

# A Framework for Smart e-Trader System for UAE Stock Markets

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*Abstract - The fast development in computing and communication has strongly changed the dynamics of financial markets. More people are trading online through the Web instead of using full-service brokerages. Many online financial services have given investors new opportunities to trade stocks and access real-time market information efficient way. But, very few investors in UAE are familiar and use these services. A survey was conducted in Dubai Financial Market (DFM) to study the need for such service and found a strong demand for it, especially among women investors. A new system architecture is being proposed, called smart trader, to accommodate investors' needs and profiles. Smart trader is a web-based application that provides a real time stock market information and personalized stock recommendation. It is suggested that deploying a smart stock trading applications in DFM would assist investors make an informative investment decision as well as help them streamline their stock trading transactions.*

**Keywords:** Online trading, Stock market, Recommendation system, Client-server architecture.

## 1.0 Introduction

A financial market is a place where firms and individuals enter into contracts to sell or buy a specific product such as a stock, bond, or futures contract. Buyers seek to buy at the lowest available price and sellers seek to sell at the highest available price. There are a number of different kinds of financial markets, depending on what you want to buy or sell, but all financial markets employ professional people and are regulated. Securities market is the place to buy stocks. Examples of securities markets include the New York Stock Exchange and the American Stock Exchange. Another securities market is the Over-the-Counter market, where a computer network of dealers buys and sells shares [14].

Technology has changed the way services are being handled and delivered especially in the brokerage industry and stock exchanges. Services that were traditionally provided by people became replaced by computers [1]. Technology has brought in improvements to individual's investments and trading. The development of technology has made a large amount of information and tools available for traders. The Internet and online trading products has facilitated efficient stock online trading. These technologies are provided at a lower trading cost and at a high communicating speed [13]. From 1995 through mid-2000, investors globally opened 12.5 million on-line brokerage accounts, and it is believed that these figures will grow more than 42 millions by the year 2003 [1].

The concept of online trading is defined globally as using a computer and the Internet connection to buy and sell orders with an online brokerage firm. With online trading, users have the option of placing orders at their own convenience. In the future, online trading will become more common, especially if after-hours trading and electronic communications networks (ECNs) become on demand. However, there are some issues to be worked out in these systems. Some of these issues include the responsibility of online brokerage firms to monitor trades by inexperienced or enthusiastic investors to prevent major losses resulting from inappropriate buy and sell decisions, and the need to keep and provide accurate records of all trades [18]. From a local point view the stock online trading is used to contribute in developing the national economy. It allows the national people gain money from trading through online markets [5]. People need to complete and improve their education and training experience. Investors should focus on trading fundamentals, technical analysis, and highly-developed skills of execution for as they are needed as important stocks trading instrument [22].

There are several recommendation systems for trading stocks that look up the user preferences to tailor its buy and sell advice [11]. Some of the most popular online stock trading programs are GCI Financial and Worden. GCI Financial is one of the world's largest online brokers offering commission-free trading [10]. Worden can show users charts of the stocks and manage a lot of data easily. The program can scan the stock market simultaneously for technical and fundamental conditions and improve the users trading with the added technical charts [27].

Buying and selling stocks isn't restricted to men only, but nowadays women are also becoming active investors in the stock markets. Recently, women have more representation percentages within investors, assisting policy makers and trade negotiators [3]. As people are becoming increasingly concerned about their financial futures, investors are entering the market at a younger age and investing their shares on the Internet. While investors in their late 20s to mid-40s comprise the large part of those making trades online, a new boom in online investing is taking place among those 25 years old and younger [9]. In the UAE, many banks and brokerage services are shifting gradually towards online trading services by allowing its clients to buy and sell shares over the Internet. By doing that officials are hoping to reduce administrative costs at the stock exchange and allow investors from outside the UAE to use the service [23]. So, the main goal behind this research project is to design and develop a reliable system that handles all stock trading transactions online without the intervention of a broker as well as helping investors decide when it is a good time to buy or sell a certain share based on a recommendation generated by the new system.

