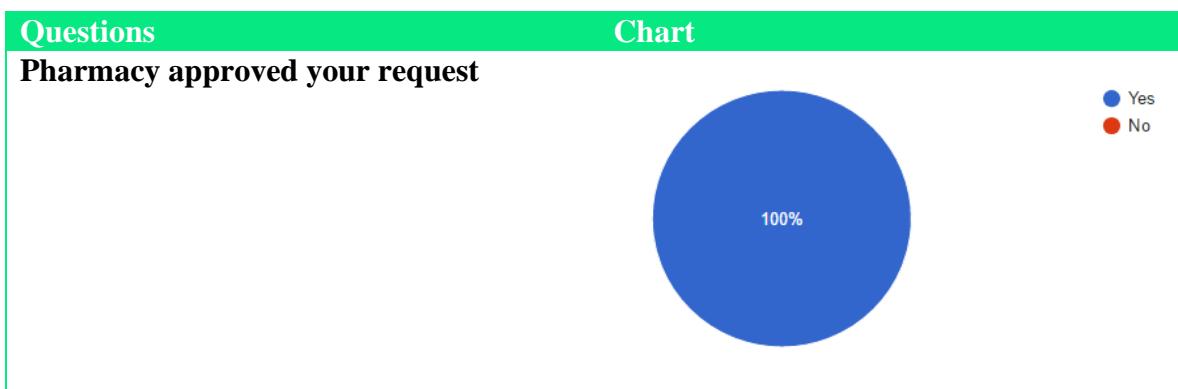
To test the website, we made 20 persons from different ages to use the website then they filled the survey to give us feedback about the whole thing in the website. To be sure that the survey will cover the testing of all the functions and it would test all the qualities in the website we Separated the questions in section these sections are:

Functionality Test

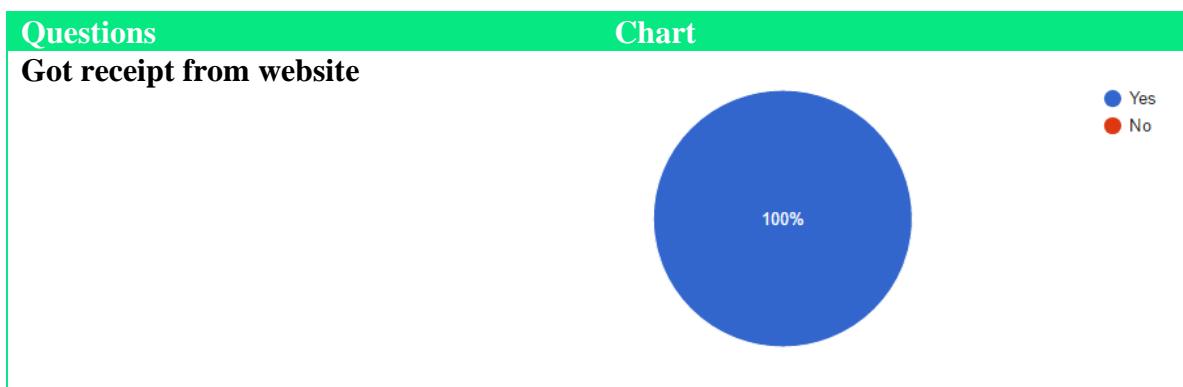
➤ Determine medicine availability effectively



