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Online Examination Platform System

An Online Examination Platform System is a secure, digital solution designed to automate, conduct, and evaluate assessments remotely. Replacing traditional paper-based method.

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Abstract: The rapid digitization in education has accelerated the demand for secure and efficient examination systems. Traditional paper-based assessments suffer from a number of issues, including high administrative overhead, time-consuming evaluation, and vulnerability to human error. This study describes the design and implementation of an Online Examination Platform System that is scalable, reliable, and academically integrous. The design features secure authentication, automated grading, and real-time analytics to provide immediate scores while easing the burden of examiners. Multiple question types, such as multiple-choice, short, and descriptive, are enabled to increase assessment flexibility. Experimental results show increased efficiency, reduced expenses, and overall positive feedback from students and institutions. The study concludes that online examination platforms can serve as a sustainable alternative to traditional modes of examination, with further possibilities for future enhancement by AI-driven proctoring and integration with adaptive learning.

I. INTRODUCTION

Assessment is the most important aspect of the education system, mainly because it delineates the learning achieved, knowledge acquired, and academic performance attained by students. Conventionally, examinations were conducted in a paper-based fashion, which was effective but now is becoming increasingly inefficient in the digital era. Manual examinations usually take a lot of time and resources, with many errors occurring in the process of managing questions and their evaluation. In addition, the increasing demand for large-scale assessments, especially in higher education and competitive examinations, reveals the inefficiencies of traditional examination systems.

The emergence of OEPs, therefore, is, in a way, set to bridge this gap. It is an alternative to traditional written examinations, promising security, scalability, and efficiency. Institutes could achieve these advantages by conducting remote assessments enabled through automated grading, the generation of results in real time, and secure question delivery. Online systems also minimize administrative overhead, logistical barriers, and have shown the potential to be more sensitive towards ecological concerns by reducing paper consumption. Despite these advantages, challenges still occur in online examination platforms related to data security, academic-integrity, system scalability, and user accessibility. Modern platforms combine different technologies, including encryption, role-based authentication, artificial intelligence, and cloud computing to overcome such limitations. These advancements increase the overall reliability of the systems by also affording institutions with valuable insights through analytics and reporting tools.

The paper presents the design, development, and implementation of an Online Examination Platform System. It reviews existing systems, outlines the proposed methodology, and discusses the results of experimental implementation. It has been established in this paper that online examination platforms have proved to be effective in bringing efficiency, reliability, and transparency in the educational assessment process.

For this study secondary data has been collected. From the website of KSE the monthly stock prices for the sample firms are obtained from Jan 2010 to Dec 2014. And from the website of SBP the data for the macroeconomic variables are collected for the period of five years. The time series monthly data is collected on stock prices for sample firmsand relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

II. Type Style and Fonts

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3.1Population and Sample

KSE-100 index is an index of 100 companies selected from 580 companies on the basis of sector leading and market capitalization. It represents almost 80% weight of the total market capitalization of KSE. It reflects different sector company's performance and productivity. It is the performance indicator or benchmark of all listed companies of KSE. So it can be regarded as universe of the study.Non-financial firms listed at KSE-100 Index (74 companies according to the page of KSE visited on 20.5.2015) are treated as universe of the study and the study have selected sample from these companies.

The study comprised of non-financial companies listed at KSE-100 Index and 30 actively traded companies are selected on the bases of market capitalization.And 2015 is taken as base year for KSE-100 index.

3.2 Data and Sources of Data

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3.3 Theoretical framework

Variables of the study contains dependent and independent variable. The study used pre-specified method for the selection ofvariables. The study used the Stock returns are as dependent variable. From the share price of the firm the Stock returns are calculated. Rate of a stock salable at stock market is known as stock price.

Systematic risk is the only independent variable for the CAPM and inflation, interest rate, oil prices and exchange rate are the independent variables for APT model.

Consumer Price Index (CPI) is used as a proxy in this study for inflation rate. CPI is a wide basic measure to computeusualvariation in prices of goods and services throughout a particular time period. It is assumed that arise in inflation is inversely associated to security prices because Inflation is at lastturned into nominal interest rate andchange in nominal interest rates caused change in discount rate so discount rate increase due to increase in inflation rate and increase in discount rateleads todecreasethe cash flow's present value (Jecheche, 2010). The purchasing power of money decreased due to inflation, and due to which the investors demand high rate of return, and the prices decreased with increase in required rate of return (Iqbal et al, 2010).

I. RESEARCH METHODOLOGY

The proposed system, the Online Examination Platform System, is developed on a three-tier client–server architecture to be modular, secure, and scalable.

A. System Architecture

• Presentation/Front-end Layer: Implemented using HTML, CSS, and JavaScript/React for dynamic interfaces.
• Application Layer (Backend): Developed in Python using Django/Flask or Java with Spring Boot. Handles business logic, authentication, and grading.
• Database Layer: MySQL/PostgreSQL provides secure storage of user details, question banks, and results.