## **2.0 Existing Stock Trading Services**

The fast development in computing and communication has strongly changed the dynamics of financial markets. More people are trading online through the Web instead of using full-service brokerages. Online financial services have given investors new opportunities to trade stocks and access to real-time market information easily. Many online services have been grown all over the world and the number of investors using these services is growing [8]. Dubai Financial Market announced during the month of February that the value of electronic share trading (e-trading) on the market was close to AED8 billion in January 2006. Officials in the DFM believe that E-trading is a major priority for Dubai Financial Market. Officials have taken on the responsibility of spreading awareness about e-trading features and its importance especially within the investor and broker community [12].

Mubasher entered the UAE financial markets during 2005 and was considered as the leading e-financial solution provider. Mubasher combines straight-through processing (STP) with real time prices and advanced charting and analytical tools to empower reliable investment and allow investors to conduct remote transactions in financial markets. Mubasher provides a high-performance, digital data feed that delivers real-time stock market information from Dubai Financial Market (DFM) and Abu Dhabi Securities Market (ADSM) to investors and traders. With Mubasher, investors can control their trading decisions regardless of where they are [26]. Managers believe that online trading offers a huge advancement in stock market trading by overcoming difficulties and complexities faced by investors trading traditionally [21].

Emirates International Brokerage (EIB) a unit of Emirates Bank introduced eBroker, the online trading service in 2005. EIB allows its clients to buy and sell shares over the Internet [23]. Officials believe that EIB has helped to provide convenience to the investor and broker. The instantaneous verification and processing of the system eliminates latency, and allow for higher volumes of conducted transactions [24]. The online trading services was initiated for clients trading with EIB during 2005 and opened in January 2006 for the rest of customers. EIB offered convenience and faster methods of trading. The online trading system also reduced the problem of overcrowding on the floor of the stock exchange and the administrative costs at stock exchange [25]. The eBroker system uses a simple interface consisting of menu sections such portfolio, market, trading, accounts and many others. In order to join the system users should open an Investment account with EIB, get a login username and password from EIB and complete and sign an EIB Trade Agreement [7].

In 2005, Emaar Financial Services (FS) launched its real time online e-trading in UAE stocks. Traders can buy and sell shares online and monitor the performance of their portfolio [4]. As users of Emaar FS login to the program, they are provided useful trading tools and figures. The users get to view real time market prices and information. The tools in the program include: buying stocks, selling stocks, keeping track of user's portfolio, following up with the transactions (Trade Book) and displaying user's

statements and account details. Users can also view organized figures and statistics such as the top gainers, top losers, market index, market information by sector and companies' information [15].

### 3.0 Recommendation Systems

Recommendation systems are widely used nowadays and their purpose is to suggest items, usually products or services, to those who might be interested in them [19]. Recommendation systems help users find and evaluate items of interest where there are many overwhelming choices. Recommendation systems function by connecting users with information regarding the content of recommended items or the opinions of other individuals. These tools have become powerful tools in domains such as electronic commerce, digital libraries, and knowledge management [17]. Recommendation systems often exist as services embedded into web sites which support for e-commerce activities. Epinions.com, amazon.com, and ebay are some of the most popular commercial sites [19]. A variety of techniques have been proposed for performing recommendations, including content-based, collaborative, knowledge based and other techniques. Collaborative technique is the most familiar and most widely implemented technique [2]. One of the most known recommendation software is MetaStock Pro FX trading software that generates trading signals. MetaStock Pro FX has about 60 built-in experts that you can apply to your trading, and each depends on its own analysis techniques [20].

Some of the technique tools that are used to recommend in many stock applications include: One-year price history, Bollinger Bands, Volume chart, High-low-close and the Candlestick Patterns [16]. Bollinger Bands technique relays on the average of the last 20 days of the closing price of each day to do the comparison with the current price. Bollinger Bands is developed by John Bollinger; Bollinger Bands are similar to moving average envelopes. The bands are plotted at two standard deviations above and below a 20-day moving average. As a rule, prices are considered overbought when they touch the upper band. They are considered oversold when they touch the lower band. Using two standard deviations ensures that 95% of the price data will fall between the two trading bands [28].

### 4.0 System Operations and Features

Smart Trader is a high performance, interactive, application that delivers the necessary real-time stock market information to Investors and traders. Smart Trader provides advanced features and tools required by active traders. It will allow subscribers to observe the market move in real-time from the comfort of their homes or offices. In addition to that, Smart Trader recommends stocks buying and selling process based on an individual trading profile.