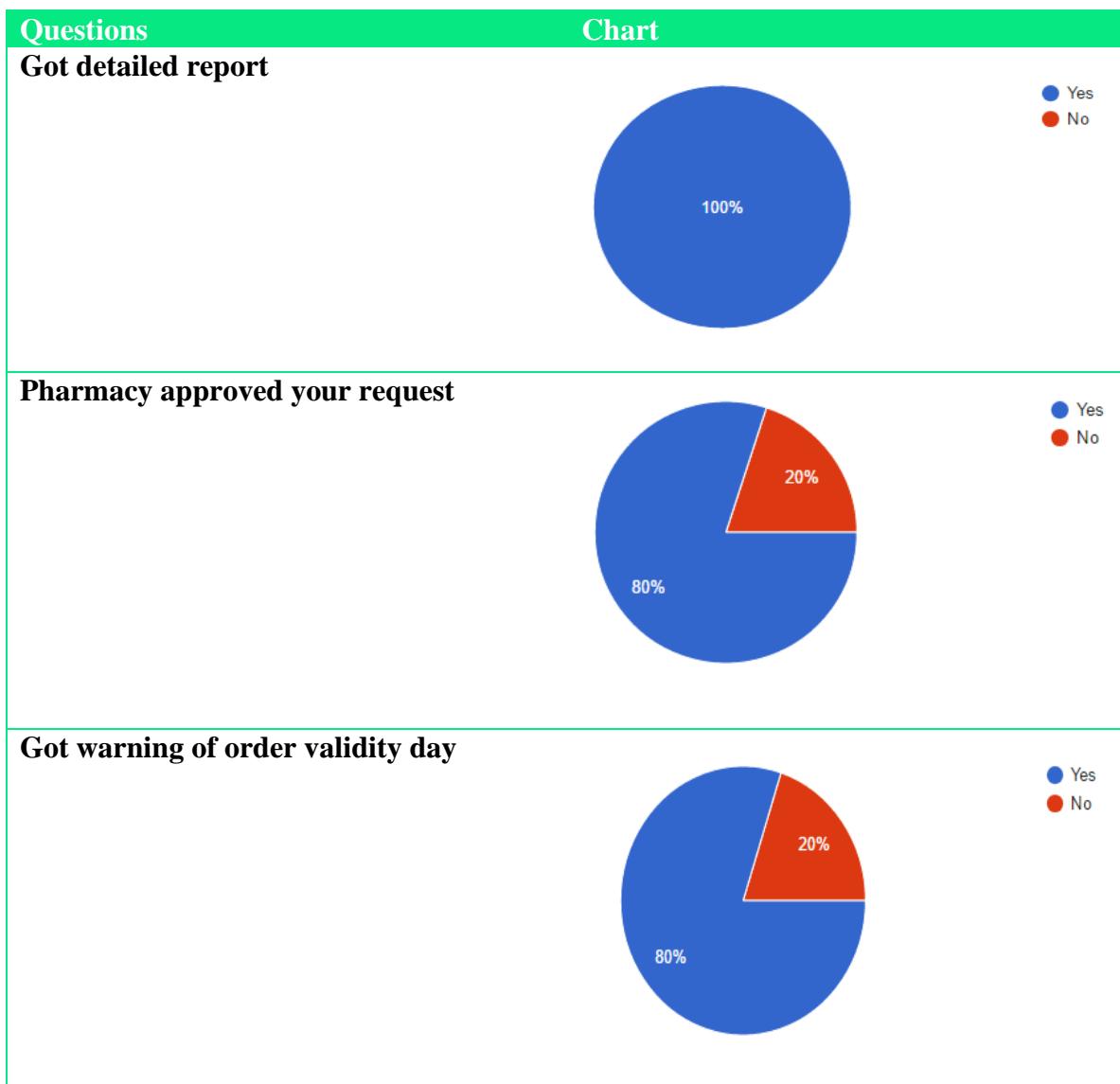
➤ Uploading medical prescriptions



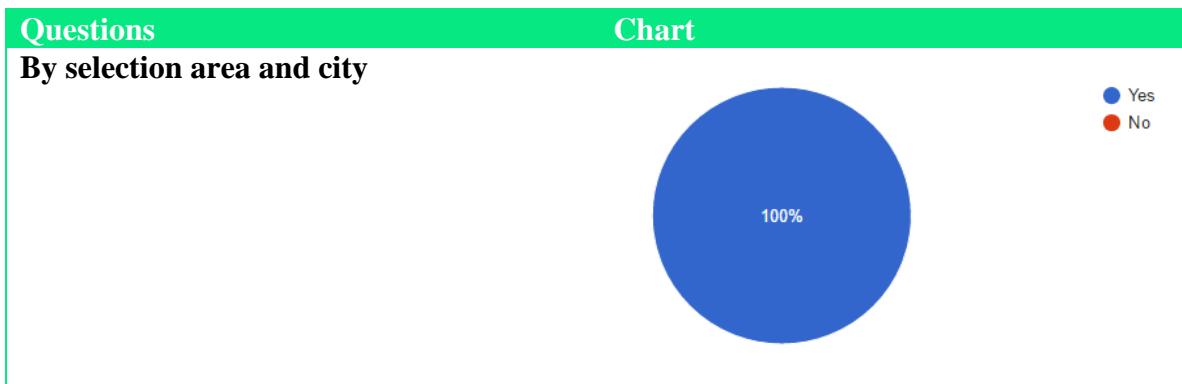
➤ Order medicine online



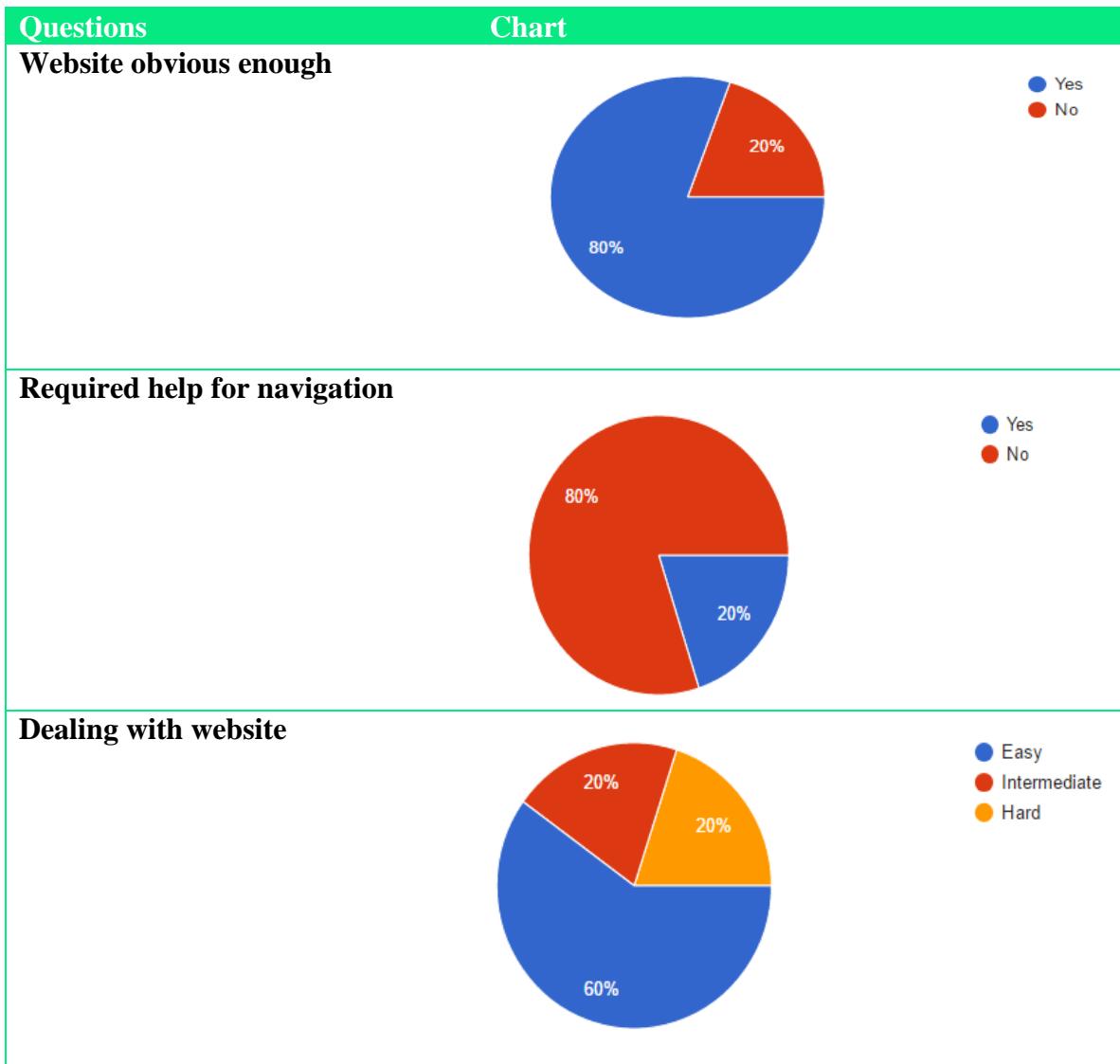
➤ Reserve medicine online

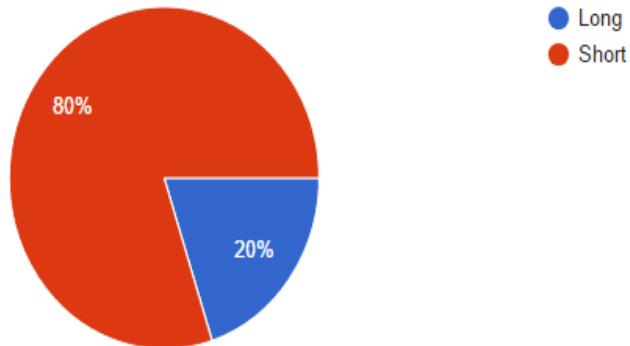


➤ Determine location effectively



| **Website Design Test**
➤ Easy user interface

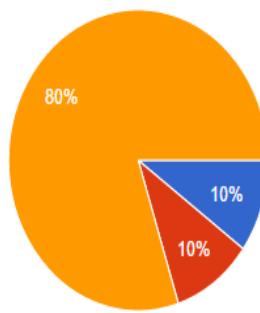
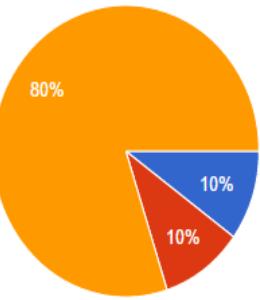


Steps for sign up an account

➤ **Showcase the website's feature effectively**

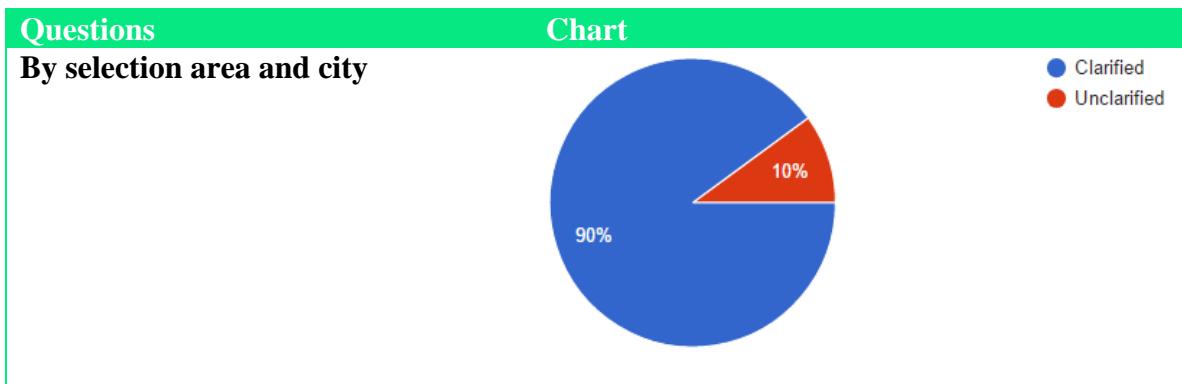
Questions**Well organized sections****Chart**