B. Security Mechanisms

• Role-based authentication and authorization.
• Hashing of passwords and SSL encryption.
• Plagiarism detection for descriptive answers.
• AI-powered proctoring (webcam and keystroke monitoring).

C. Question Management

• Question types supported: MCQs, true/false, fill-in-theblank, short answers, and essays.
• Randomized question sequencing to minimize cheating.
• Question bank management with difficulty tagging.
• Systematic risk is the only independent variable for the CAPM and inflation, interest rate, oil prices and exchange rate are the independent variables for APT model.

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Exchange rate is a rate at which one currency exchanged with another currency. Nominal effective exchange rate (Pak Rupee/U.S.D) is taken in this study.This is assumed that decrease in the home currency is inverselyassociated to share prices (Jecheche,2010). Pan et al. (2007) studied exchange rate and its dynamic relationship with share prices in seven East Asian Countries and concludethat relationshipof exchange rate and share prices varies across economies of different countries. So there may be both possibility of either exchange rate directly or inverselyrelated with stock prices.

Oil prices are positively related with share prices if oil prices increase stock prices also increase (Iqbal et al, 1012).Ataullah (2001) suggested that oil prices cause positive change in the movement of stock prices. The oil price has no significant effect on stock prices (Dash & Rishika, 2011).Six month T-bills rate is used as proxy of interest rate. As investors arevery sensitive about profit and where the signals turn into red they definitely sell the shares.

This sensitivity of the investors towards profit effects the relationship of the stock prices and interest rate, so the more volatility will be there in the market if the behaviors of the investors are more sensitive. Plethora (2002)has tested interest rate sensitivity to stock market returns, and concluded an inverse relationship between interest rate and stock returns. Nguyen (2010) studies Thailand market and found thatInterest rate has aninverse relationship with stock prices.

KSE-100 index is used as proxy of market risk. KSE-100 index contains top 100 firms which are selected on the bases of their market capitalization. Beta is the measure of systematic risk and has

alinear relationship with return (Horn, 1993). High risk is associated with high return (Basu, 1977, Reiganum, 1981 and Gibbons, 1982). Fama and MacBeth (1973) suggested the existence of a significant linear positive relation between realized return and systematic risk as measured by β. But on the other side some empirical results showed that high risk is not associated with high return (Michailidis et al. 2006, Hanif, 2009). Mollah and Jamil (2003) suggested thatrisk-return relationship is notlinear perhaps due to high volatility.

D. Evaluation and Result Processing

• Automated grading algorithms for objective questions.
• Descriptive answers stored for manual or AI-assisted evaluation.
• Instructors' analytics dashboards for student performance.**3.4.1 Descriptive Statistics**

Descriptive Statics has been used to find the maximum, minimum, standard deviation, mean and normally distribution of the data of all the variables of the study. Normal distribution of data shows the sensitivity of the variables towards the periodic changes and speculation. When the data is not normally distributed it means that the data is sensitive towards periodic changes and speculations which create the chances of arbitrage and the investors have the chance to earn above the normal profit. But the assumption of the APT is that there should not be arbitrage in the market and the investors can earn only normal profit. Jarque bera test is used to test the normality of data.

3.4.2 Fama-Mcbeth two pass regression

After the test statistics the methodology is following the next step in order to test the asset pricing models. When testing asset pricing models related to risk premium on asset to their betas, the primary question of interest is whether the beta risk of particular factor is priced. Fama and McBeth(1973)develop a two pass methodology in which the beta of each asset with respect to a factor is estimated in a first pass time series regression and estimated betas are then used in second pass cross sectional regression to estimate the risk premium of the factor.

According to Blum (1968) testing two-parameter models immediately presents an unavoidable errors-in-the variables problem.It is important to note that portfolios (rather than individual assets) are used for the reason of making the analysis statistically feasible.Fama McBeth regression is used to attenuate the problem of errors-in-variables (EIV) for two parameter models (Campbell, Lo and MacKinlay, 1997).If the errors are in the β (beta)of individual security are not perfectly positively correlated, the β of portfolios can be much more precise estimates of the true β (Blum, 1968).

The study follow Fama and McBeth two pass regressionto test these asset pricing models.The Durbin Watson is used to check serial correlation and measures the linear association between adjacent residuals from a regression model. If there is no serial correlation, the DW statistic will be around 2. The DW statistic will fall if there is positive serial correlation (in worst case, it will be near zero). If there is a negative correlation, thestatistic will lie somewhere between 2 and 4. Usually the limit for non-serial correlation is considered to be DW is from 1.8 to 2.2. A very strong positive serial correlation is considered at DW lower than 1.5 (Richardson and smith, 1993).

According to Richardson and smith(1993) to make the model more effective and efficient the selection criteria for the shares in the period are: Shares with no missing values in the period, Shares with adjusted $R^2 < 0$ or F significant (p-value) >0.05of the first pass regression of the excess returns on the market risk premium are excluded. And Shares are grouped by alphabetic order into group of 30 individual securities (Roll and Ross, 1980).

3.4.2.1 Model for CAPM

In first pass the linear regression is used to estimate beta which is the systematic risk.