The following are functions/features that would be offered by the new proposed system:

Analytical charts: it displays different charts for a particular stock.

Buy and sell indicators: it displays a chart for a certain stock and the movement of the stock's price over a period.

Investor wallet: a portfolio of the investor's shares, quantity and price of each share.

Recommendation window: it provides a summarized analysis on what stocks to buy or sell.

Market view: it lists the stocks symbols available in the market and traces the price movement of these symbols.

Order box: it allows investors to place stock orders.

Financial News: it shows the financial news released from companies about the latest development in the market.

In this research paper we will adopt the Bollinger Bands method to recommend stocks to users of the program since its one of the most used tools and powerful technique. We created a simple structure of the recommendation system that could be improved in the future. As the user clicks recommend the application will compare the current price with the 20-day moving average. The application will look into the stock's prices within the 20 days and the recommendation will appear. The following recommendation messages will be displayed in the application in different transaction scenarios, when the user clicks the recommendation button In case of buying stocks scenario:

"Based on the last 20-day moving average we recommend you to buy the stocks, since the current price is greater than the 20-day moving average."

"Based on the last 20-day moving average we recommend you to not buy the stocks, since the current price is lower than the 20-day moving average."

In case of selling stocks scenario:

“Based on the last 20-day moving average we recommend you to sell the stocks, since the current price is lower than the 20-day moving average.”

“Based on the last 20-day moving average we recommend you not to sell the stocks, since the current price is greater than the 20-day moving average.”

In case of equality between the current price and the 20-day moving average for both buying and selling scenario: “Based on the last 20-day moving average we recommend you to wait for the next working day, since the current price is equal to the 20-day moving average.”

#### 4.1 The Proposed System Architecture

The system architecture of Smart Trader is based on the architecture of the system “Stock Tracker” with minor modifications [11]. Stock Tracker is an adaptive recommendation system for trading stocks. Smart Trader includes both recommendation module as well as modules for stocks transactions and investors portfolios. The Smart Trader is built on a client-server architecture, with information filtering, data keeping, and modification performed on the server, while the investor interface and related computing are done on the client, as depicted in Figure 1.

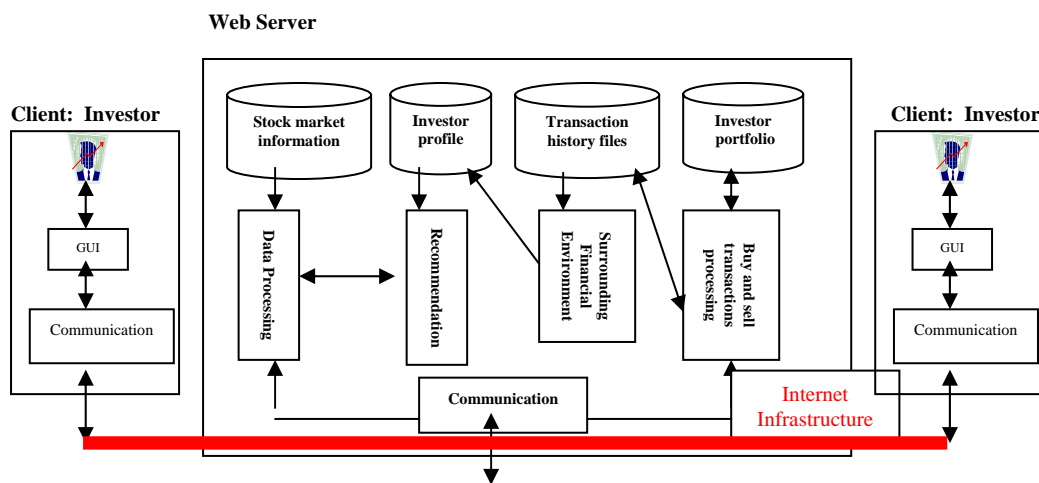


Figure 1: System architecture for smart e-trader

The web server contains the data processing unit, recommendation unit, surrounding financial environment unit, buy and sell transaction proceeding unit, and communication unit. The data processing unit converts raw input (i.e., current stock readings and historical trading information) into reports that contain buy and sell recommendations for the investor. It relies on the recommendation unit to make appropriate suggestions for each stock based on individual investor’s profile. The surrounding financial environment unit tracks the latest reports, news and developments about certain stocks and companies and constructs these profiles based on investor responses to previous recommendations. The buy and sell transaction proceeding unit records traces transaction history of investor with the system and also keeps track of investor portfolios. Finally, the communication unit manages the information into and out of the server.