- Unproficient
- Proficient
- Well proficient

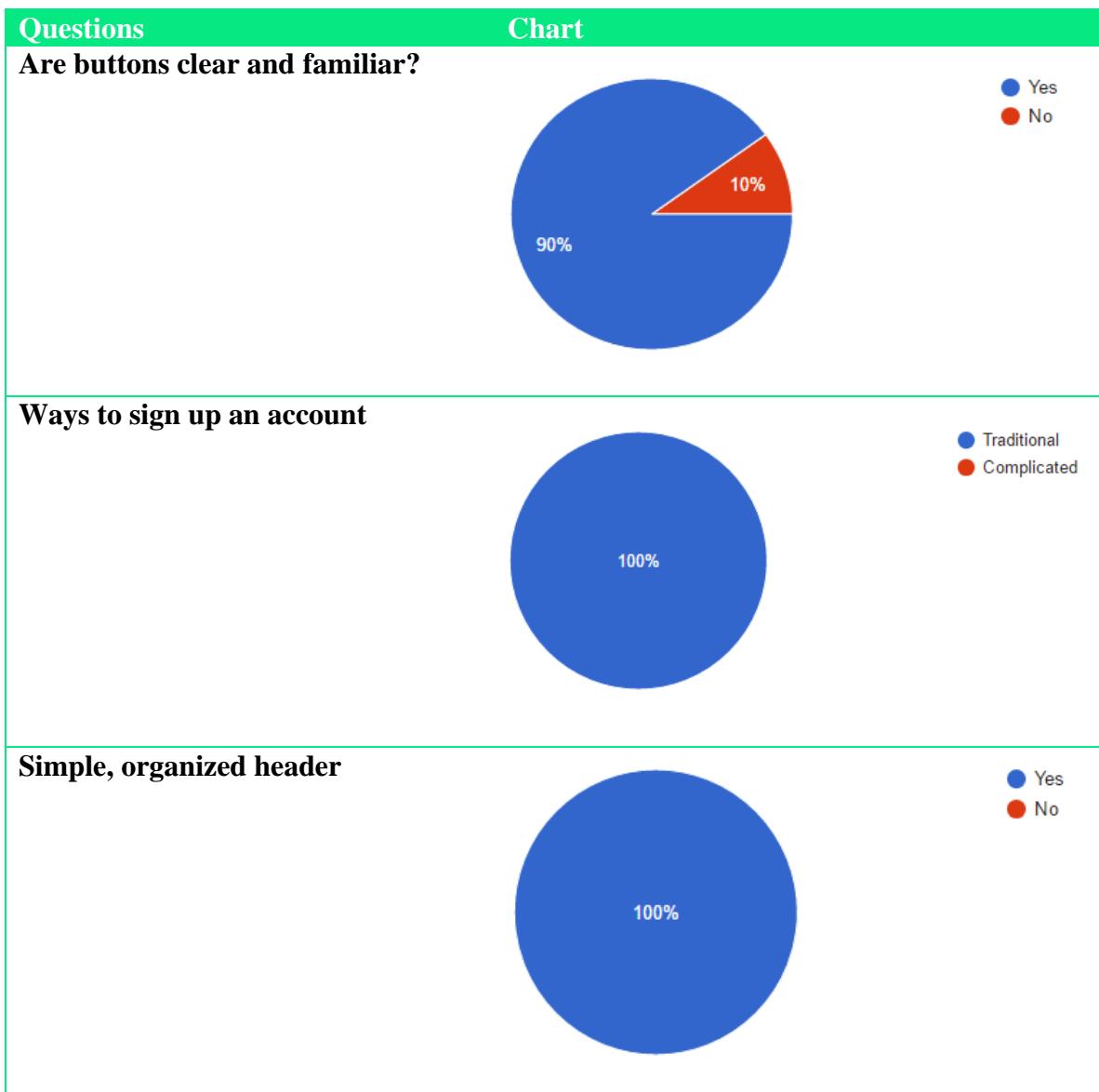
**Make use of white space**

- Unproficient
- Proficient
- Well proficient

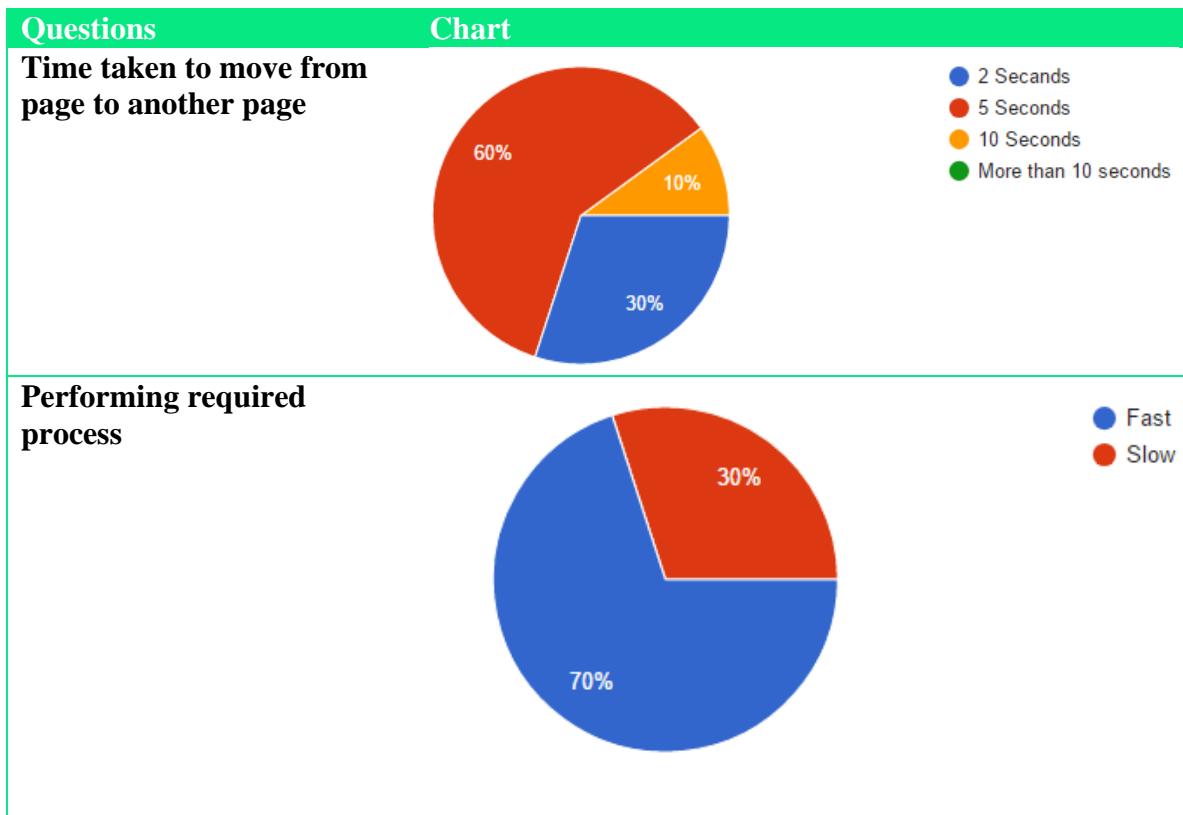
➤ Well formatted content



➤ Use familiar formats



➤ **Fast load times**



Analysis and discussion:

Communication in a healthcare setting is one of the most important tools that have to be existed for providing a great care for patients and enhancing the health field. The main obstacles that may occur in communication between pharmacies and patients are: language, cost of medication or the most challenging obstacle which is the inability of the patients to get their medicine easily especially if there is a shortage of some kind of medicine or the pharmacies are far apart from the users that they will not be able to reach them searching for their medicine. All of these obstacles combine to form a kind of a catastrophe that eventually lead to death of patients as they will not be able to get their medication on time which will cause health deterioration and more hard complications and finally death. That is why enhancing the communication between the patients and the pharmacies is an effective tool that saves the patients' life.

According to the project scientific base, identifying its design requirement is a main principle to reach its success. The website and its testing results was an evidence that shows how the solution met the determined design requirements which were classified into two main categories: the functionality and the website design that will enable us to test all the functions of the website in addition to the simplicity of the design and the user interface.

Functionality requirements

- **Determine medicine availability**, it will be tested if the website has the ability to show the medicine available in the pharmacies, its quantities and prices to inform the user if it is available to be ordered or not.
- **Order medicine online**, this function will be tested ensuring that the medicine will be delivered by the pharmacy to the user's location determined in the online-ordering form.
- **Reserve medicine online**, the ability of the website to reserve an order and update in database of available medicine will be tested ensuring that the user will be able to get the medicine during the validity days.
- **Uploading medical prescriptions effectively**, which will test whether or not the user is able to upload a photo of a medical prescription and if the photo was sent to the chosen pharmacy and approved by it or not.

➤ **Personal user account**

The user has to sign up for an account to order medicine online, to ensure that the pharmacy have all information needed from the user to facilitate the delivery services. but if he is just searching for medicine and pharmacy this process will not be necessarily.

➤ **Pharmacy domain account**

Each pharmacy has to sign up for an account in order to be shown to user as choice. And to be able to show offer and sell through our website. This process is done by the super admin and then send the details of the account to pharmacy in order to begin adding its database, selling and showing offers.

Website design requirements:

➤ **Easy user interface,**

as it will be tested whether or not the user is able to easily deal with the website without help to ensure that it is suitable and easy-used by a wide range of users from different social levels.

➤ **Showcase the website's features effectively,**

as it will be tested if the content of the website is clear and obvious or not and whether or not there is a difficulty in viewing its features.

➤ **Communicate Effectively**

Our website is a visual communication tool between the patient and the pharmacy. Checking the content and design for the essentials that need to be communicated and the clarity with which it is communicated. The website should communicate the patient with the pharmacy needed in effective way to make buying the medicine much and much easier.

➤ **Don't Waste User's Time**

When you need a user to sign up for a service, keep the process as simple as possible. 3-4 steps on a single page is usually the limit in terms of the number of steps a user is willing to put up with to sign up for your service. In order to be easy in ordering medicine and reserving online. And people can use website easily without any need to help in navigation.

➤ **Well formatted content**

Try to write the content of our website in simple language that is broken down category-wise and which has headers that are easy for a user to scan through. Keeping it simple as possible. In order for different people to be able use the website easy and smooth.

➤ **Use familiar formats**

Little things like placing the search box in places where users would expect it, using familiar terms like sign-up and log-in and placing the major links in familiar places will help in reducing the user's learning curve for your website.

➤ **Browser configuration**

the website to be able to open on different websites as Internet Explorer, Google Chrome, Mozilla Firefox, Safari, Opera, Konqueror, Lynx. In order to be suitable for user interface.

➤ **Fast load times**

Try to reduce time taken for website to perform specific process. In order to save time and effort for the user or the pharmacy. And facilitate the problem of communication.

All in all, combination of all the previous requirements including functionality and website design requirements lead us to achieve an ideal solution to solve the huge problem we are addressing “communication of the patient and pharmacies”. This way we met all the design requirements we have previously determined as the survey results proved that the functions of the website are working appropriately and its design is easy and simple regarding user interface. That showed through the satisfaction of almost all the users have tested the website. Also, their feedbacks greatly helped us in determining how to best improve website design in order to be more and more easy for the user to make use of it.

There are many functions and features provided by “pharmadology” website and the main ones of them will be discussed in details with their codes shown as follows:

➤ Search medicine online

```
[HttpGet]
0 references | 0 changes | 0 authors, 0 changes | 0 requests | 0 exceptions
public ActionResult List(string ProductName, string LocationName)
{
    _context.Configuration.ProxyCreationEnabled = false;

    var product = _context.products.Where(p => p.Name == ProductName);
    var locationId = _context.Locations.Where(l => l.Name == LocationName).Select(l=>l.Id).ToList();

    var Pharmicies = _context.Locations.Include(p => p.Pharmacy)
        .Where(p => p.Name == LocationName).Select(p => new PharmacyDto
    {
        Id = p.Pharmacy.Id,
        Name = p.Pharmacy.Name,
        Text = p.Pharmacy.Text,
        Email = p.Pharmacy.Email,
        PhoneNumber = p.Pharmacy.PhoneNumber,
        Products = product.Select(r=> new ProductDto
        {
            Id=r.Id,
            Name=r.Name,
            Count=r.Count,
            Price=r.Price
        }).ToList(),
    }).ToList();

    return View(Pharmicies);
}
```

Figure 58

Fig.58, Showing the code part related to the function of searching medicine online

As shown in the figure (58), the user can order medicine online through selecting a city, area and the required medicine. After that, a list of pharmacies in this area at which the medicine is available will appear to the user to choose the suitable one. This will be done by getting two inputs from the user: the medicine name stored in the variable of string datatype named “PRODUCTNAME” and the location that is stored in another variable of the same datatype named “LOCATIONNAME”. After that, some built-in functions were used as the “SELECT []” function which was used in a loop to filter out the other pharmacies and select only the ones that match with the “PRODUCTNAME”. Another function named “TOLIST []” was also used in a loop to list all of the matched pharmacies. Finally, the “VIEW []” function was then used to help view and show the list done.

➤ Order medicine online

```
[HttpPost]
0 references | 0 changes | 0 authors, 0 changes | 0 requests | 0 exceptions
public ActionResult Order(String userName, String productName, string Count, DateTime Datetime
{
    order order = new order();
    order.productName = productName;
    order.userName = userName;
    order.dateTime = DateTime.Now;

    _context.Orders.Add(order);

    _context.SaveChanges();
    return RedirectToAction("Index", "Home");
}
```

Figure 59

Fig.59, Showing the code part related to the ordering medicine online function

As shown in the figure (59), the user can order medicine online if the pharmacy has this service. A receipt of all the details will then be appeared for the user immediately. This will be done by getting two inputs from the user: the user name stored in the variable “USERNAME” and the medicine name stored in the variable “PRODUCTNAME”. A function called is included in the code to add order of the user then the function “RETURN[]” will redirect the user to home page.

➤ Uploaded medical prescriptions

```
[HttpPost]
[AllowAnonymous]
0 references | 0 changes | 0 authors, 0 changes | 0 requests | 0 exceptions
public ActionResult Create(String Name, String prescriptionBody, string PhoneNumber
                           ,string PharmacyName , HttpPostedFileBase ImagePath)
{
    string pic = "";
    string imagelink = "";
    if (ImagePath != null)
    {
        pic = System.IO.Path.GetFileName(ImagePath.FileName/*+ DateTime.Now.ToString("yymmssfff")*/);
        string path = System.IO.Path.Combine(Server.MapPath("~/Images/"), pic);
        ImagePath.SaveAs(path);
        imagelink = "/Images/" + pic;
    }

    Prescription prescription = new Prescription();
    prescription.Name = Name;
    prescription.PrescriptionBody = prescriptionBody;
    prescription.PharmacyId = Convert.ToInt32(PharmacyName);
    prescription.PhoneNumber = PhoneNumber;
    prescription.PhoneNumber = PhoneNumber;
    prescription.ImagePath = imagelink;

    _context.Prescriptions.Add(prescription);

    _context.SaveChanges();
    ViewBag.message = "your prescriptions is Added Successfully.";
    return RedirectToAction("Index", "Home");
    //var data = true;
    //return Json(data, JsonRequestBehavior.AllowGet);
}
```

Figure 60

Fig.60, Showing code part related to the uploading medicine prescription function