Where $R_i$isMonthly return of thesecurity, R_f isMonthly risk free rate, R_m isMonthly return of market and βis systematic risk (market risk).

The excess returns $R_i - R_f$ of each security is estimated from a time series share prices of KSE-100 index listed shares for each period under consideration. And for the same periodthe market Premium

R_m - $R_f$also estimated. After that regress the excess returns R_i - R_f on the market premium R_m - $R_f$to find the beta coefficient (systematic risk).
Then a cross sectional regression or second pass regression is used on average excess returns of the shares and estimated betas.

Where λ_0= intercept, $\hat{R}_I$is average excess returns of security i,$\beta_I$isestimated be coefficient of security I and ϵ is error term.

3.4.2.2 Model for APT

In first pass the betas coefficients are computed by using regression.

Monthly return of stock i,R_f is risk free rate, β_i is the sensitivity of stock i with factors and ϵ is the error term.
Then a cross sectional regression or second pass regression is used on average excess returns of the shares on the factor scores.

Average monthly excess return of stock I, λ = risk premium, β_1 to β_4 are the factors scores and ε_i is the error term.

3.4.3 Comparison of the Models

The next step of the study is to compare these competing models to evaluate that which one of these models is more supported by data.This study follows the methods used by Chen (1983), the Davidson and Mackinnon equation (1981) and the posterior odds ratio (Zellner, 1979) for comparison of these Models.

3.4.3.1 Davidson and MacKinnon Equation

CAPM is considered the particular or strictly case of APT. These two models are non-nested because by imposing a set of linear restrictions on the parameters the APT cannot be reduced to CAPM. In other words the models do not have any common variable. Davidson and MacKinnon (1981) suggested the method to compare non-nested models. The study used the Davidson and MacKinnon equation (1981) to compare CAPM and APT.
This equation is as follows;

The average monthly excess returns of the stock i, $R_{APT=}$ expected excess returns estimated by APT, $R_{CAPM=}$ expected excess returns estimated by CAPM and α measure the effectiveness of the models. The APT is the accurate model to forecast the returns of the stocks as compare to CAPMif α is close to 1.

3.4.3.2 Posterior Odds Ratio

A standard assumption in theoretical and empirical research in finance is that relevant variables (e.g stock returns) have multivariate normal distributions (Richardson and smith, 1993). Given the assumptionthat the residuals of the cross-sectional regression of the CAPM and the APT satisfy the IID (Independently and identically distribution) multivariate normal assumption (Campbell, Lo and MacKinlay, 1997), it is possible to calculate the posterior odds ratio between the two models.In general the posterior odds ratio is a more formal technique as compare to DM equation and has sounder theoretical grounds (Aggelidis and Maditinos, 2006).
The second comparison is done using posterior odd radio. The formula for posterior odds is given by Zellner (1979) in favor of model 0 over model 1.
The formula has the following form;

WhereESS_0iserror sum of squares of APT, ESS_1iserror sum of squares of CAPM, Nisnumber of observations, $K_0$is number of independent variables of the APT and K_1 isnumber of independent variables of the CAPM.As according to the ratio when;
R> 1 means CAPM is more strongly supported by data under consideration than APT.
R < 1 means APT is more strongly supported by data under consideration than CAPM.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

Table 4.1: Descriptive Statics

Variable	Minimum	Maximum	Mean	Std. Deviation	Jarque-Bera test	Sig
KSE-100 Index	-0.11	0.14	0.020	0.047	5.558	0.062
Inflation	-0.01	0.02	0.007	0.008	1.345	0.510
Exchange rate	-0.07	0.04	0.003	0.013	1.517	0.467
Oil Prices	-0.24	0.11	0.041	0.060	2.474	0.290
Interest rate	-0.13	0.05	0.047	0.029	1.745	0.418

This has been tested on a sample group of 500 students and
20 faculty members in different disciplines.H_0 :
The data is normally distributed.
H_1 :The data is not normally distributed.
Analysis Transparency in grading and faster processing of results instilled more trust in the examination process. However, challenges in internet connectivity among some students highlighted the need for hybrid support

• Students: Reported high usability (average rating 4.6/5) and appreciated immediate feedback.

• Faculty: Experienced reduced workload in evaluation and result generation.

• Institutions: Printing, logistics, and administration costs were significantly reduced.

• System Efficiency: Reduced setup and evaluation time by about 75% compared to manual exams.

• Accuracy: Automated grading achieved an accuracy of almost 100 percent for objective questions.

• Scalability: Stress test passed with 1,000+ concurrent users without failure

Table 1 Table Type Styles

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III. ACKNOWLEDGMENT

The research shows that the Online Examination Platform System is a secure alternative to traditional methods. Key contributions include: Development of a modular architecture that is scalable and secure.

• Integration of automated grading and proctoring mechanisms. Positive user feedback indicating higher acceptance of online examinations. Future work should explore AI-powered proctoring for more effective detection, adaptive testing models, and blockchain for tamper-proof records

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