A client contains a communication unit and a graphical user interface (GUI) component. The communication unit performs activities that correspond to the server’s communication unit. Meanwhile, the GUI presents all reports to the investor and accepts commands such as buying/selling stocks and viewing portfolios, along with requests for additional financial information on particular companies.

#### 4.2 System Prototype and Implementation

A simple prototype has been implemented to evaluate the usefulness and effectiveness of the proposed system. The aim of this project is to develop online stock trading software that is simple to understand easy to use by investors. The application works to minimize risks and produce profits for stock investors. The application provides recommendations on how to trade effectively, when and when not to trade and what to trade and why. The recommendation and analytical information provided by the application will aid in the trading decision making process. The new tool will provide the investor with

an updated quotes, charts and news headlines about the stocks. The application also includes a simple stock interface ordering menu and a stock wallet that keeps track of an investor's shares. The main feature behind the stock trading application is to provide recommendations and helps users to decide when it is a good time to buy or sell a certain share. Recommendations are done by certain technical analysis. Figure 11 and 12, show a screen shots of the newly developed prototype system.



Figure 11: Screen layout for an online trading program



Figure 12: Registration screen

## 5.0 Survey Used

In order to get the investors full responses and how likely they will respond and react to such system, a surveys was designed and used as an instrument to capture investors' perspectives, thoughts and opinions about the envisioned system. The survey was conducted in United Arab Emirates financial market at Dubai to assess the needs for an online stock trading services. The format of the survey was mainly multiple choice questions with a section for comments. We also provided a section to gather demographic data of the participants, the purpose of the survey was clearly stated. The survey targeted those who were active stock traders and also those who were not involved directly in the trading process. We thought that those who aren't active traders may become interested in trading if they learn about the availability of such system which will make their stock trading transaction simple and easy.

### 5.1 Discussion of Results

Our objectives are to reach as many individuals and groups from different age groups, job sectors and stocks trading experiences. The total number of respondents who participated in the study were 70. In terms of gender demographic, 35 of them are males and 35 are females. In terms of their job sectors, we have, 17 from business, 12 from education, 11 from technology, 12 from administrative positions and 17 were from other unlisted sectors. Regarding their age groups, we have 38 subjects are between the age group of 18 to 29, 29 subjects are between the age group 30 to 49 and 3 are between the age of 50 and above. In terms of active trading experience, 43 respondents were active traders and the rest are non active (see Figure 2).

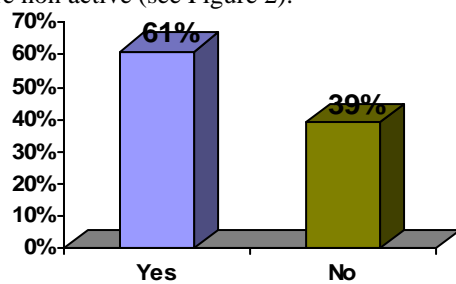


Figure 2: Trader status



Figure 3: Sources of stock trading

Out of these 43 participants, each has different years of experience in stock trading market. The largest group was the one with one year experience in stock trading (see Figure 4).