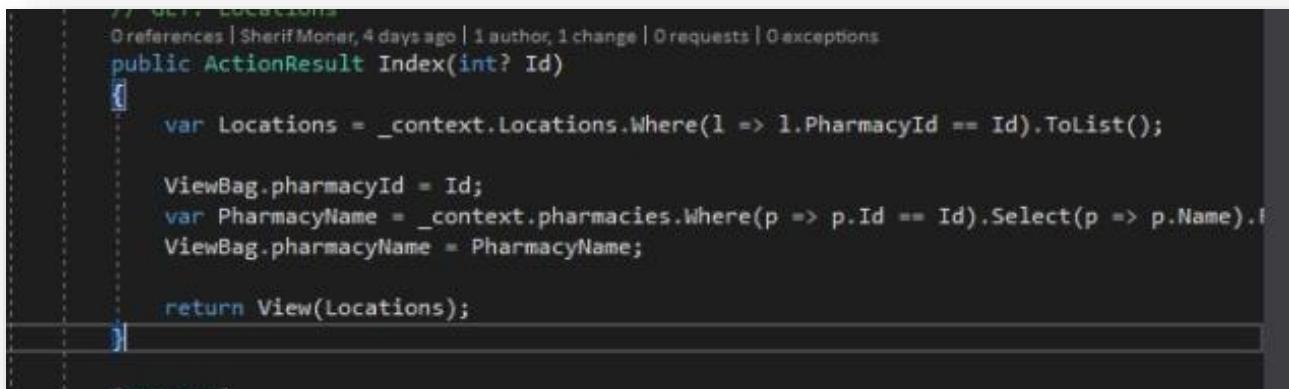
As shown in the figure (60), the user can upload a medical prescription and choose the pharmacy he wants to order from then he will have to add his home address and phone number to complete the process. This will be done by getting four inputs from the user: the user name stored in the variable “NAME”, the description stored in the variable “PRESCRIPTION BODY”, the phone number stored in the variable “PHONE NUMBER”, and the uploaded photo stored in the variable “IMAGEPATH” of data type “HTTPPOSTEDFILEBASE”. Then an “IF” condition was put to ensure that the user will not submit the ordering form without an uploaded photo and that the type of the uploaded photo is only in a jpg format to be stored in the database, through this line: prescription. Imagepath=image link:

➤ Reserve medicine online

Here, the user can reserve medicine online if the pharmacy does not have the delivery services. This way the user orders the medicine required and then got a receipt by all the details as time, price, ID for the order, and the validity day of the reservation as the user will have only 24 hours available to go and get the medicine from the pharmacy otherwise the reserved order will be canceled automatically.

All of these functions are related to the front-end users of the website. However, there are also other important functions regarding the back-end users (pharmacies) that will be able through “Pharmadology” website to add their branches and fill in their medicine databases providing their offers to be showed to front-end users.

➤ List of all locations of specific pharmacy



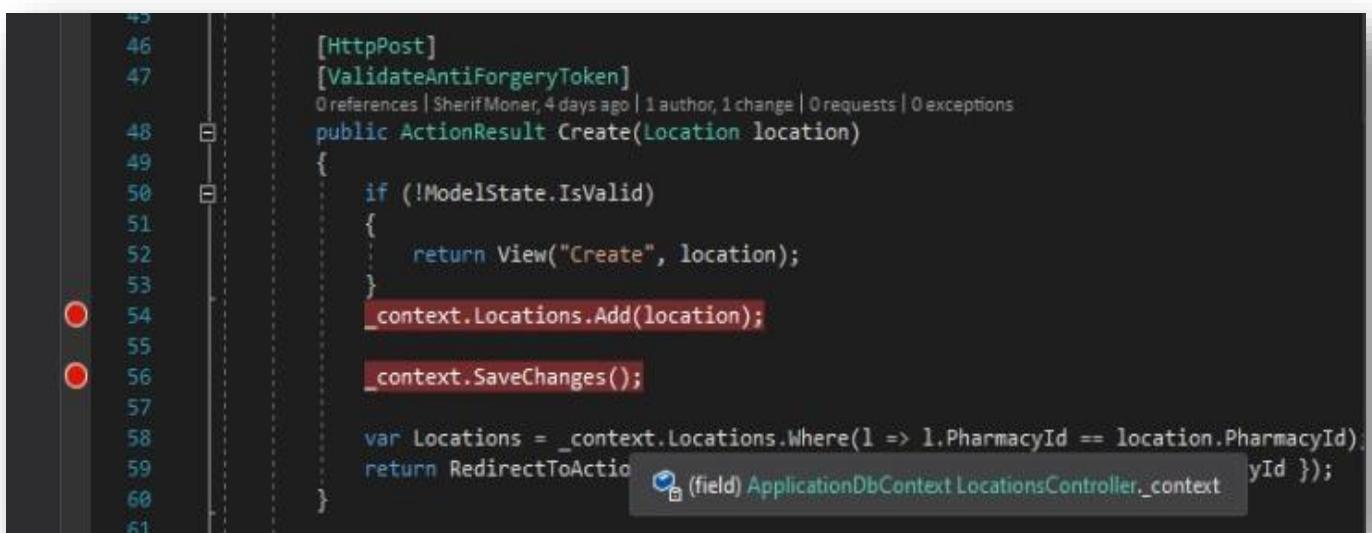
```
// GET: Locations/Details/5
[References | SheriffMoner, 4 days ago | 1 author, 1 change | 0 requests | 0 exceptions]
public ActionResult Index(int? Id)
{
    var Locations = _context.Locations.Where(l => l.PharmacyId == Id).ToList();

    ViewBag.pharmacyId = Id;
    var PharmacyName = _context.pharmacies.Where(p => p.Id == Id).Select(p => p.Name).First();
    ViewBag.pharmacyName = PharmacyName;

    return View(Locations);
}
```

Figure 61

➤ Create new location for specific pharmacy



```
43
44
45
46     [HttpPost]
47     [ValidateAntiForgeryToken]
48     public ActionResult Create([Bind(Include = "Id,Name,Address,Phone,Email,Lat,Long,PharmacyId")]
49     {
50         if (!ModelState.IsValid)
51         {
52             return View("Create", location);
53         }
54         _context.Locations.Add(location);
55
56         _context.SaveChanges();
57
58         var Locations = _context.Locations.Where(l => l.PharmacyId == location.PharmacyId);
59         return RedirectToAction("Index");
60     }
61 }
```

Figure 62

➤ Delete location of specific pharmacy

```

21     [HttpDelete]
22     public void DeleteLocation(int id)
23     {
24         var LocationInDb = _context.Locations.Single(p => p.Id == id);
25
26         if (LocationInDb == null)
27             throw new HttpResponseException(HttpStatusCode.NotFound);
28         _context.Locations.Remove(LocationInDb);
29         _context.SaveChanges();
30     }
31 }
32 }
```

Figure 63

➤ Edit location of specific pharmacy

```

75     [HttpPost]
76     [ValidateAntiForgeryToken]
77     public ActionResult Edit(Location location)
78     {
79         if (!ModelState.IsValid)
80         {
81             return View("Edit", location);
82         }
83         var locationInDb = _context.Locations.Single(l => l.Id == location.Id);
84         locationInDb.Name = location.Name;
85
86         _context.SaveChanges();
87         return RedirectToAction("Index", "Locations", new { Id = locationInDb.PharmacyId });
88     }
89 }
```

Figure 64

- Display data of pharmacy like Name, email, bio
- And control of pharmacy like locations, Preceptions, delete, And Edit

```

38     public ActionResult Index()
39     {
40         string email = User.Identity.GetUserName(); // browser
41         if (User.IsInRole("CanManagePharmacy" + email))
42         {
43             var Pharmacies = _context.pharmacies.Where(p=>p.Email == email).ToList();
44             return View(Pharmacies);
45         }
46         return HttpNotFound();
47     }
48 }
```

Figure 65

➤ Delete pharmacy that delete Account of pharmacy from our site

```

20     [HttpDelete]
21     public void DeletePharmacy(int id)
22     {
23         var pharmacyInDb = _context.pharmacies.Single(p => p.Id == id);
24
25         if (pharmacyInDb == null)
26             throw new HttpResponseException(HttpStatusCode.NotFound);
27         _context.pharmacies.Remove(pharmacyInDb);
28         _context.SaveChanges();
29     }
30 }
31 }
```

Figure 66

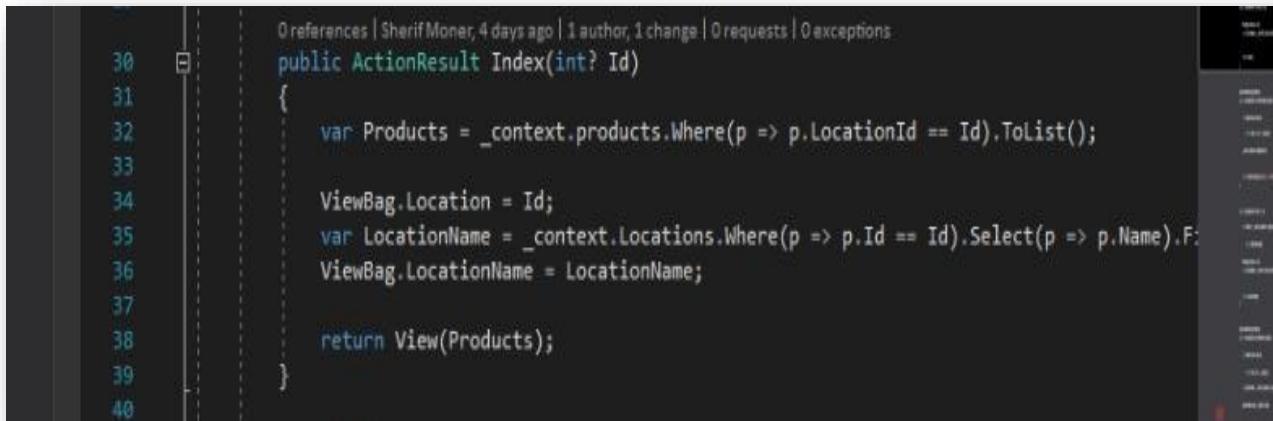
➤ Edit profile date of pharmacy

```

80
81     [HttpPost]
82     [ValidateAntiForgeryToken]
83     public ActionResult Edit(Pharmacy.Models.Pharmacy pharmacy)
84     {
85         if (!ModelState.IsValid)
86         {
87             return View("Edit", pharmacy);
88         }
89         var pharmacyInDb = _context.pharmacies.Single(p => p.Id == pharmacy.Id);
90         pharmacyInDb.Name = pharmacy.Name;
91         pharmacyInDb.Text = pharmacy.Text;
92         pharmacyInDb.Email = User.Identity.GetUserName();
93         pharmacyInDb.PhoneNumber = pharmacy.PhoneNumber;
94
95         _context.SaveChanges();
96         return RedirectToAction("Index", "Pharmacies");
97     }
98 }
```

Figure 67

- List all products data of specific location of specific pharmacy and control product like create new product, delete, Edit



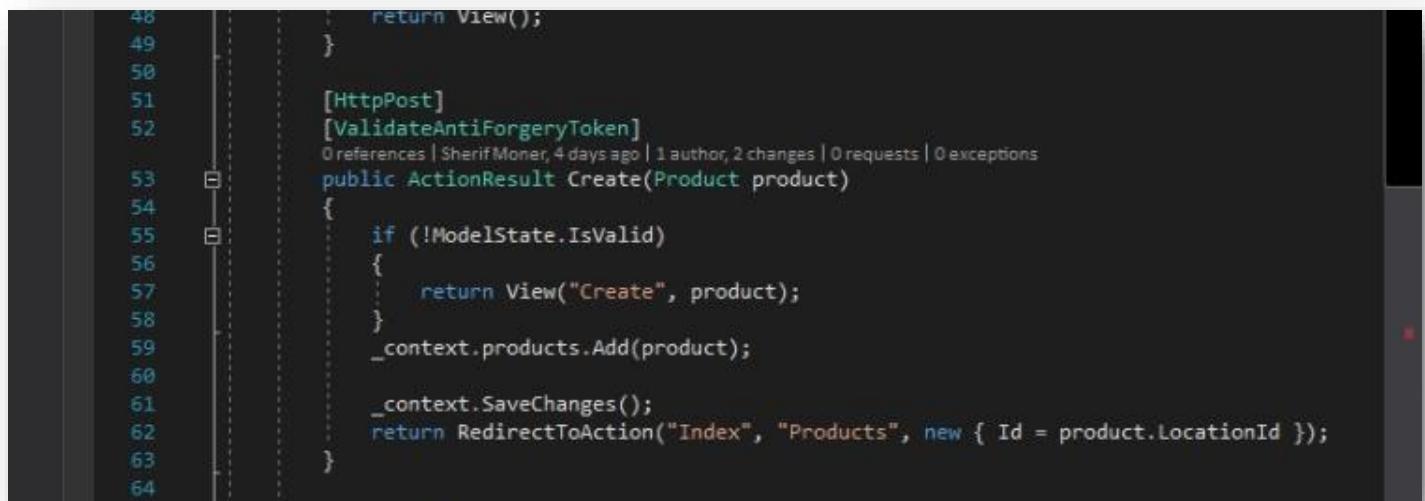
```

30     public ActionResult Index(int? Id)
31     {
32         var Products = _context.products.Where(p => p.LocationId == Id).ToList();
33
34         ViewBag.Location = Id;
35         var LocationName = _context.Locations.Where(p => p.Id == Id).Select(p => p.Name).F;
36         ViewBag.LocationName = LocationName;
37
38         return View(Products);
39     }
40

```

Figure 68

- Create New medicine by adding Name, price, And count of medicine



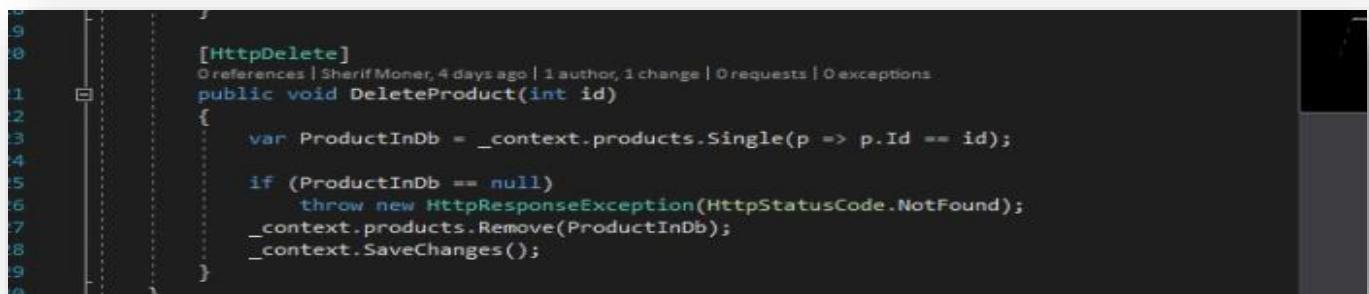
```

48     return View();
49 }
50
51 [HttpPost]
52 [ValidateAntiForgeryToken]
53 public ActionResult Create(Product product)
54 {
55     if (!ModelState.IsValid)
56     {
57         return View("Create", product);
58     }
59     _context.products.Add(product);
60
61     _context.SaveChanges();
62     return RedirectToAction("Index", "Products", new { Id = product.LocationId });
63 }
64

```

Figure 69

- Delete selected product from specific location of specific pharmacy



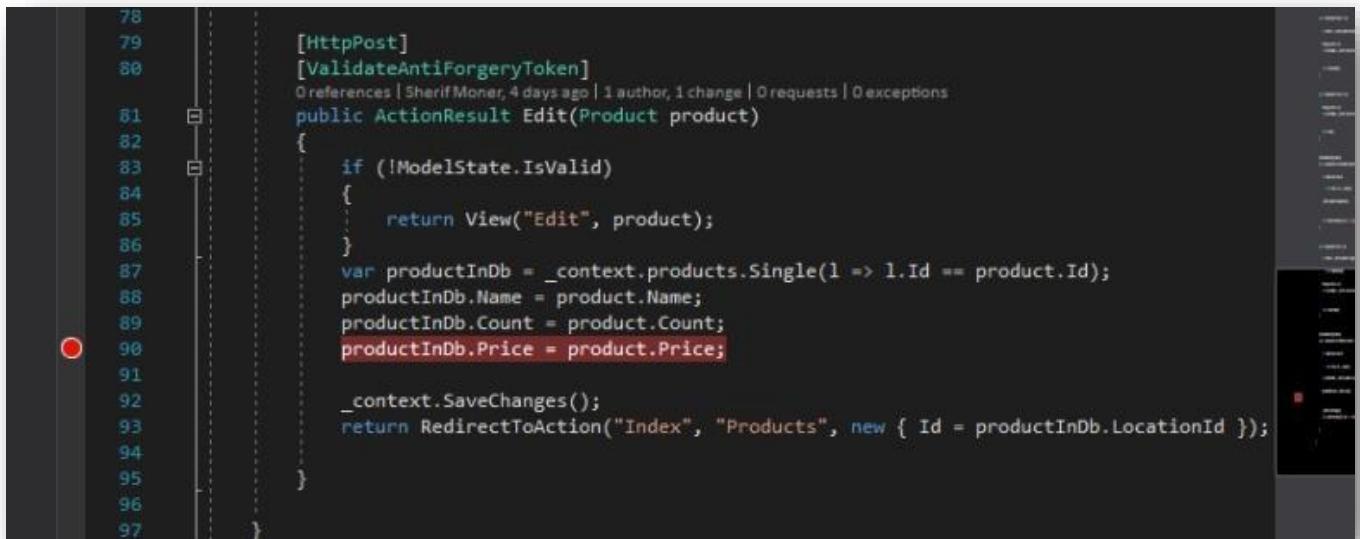
```

9
10 [HttpDelete]
11 public void DeleteProduct(int id)
12 {
13     var ProductInDb = _context.products.Single(p => p.Id == id);
14
15     if (ProductInDb == null)
16         throw new HttpResponseException(HttpStatusCode.NotFound);
17     _context.products.Remove(ProductInDb);
18     _context.SaveChanges();
19 }
20

```

Figure 70

- Edit medicine date count, price And Name in specific location of specific pharmacy

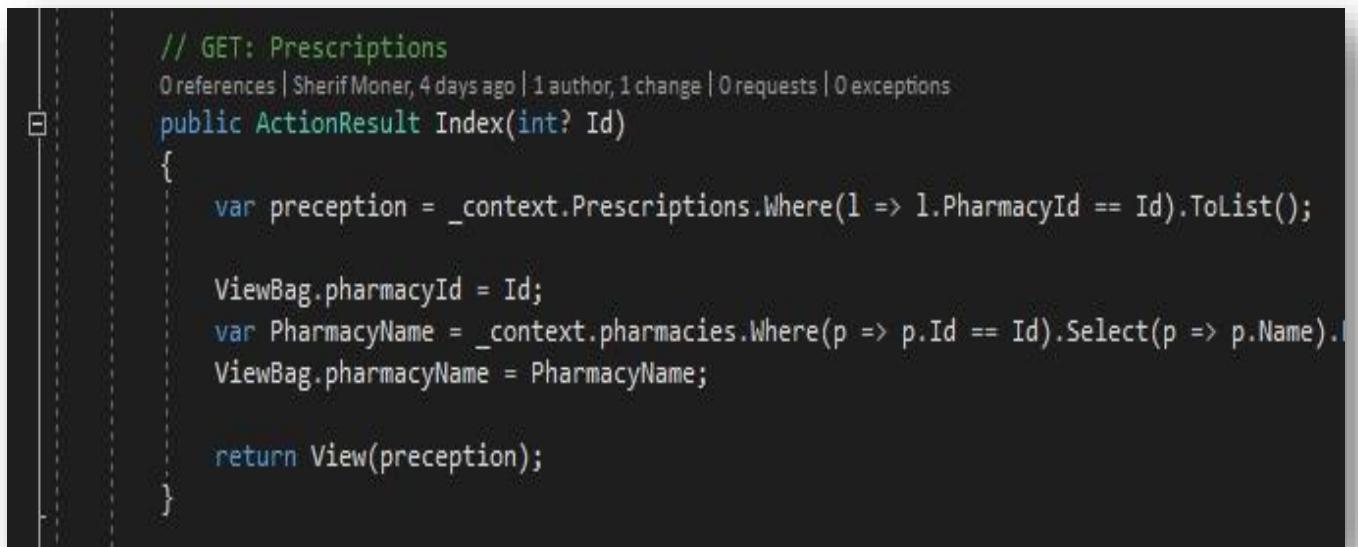


```

78
79
80
81     [HttpPost]
82     [ValidateAntiForgeryToken]
83     public ActionResult Edit(Product product)
84     {
85         if (!ModelState.IsValid)
86         {
87             return View("Edit", product);
88         }
89         var productInDb = _context.products.Single(l => l.Id == product.Id);
90         productInDb.Name = product.Name;
91         productInDb.Count = product.Count;
92         productInDb.Price = product.Price;
93
94         _context.SaveChanges();
95         return RedirectToAction("Index", "Products", new { Id = productInDb.LocationId });
96     }
97 }
```