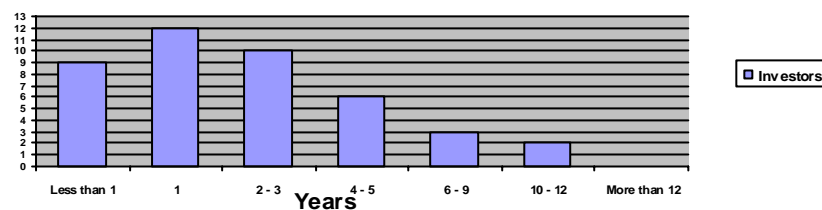


Figure 4: Trading experience

Out of the four most common sources to plan stock trading, it turned out that “own analysis” is the most used source, since 28 individuals responded that they depend on that source to decide their investment strategies (see Figure 3). 42 responded with “NO” knowledge of available stocks trading programs which shows the limited knowledge traders have of such tools in the market (see Figure 5). 28 of the people surveyed responded that are familiar with some stock trading programs such as Ticker Chart, Meta Stock, ABN and Mega Stock (see Figure 6). 63 participants stated that it would be useful if there is an online stock guide application available to them to use (see Figure 7).

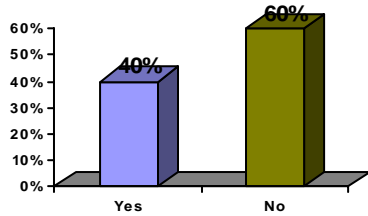


Figure 5: Knowledge of other stock services

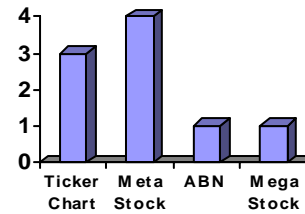


Figure 6: Familiar Trading Programs

The results of the preferred features were close to each others and the 2 most preferred features were “Analytical Charts” and “Buy and Sell Signals”, out of those, 49 responded that they would like to have the buy and sell feature and 48 preferred to have analytical charts analysis tool (see Figure 9). 38 samples agreed that they will depend on the recommendation provided by the software (see Figure 8).

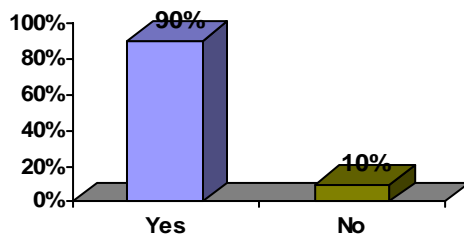


Figure 7: Usefulness of the new system

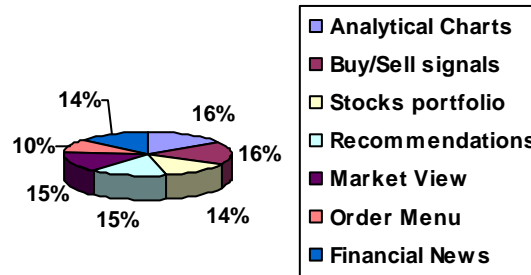


Figure 8: Preferred features in the new system

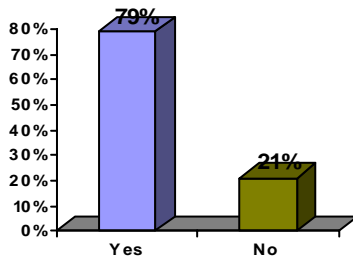


Figure 9: Investor's usage of the new system

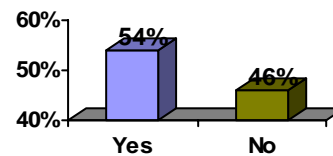


Figure 10: Investor's dependency on system

Finally, 55 participants responded that they are going to use such system if it was made available to them for a variety of reasons (see Figure 10). 15 subjects responded that they will not use such system for various reasons.

## 6.0 Future Work

The next logical step for this research is to test and evaluate this system with active investors using real time stock market information. Then, investors' perspectives, feedback and input needs to be collected and analyzed. The main purpose of the evaluation process of this project to assess its usage, usefulness and effectiveness.

## 7.0 Conclusion

In conclusion, many online stock trading products and services have given investors the option of placing orders at their own convenience. It turns out that many people in the UAE don't have a good knowledge of the available tools for online stock trading. People mainly buy and sell without evaluating the market or would have to use the help of brokers. Because of that, many investors are losing profits in the stock market. A new system architecture is being proposed, called smart trader, to accommodate investors' needs and profiles. Smart trader is a web-based application that provides a

real time stock market information and personalized stock recommendation. It is suggested that deploying a smart stock trading applications in DFM would assist investors make an informative investment decision, help them streamline their stock trading transactions as well as empowers them with smart information and tools required to make a profitable decisions.

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