Figure 71

- index function that list data of prescriptions that send By user For Specific pharmacy



```

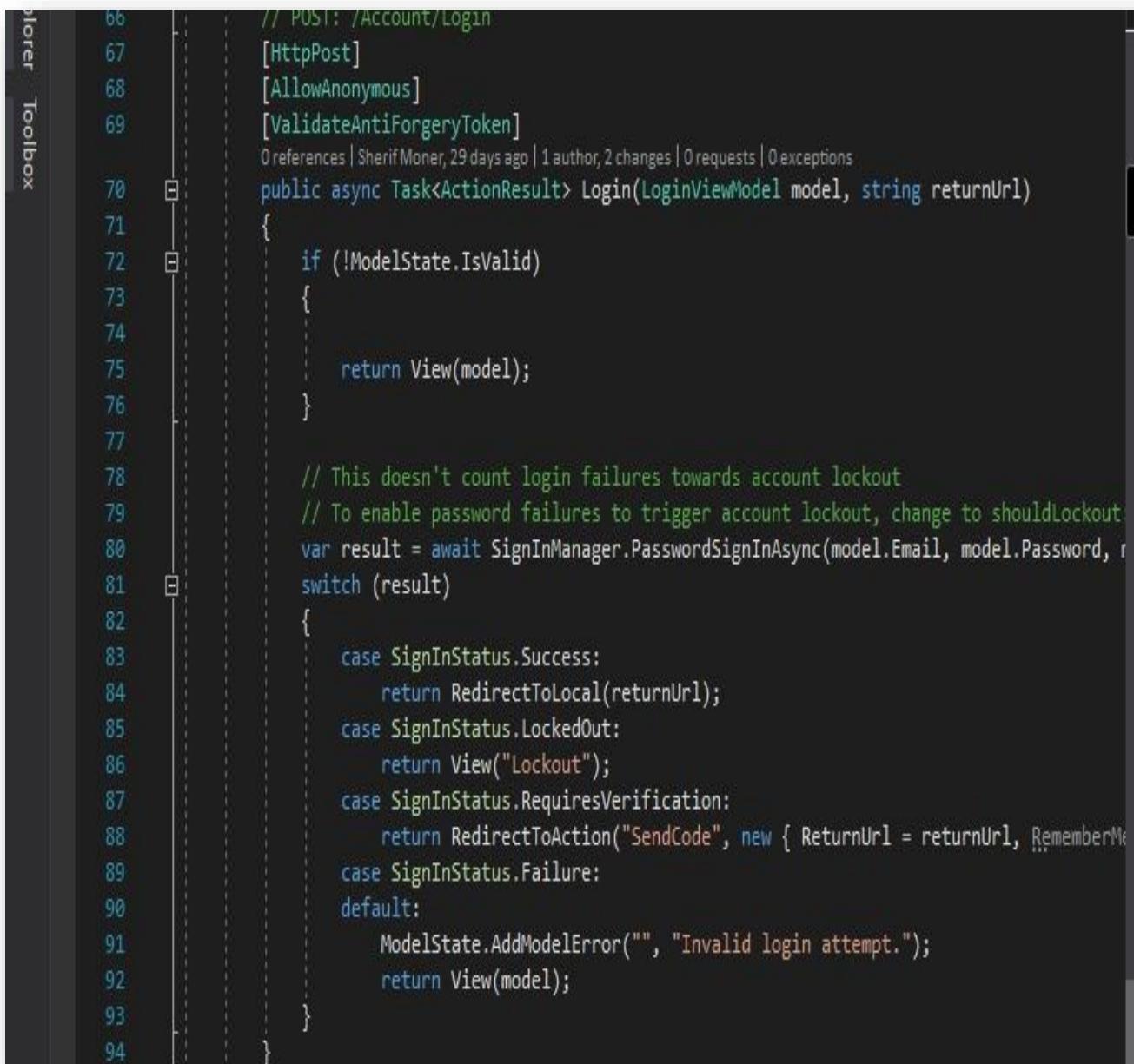
// GET: Prescriptions
public ActionResult Index(int? Id)
{
    var preception = _context.Prescriptions.Where(l => l.PharmacyId == Id).ToList();

    ViewBag.pharmacyId = Id;
    var PharmacyName = _context.pharmacies.Where(p => p.Id == Id).Select(p => p.Name).First();
    ViewBag.pharmacyName = PharmacyName;

    return View(preception);
}
```

Figure 72

- Login pharmacy Admin to Backend By Enter Email And Password And This Function Check Entering Data With DataBase if Matching Allow Pharmacy Admin to Access Data that belong to this pharmacy .. Login Roles Control Every Admin Access only belongs data profile



The screenshot shows a code editor window with a dark theme. On the left, there's a vertical toolbar with icons for 'Storage' and 'Toolbox'. The main area contains C# code for a controller action named 'Login'. The code includes annotations for HTTP POST, anonymous users, and anti-forgery tokens. It checks if the model state is valid, then signs in the user using a SignInManager. The result of the sign-in is checked against various status cases: Success, LockedOut, RequiresVerification, or Failure. If successful, it redirects to the local URL; if locked out, it shows a lockout view; if verification is required, it sends a code; if failed, it adds an error message and returns the view.

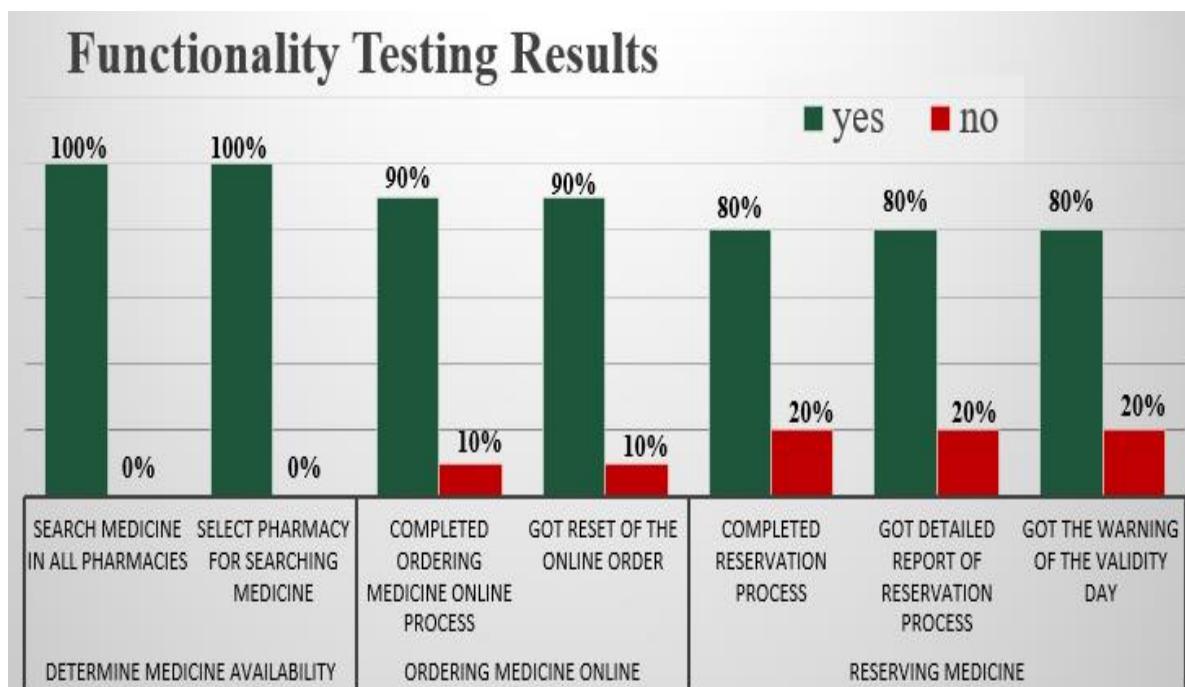
```

66     // POST: /Account/Login
67     [HttpPost]
68     [AllowAnonymous]
69     [ValidateAntiForgeryToken]
70     public async Task<ActionResult> Login(LoginViewModel model, string returnUrl)
71     {
72         if (!ModelState.IsValid)
73         {
74             return View(model);
75         }
76
77         // This doesn't count login failures towards account lockout
78         // To enable password failures to trigger account lockout, change to shouldLockout:
79         var result = await SignInManager.PasswordSignInAsync(model.Email, model.Password, model.RememberMe, false);
80         switch (result)
81         {
82             case SignInStatus.Success:
83                 return RedirectToLocal(returnUrl);
84             case SignInStatus.LockedOut:
85                 return View("Lockout");
86             case SignInStatus.RequiresVerification:
87                 return RedirectToAction("SendCode", new { ReturnUrl = returnUrl, RememberMe = model.RememberMe });
88             case SignInStatus.Failure:
89                 default:
90                     ModelState.AddModelError("", "Invalid login attempt.");
91                 return View(model);
92         }
93     }
94 }
```

Figure 73

Test results for the website requirements:

Based on the survey results, it was observed that all the functions of “pharmadology” website are working proficiently which is obvious as shown in graph(1) as all of the users were able to check the medicine availability in different pharmacies. In addition, 90% of the users were able to order their medicine online and completed this process successfully. Also, 80% of the users were able to complete the process of reservation, but only 4 of the total number of users had problems as some of them did not find the suitable amount of medicine while others had their medicine out of stock of the pharmacies.

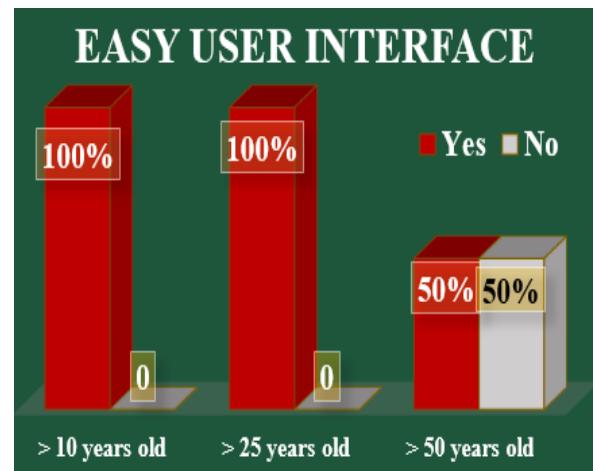


Graph 1

According to design testing results and the graph (2) shown, it was founded that all users who aged from above 10 years old to 50 years had faced no problems dealing with the website and only half of the users aged above 50 needed a little help with navigation. also, all of them stated that the content is clear, obvious, and well formatted.

Thus, the design requirements were successfully met according to these results, making the website ready as a suitable solution for the problem.

Showing the number of users opinions on the website format.



Graph 2

	>10 years	>25 years	>50 years
Unproficient	0	0	2
Proficient	0	0	2
Well proficient	6	6	4

Conclusion:

To conclude, the “Pharmadology” website has succeeded in developing a strong communication between the patients and the pharmacies making it a suitable and a reliable solution ready for a worldwide commercial use. All of the determined design requirements were achieved successfully, and that was ensured by the results of the test plan which was conducted in a form of a survey tested on users of various ages.

The users’ feedback proved that the project has successfully satisfied our customers and pharmacies as 80% of the users who tested the website stated that it was a simple interface with no complications and about 90% declared that the website was efficient and conventional as it saved their time, money, and effort making our project stands out when compared to other prior solutions especially in the following aspects:.

1. By simply entering your location, it suggests the nearest pharmacies (you can search for a specific pharmacy) and whether the medicine needed can be found there.
2. The medicine can be reserved or ordered online easily from the pharmacy.
3. Consulting the pharmacist about the condition by uploading a picture to clarify his/her situation.
4. As from the perspective of pharmacies, they are able to deal with a lot of more customers easily without their privacy being hacked.

Recommendations:

There are so many modifications that could be applicable in the future for our project. Thus, for anyone who wants to follow our footprints and make further developments regarding “Pharmadology” website. It is recommended to:

- Use the database provided by GPS maps in order to activate the feature of locating and detecting the nearby pharmacies using the GPS in the website.
- Add an option that combine the idea of other prior applications which will allow the website to provide some extra features as: making health profiles for the patients
- Develop a mobile application version of the website making it suitable for and useable by the disabled.
- Provide an extra feature in the website which will let the users fill in their medical history when signing up their accounts in order for the pharmacies to regard their sensitive medication when ordering their medicine online.
- Add a feature to the website that could enable the pharmacies to view their special daily offers.
- Add a database of the red-listed drugs to ensure that no one can order any of them using the website.

Learning Transfer:

At a level, a combination of science and technical subjects which is the learning transfer that is integrated with our capstone project helped us like:

Subject	Learning outcome	Connection
English	Cycle (1)	<p>We have also learned about how to use mind mapping and graphic organizers strategies which are strategies that we can follow to generate different ideas, organize them to choose their best in order to solve a specific problem or achieve a particular task. Mind mapping helps us a lot with our capstone project as we used it a lot during our capstone meetings to first searching the problem as we used a mind map to generate all of the causes we could think about that are related to the water scarcity problem in general and the problem of the huge water loss in the field of agricultural specifically in Egypt. It was also very helpful for us during selecting our solution after searching a lot of prior solutions. In addition, we have learned a lot about the presentation skills and the different techniques and skills used when giving presentations which really improved and developed the presentation skills we need during the exhibition and the evaluation.</p>
English	Cycle (2)	<p>We have learned about how to write a film, a book, a story, or a poster review according to a specific rubric. We have practiced writing reviews on old posters, evaluating them according to the rubric, and specifying their points of weaknesses in addition to their points of strengths. This helps us a lot as we became aware of the previous mistakes so as not to step down in them. As well as, we have worked on developing the points of strengths we have found in the posters which improves our performance in writing the capstone project for this semester sticking to the evaluating rubric all the time.</p>
Statistics	L.O. (1 and 2)	<p>We have learned about how to get and determine a sample of a population in order to conduct a survey which helped in determining the users of the website in which our population is the Egyptian citizens and our samples are specified by whom who are aged above 10 years old. We have also learned about how to do a survey analysis survey using the mean, median, mode, the standard deviation and the 10 % condition which help us with analyzing the results of the survey.</p>

Statistics	L.O. (1 and 2)	<p>In our project this semester, we are developing a website that will easily connect any patient or customer to any pharmacy provided by the online ordering feature so as anyone can access his medicine quickly and easily. So, we have determined our population to be the Egyptian citizens aged more than 18 years. This is to be able to use the website and deal with it. We are going to deal with just some samples of the population to test our website. Each sample will be of 10 users. After conducting our surveys and collecting our data. We will then analyze these data in graphs and determine the mean of the sampling distribution of p (proportion population) which is $\mu_{\hat{p}} = p$. We will also determine the standard deviation of the sampling distribution of \hat{p} is : $\sigma_{\hat{p}} = \sqrt{p(1-p)/n}$ where we must check the 10% condition that $n \leq (1/10)N$.</p>
Physics	L.O. (4)	<p>While using our website, radio waves will be used for communication as they have wavelengths longer than infrared light. They also have frequencies as high as 300 gigahertz (GHz) to as low as 30 hertz (Hz). At 300 GHz, the corresponding wavelength is 1 mm, and at 30 Hz is 10,000 km. that is why it is really appropriate for our project. In addition, the variety in the frequencies means dealing with different antennas with different mobile phones which widen the range of the users.</p>
Physics	L.O. (6)	<p>the radio waves are a type of electromagnetic radiation best-known for their use in communication technologies, such as television, mobile phones and radios. These devices receive radio waves and convert them to mechanical vibrations in the speaker to create sound waves. That why while using our website I would use radio wave for communication.</p> <p>As Radio waves have wavelengths longer than infrared light. Radio waves have frequencies as high as 300 gigahertz (GHz) to as low as 30 hertz (Hz). At 300 GHz, the corresponding wavelength is 1 mm, and at 30 Hz is 10,000 km. that why its really appropriate for our app project. As differing frequencies means also dealing with different antennas with different mobile phones which mean huge number of people would be able to use it.</p>
Math	L.O. (1)	<p>In this learning outcome in Mathematics, we have learned a lot about the relations, functions, explicit and implicit differentiation to easily determine the slopes of any curve at any point. A relation is a set of inputs and outputs, often written as ordered pairs (input, output). We can also represent a relation as a mapping diagram or a graph. A function, on the other hand, is a relation in which each input has only one output. Explicit and implicit which are methods and approaches used in numerical analysis for obtaining numerical approximations to the solutions of time-dependent ordinary and partial differential equations. For example: if there is a function of x, $f(x)=x^2 - 8x$, then the first derivative of the function will be $2x - 8$.</p>

		<p>In our capstone project, this learning outcome helped us a lot as we have used it in exploiting different graphs related to our project. For example: a graph representing the relationship between the number of our app users denoted as (x) and the profit of different pharmacies denoted as (y). We then got the slope using the derivative's method. The relation founded was that by increasing the number of the patients that will order medicine online using our website, the profit of the pharmacies will increase.</p>
Biology	L.O. (1)	<p>Neurons are cells specialized for communication. They handle each stage of information processing. They generate and conduct electrical impulses, called action potentials, from one part of body to another. This information is sent to processing centers in the brain or ganglia. Neurons in brain or ganglia integrate (analyze and interpret) sensory input, considering the immediate context and experience.</p> <p>Neuron looks similar to mobile application as it works with the same way. As Sensory neurons respond to a certain type of stimulus, such as pressure or light. They transmit information to the next neuron. So, the next neuron gets information by its dendrites. It gathers information by the dendrites. As the information is gathered, the cell body transforms the information into an electric pulse in order to be conducted through the axon to the next neuron.</p> <p>In other words, dendrites gather information which is the database for the app, the cell body transforms the provided input to the axon, which is the role of the application as it transforms the database gathered to a way that is suitable for the user to understand and shape of data required.</p> <p>All in all, we can say that neuron is able to receive input from dendrites, integrate this information, and influence the functioning of axon to transmit it.</p> <p>The same as the app works. The app gets information from the database and transforms the data in the shape that is suitable for the user. Then, send this information to the user through the interface of the application.</p>
Geology	L.O.(2)	<p>GPS or Global Positioning System is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also. The system gives critical abilities to military and civilian users around the globe.</p> <p>GPS is a system. It's made up of three parts: satellites, ground stations, and receivers.</p> <ul style="list-style-type: none"> • Satellites act like the stars in constellations—we know where they are supposed to be at any given time. • The ground stations use radar to make sure they are actually where we think they are.

		<ul style="list-style-type: none"> • A receiver is constantly listening for a signal from these satellites. The receiver figures out how far away they are from some of them. <p>Once the receiver calculates its distance from four or more satellites, it knows exactly where you are. From miles up in space your location on the ground can be determined with incredible precision. They can usually determine where you are within a few yards of your actual location.</p> <p>We used the GPS in our project to help patients in finding the nearest pharmacy to their location. By this way you can get you medicine in the easiest way as our website offer ordering medicine online and also reserving if the pharmacy has no delivery. By this way, we improved the communication between the patient and pharmacy. Facilitating the way of getting the medicine to the patient. Making it easier to know location of pharmacies around you and the nearest one to your current location picked up by the GPS satellite.</p>
Biology	L.O. (3)	<p>sensory receptor is a structure that reacts to a physical stimulus in the environment, whether internal or external. The four types of general sensory receptors (and the stimuli that excite them) are nociceptors (pain), thermoreceptors (temperature), mechanoreceptors (physical distortion), and chemoreceptors (chemical concentration).</p> <p>It is a sensory nerve ending that receives information and conducts a process of generating nerve impulses to be transmitted to the brain for interpretation and perception.</p> <p>In case of wireless communication systems, antennas play a prominent role as they convert the electronic signals into electromagnetic waves efficiently. Antennas are basic components of any electrical circuit as they provide interconnecting links between transmitter and free space or between free space and receiver. An antenna plays a vital role in a communication system.</p> <p>It is used in both the transmission and reception of radio frequency signals. In fact, an antenna is a structure that is capable of radiating electromagnetic waves or receiving them, as the case may be.</p> <p>Antennas are required by any radio receiver or transmitter to couple its electrical connection to the electromagnetic field. Radio waves are electromagnetic waves which carry signals through the air (or through space) at the speed of light with almost no transmission loss.</p> <p>By this way, the antennas of communication work with the same mechanism of sensory receptors. as the Wi-Fi signal coming to the antenna is only changed based on the design. Omnidirectional antennas send/receive signals in a 360-degree disk around the antenna. Directional antennas send/receive signal from the area in which you point the antenna.</p>

		<p>All in all, antennas are working in the same way as receptors in nerve cells as the purpose of an antenna is to collect and convert electromagnetic waves to electronic signals. As the sensory collect the stimulus from the outer world and then convert it to electric impulses.</p> <p>We use antennas in communication between device and server in order for the device to be online and can use our website.</p>
Chemistry	L.O. (1)	<p>Following the EDP (engineering design process), we have applied the steps of experimental design in an indirect way.</p> <ul style="list-style-type: none"> ▪ We studied that Law A statement of fact, deduced from observation, to the effect that a particular natural or scientific phenomenon always occurs if certain conditions are present. ▪ An expression of a relationship that is well studied, well understood and extremely unlikely to be contradicted by additional data. Almost always the relationship is a general one capable of being applied to many specific situations/contexts. ▪ Scientific laws are short, sweet, and always true. Many times, laws are expressed in a single expression. Laws cannot ever be shown to be wrong (that is why there are many theories and few laws). <p style="text-align: center;">Hypothesis</p> <ul style="list-style-type: none"> ▪ A supposition or proposed explanation made based on limited evidence as a starting point for further investigation. ▪ An expression of a relationship that is well studied, well understood, and extremely unlikely to be contradicted by additional data. Usually the relationship is a general one capable of being applied to many specific situations/contexts. <p style="text-align: center;">Quantitative Analysis Definition:</p> <ul style="list-style-type: none"> ▪ Deals with numbers. ▪ Data which can be measured. ▪ Length, height, area, volume, weight, speed, time, temperature, humidity, sound levels, cost, members, ages, etc. ▪ The determination of how much of a given component is present in a sample. Quantitative chemical analysis is performed to accurately determine the concentration, amount or percentage of one or more elements in a test sample. This technique, along with qualitative analysis, provides information on what and how much of each element is present in a sample for a complete elemental analysis. <p style="text-align: center;">E.g. Titration (volumetric analysis) Weighing Precipitate (gravimetric analysis)</p>

Qualitative chemical analysis:

- Deals with descriptions.

- Data can be observed but not measured.

- Colors, textures, smells, tastes, appearance, beauty, etc.
- Qualitative chemical analysis, branch of chemistry that deals with the identification of elements or grouping of elements present in a sample. The techniques employed in qualitative analysis vary in complexity, depending on the nature of the sample. It is customary to classify the methods into two classes: qualitative inorganic analysis and qualitative organic analysis. It is used to separate and detect cations and anions in a sample substance

E.g. Flam test, detect the acidic and basic radicals.

So, as we set the hypothesis based on the graphs we made by following the rate of efficiency and improvements of multiple projects over the years, we took into consideration the quantitative property while experimenting the website on a sample of people, the results of the accuracy of services and the difference between common response time and this project's response time.

We took into consideration the qualitative analysis while working on the simple interface, easy tools and decision making and executing.

We set the hypothesis based on the graph and the laws of mathematics and we put an about based on the unbiased sample we too from the whole population and did the calculations.

APA citation:

1. What's being done about overpopulation in Egypt? (n.d.). Retrieved from <https://www.egypttoday.com/Article/2/40295/What's-being-done-about-overpopulation-in-Egypt>.
2. Khalifa, Mona, DaVanzo, Julie, Adamson, & M., D. (2000, January 1). Population Growth in Egypt: A Continuing Policy Challenge. Retrieved from https://www.rand.org/pubs/issue_papers/IP183/index2.html.
3. Egypt, SEKEM, and Climate Change. (2013, September 23). Retrieved from <https://www.wri.org/our-work/project/world-resources-report/egypt-sekem-and-climate-change>.
4. Egypt. (n.d.). Retrieved from <https://www.adaptation-undp.org/explore/northern-africa/egypt>.
5. Drug Addiction in Egypt the ancient culture of Egypt includes an equally ancient history of drug and alcohol abuse. Opium and hashish have been used in Egypt for centuries. (n.d.). Drug Addiction in Egypt. Retrieved from <https://www.narconon.org/drug-information/egypt-drug-addiction.html>.
6. Anderson, B., Lin, S., Newing, A., Bahaj, A. B., & James, P. (2016, July 1). Electricity consumption and household characteristics: Implications for census-taking in a smart metered future. Retrieved from <https://www.sciencedirect.com/science/article/pii/S0198971516300813>.
7. 12 important Industrial Problems faced in India. (2012, January 30). Retrieved from <http://www.preservearticles.com/food/12-important-industrial-problems-faced-in-india/19759>.
8. <http://ljournal.ru/wp-content/uploads/2017/03/a-2017-023.pdf>. (2017). doi: 10.18411/a-2017-023
9. Addiction and Negative Effects of Drug Abuse on the Human Body & Brain. (n.d.). Retrieved from <https://www.gatewayfoundation.org/faqs/effects-of-drug-abuse/>.
10. What is Alzheimer's? (n.d.). Retrieved from <https://www.alz.org/alzheimers-dementia/what-is-alzheimers>.
11. Baqary, A. E. (2015, April 27). Living with Alzheimer's in Egypt. Retrieved from <https://egyptianstreets.com/2015/04/27/living-with-alzheimers-in-egypt/>.

12. Gwyther, L. P. (1998, November 14). Social Issues of the Alzheimer's Patient and Family. Retrieved from
<https://www.sciencedirect.com/science/article/abs/pii/S0002934398000242>.
13. Pros and Cons of Mobile Websites and Mobile Apps. (n.d.). Retrieved from
<https://rubygarage.org/blog/mobile-app-vs-mobile-website>.
14. Amuno, A. (2019, September 7). The Two Types of Application Software: General Purpose Applications and Custom Software. Retrieved from
<https://hubpages.com/technology/Three-Categories-of-Application-Software>.
15. Sevilla, V., Sevilla, V., Sevilla, V., Sevilla, V., & Sevilla, V. (2015, September 24). The Pros and Cons of Building A Mobile App for your Business. Retrieved from <https://webdesignledger.com/mobile-apps-pros-cons/>.
16. Thakur, D. (n.d.). Dinesh Thakur. Retrieved from
<http://ecomputernotes.com/fundamental/disk-operating-system/application-software>.
17. Vamsi, K. (2015, May 11). Practo app review: A 'healthy' search engine with a lot of potential. Retrieved from <https://indianexpress.com/article/technology/tech-reviews/practo-app-review/>.
18. Top 10 Apps to Order Medicine Online in India. (2019, May 23). Retrieved from <https://mobisoftinfotech.com/resources/blog/online-medicine-ordering-app/>.
19. The leading pharmacy delivery app in Egypt. (n.d.). Retrieved from
<http://elroshetta.com/>.
20. Online Pharmacy Delivery & Pickup Apps Builder & Software Development. (n.d.). Retrieved from <https://ordering.co/verticals/pharmacy-drugstore-delivery-pickup/>.
21. Yodawy - Pharmacy Delivery App - Apps on Google Play. (n.d.). Retrieved from <https://play.google.com/store/apps/details?id=com.medex.yodawy&hl=en>.
22. Uber for Pharmacy Delivery App: Best Prescription Delivery App Script. (n.d.). Retrieved from <https://www.trioangle.com/pharmacy-delivery-script/>.
23. From trash to treasure: Egypt's new recycling initiative triggers dispute with millions of garbage collectors. (n.d.). Retrieved from
<https://www.egypttoday.com/Article/1/4027/From-trash-to-treasure-Egypt's-new-recycling-initiative-triggers-dispute>.

24. Cairo Traffic Congestion study- Executive Note. (n.d.). Retrieved February 20, 2018, from <http://www.worldbank.org/en/country/egypt/publication/cairo-trafficcongestion-study-executive-note>
25. World Bank. (2012, August 14). Egypt - Traffic congestion in Cairo : An overview of the causes as well as possible solutions. Retrieved February 20, 2018, from <http://documents.worldbank.org/curated/en/990291468038079976/Egypt>
26. Viney, S. (2011, July 23). Cairo's over-congestion vexes urban planners. Retrieved February 20, 2018, from <http://www.egyptindependent.com/cairos-over-congestion-vexes-urbanplanners/>
27. User, S. (2018, April 22). Retrieved February 21, 2018, from <http://www.cghd.org/index.php/global-health-partnerships-andsolutions/profiles/43-egypts-health-care-system>
28. Egypt's public hospitals: From bad to worse. (n.d.). Retrieved February 21, 2018, from <http://english.ahram.org.eg/NewsContent/1/64/58686/Egypt/Politics/Egypt-public-hospitals-From-bad-to-worse.aspx>
29. Global Health - Egypt. (2013, December 05). Retrieved February 21, 2018, from <https://www.cdc.gov/globalhealth/countries/egypt/>
30. Site designed and built by Hydrant (<http://www.hydrant.co.uk>). (2016, February 11). Egypt's industrial sector a driver of economic activity. Retrieved February 21, 2018, from <https://oxfordbusinessgroup.com/overview/fuelling-expansion-industryremains-important-driver-economic-activity>
31. Egypt Industry Sectors. (n.d.). Retrieved February 18, 2018, from http://www.economywatch.com/world_economy/egypt/industry-sectorindustries.html
32. Site designed and built by Hydrant (<http://www.hydrant.co.uk>). (2016, February 11). Egypt's industrial sector a driver of economic activity. Retrieved February 18, 2018, from <https://oxfordbusinessgroup.com/overview/fuelling-expansion-industryremains-important-driver-economic-activity>
33. What's being done about overpopulation in Egypt? (n.d.). Retrieved from <https://www.egypttoday.com/Article/2/40295/What's-being-done-about-overpopulation-in-Egypt>.
34. Hussein1, A. A. A., & Pollock2, E. (2019, September 2). IOPscience. Retrieved from <https://iopscience.iop.org/article/10.1088/1755-1315/297/1/012027/meta>.

35. Khalifa, Mona, DaVanzo, Julie, Adamson, & M., D. (2000, January 1). Population Growth in Egypt: A Continuing Policy Challenge. Retrieved from https://www.rand.org/pubs/issue_papers/IP183.html.
36. Cromie, J. (2006). Introduction. QuickTime for .NET and COM Developers, 1–13. doi: 10.1016/b978-012774575-6/50003-8
37. Martin. (2019, September 20). Top Programming Languages Used in Web Development. Retrieved from <https://www.cleverism.com/programming-languages-web-development/>.
38. GPS methods. (n.d.). Retrieved from <https://oxforderewhon.wordpress.com/tag/gps-methods/>.
39. Self -Medication Problem in Egypt: A Review of Current and ... (n.d.). Retrieved from https://www.researchgate.net/publication/323255808_Self_Medication_Problem_in_Egypt_A_Review_of_Current_and_Future_Perspective.