



Experts of Academic Excellence Research Centre
مركز خبراء التميز الأكاديمي للبحوث والدراسات



2nd International Conference on New Achievements and Developments in Multidisciplinary Academic Research

Seoul, South Korea

June 13-14, 2019



CONFERENCE PROCEEDINGS

BOOK OF PROGRAM & ABSTRACTS

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These abstracts are provided to all the honourable participants who have submitted their papers and are registered in our conference. Committee has made all the possible efforts to ensure precise/accurate replication of abstracts however if any inaccuracies found in the studies, event organisers will not be liable. Thank You.

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Preface

“Experts of Academic Excellence Research Centre” is one of the most distinguished professional and academic societies for scholars from various scientific fields. Our members constitute an international homogeneous group of distinguished scientists, mentors, students and practitioners who have precious knowledge of creation and innovation. Our mission and vision serve as the framework for our Roadmap to excellence. The road starts with our mission, which is represented in exploration of new research insights and an interactive platform for enhancing creativity and innovation. Alongside, it continues with our vision, which is to promote innovation and enhance excellence through research and development. Our core values are to ensure long term improvement in knowledge and inspiring creative thinking. Our strategic objective is to contribute brilliance in scientific research and innovation.

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Chair's Welcome

Experts of Academic Excellence Research Centre serves as platform that aims to help the scholarly community across nations to explore the critical role of multidisciplinary innovations for sustainability and growth of human societies. This conference provides a good opportunity for the academicians, practitioners, scientists, and scholars from across various disciplines to discuss avenues for interdisciplinary innovations and identify effective ways to address the challenges faced by our societies globally. The research ideas and studies that we received for this conference are very promising, unique, and impactful. I believe these studies have the potential to address key challenges in various sub-domains of social sciences and applied sciences.

I am really thankful to our honourable scientific review committee for spending much of their time in reviewing the papers for this event. I am also thankful to all the participants for being here with us to create an environment of knowledge sharing and learning. We the scholars of this world belong to the elite educated class of this society and we owe a lot to return back to this society. Lets break all the discriminating barriers and get free from all minor affiliations. Lets contribute even a little or single step for betterment of society and welfare of humanity to bring prosperity, peace and harmony in this world. Stay blessed.

Thank you

Prof. Dr. Mohammad

Conference Chair Person

Program at a Glance

DAY Thursday (June 13, 2019)

Welcome Reception & Registration

09:00 09:20 am

09:20 am 09:30 am	Introduction of Participants
09:30 am 10:00 am	Welcome Remarks Dr. Mohammad Conference Chair
10:00 am 10:30 am	Grand Networking & Session Tea Break

Thursday (June 13, 2019) - Theme: Business & Social Sciences

Session 001 (10:30 am 01:00 pm)

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Closing Ceremony

List of Conference Attendees

The following scholars/ practitioners/educationists who dont have any paper presentation, however they will attend the conference as delegates & observers.

No	Official ID	Name	Affiliation Details
1	SEO-269-101MA	Muhammad Khalid Masood	Service Institute of Medical Sciences, Pakistan
2	SEO-269-102MA	Andrew Yu	Physical Medicine & Rehabilitation Pain Medicine, USA
3	GSEI19-06-104A	Steven Stewart	USA

Friday (June 14, 2019)

All respective guests are free to conduct their own sightseeing and tour. The second day of the event is reserved for this memorable purpose.



*2nd International Conference on New Achievements and
Developments in Multidisciplinary Academic Research*

**THEME: BUSINESS, ECONOMICS, SOCIAL SCIENCES &
HUMANITIES**

Agency in Language Policy and Planning: A multidisciplinary perspective

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Drawing from two volumes co-edited by the presenter (Routledge Critical Studies in Multilingualism series, currently in press), this presentation outlines a conceptual model for the study of agency in language policy and planning (LPP) informed by approaches to theorizing agency in a variety of academic fields, and grounded in empirical research conducted in national contexts on all continents of the globe. This model also pays due consideration to the broad range of constraining and enabling forces involved in the complex interaction between language, language policy and language practice. Viewing LPP processes as comprised of decisions about languages made at governmental, institutional, local and individual levels, and as encompassing languagere-related decisions and actions both constraining and enabling situated language use, the presenter also addresses concerns over whether LPP efforts meet their stated objectives, how LPP processes influence attitudes of language users on the ground, and how ideologies influence LPP processes within and across multiple domains of social life.

Keywords: Language Policy.

Using Data Mining to Validate and Enhance the Student Selection Process

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The Singapore University of Social Sciences (SUSS) was established in April 2005 (then known as SIM University) as an institution for working adults to upgrade their skills and progress in their career. In 2014, SUSS launched three full-time degree programmes for fresh school leavers. In view of the strong demand for university places, a stringent selection process was introduced to assess the applicants. In particular, the study investigates the usefulness of the selection and other variables in identifying students who are likely to do well in the University, with an aim to validate and enhance the selection process. The findings show that the students demographic variables, prior academic performance, the discipline of the programme, as well as performance in selection activities are significantly associated with their academic performance at SUSS. This paper also discusses the implications of findings, and highlights the limitations and future directions. The integration of data mining, education and problem solving is illustrated in this paper.

Keywords: determinants of student performance, selection process, integration of research, education and problem solving.

The Impact of the Graded Response Method on English Language Learners

Assist. Prof. Laura Taylor

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The Graded Response Method (GRM) is a type of assessment that resembles a multiple-choice question except that the possible responses to the question require ranking from best to worst. For students to achieve the correct hierarchy of responses, they must not only be able to rationalize the correct answer but also to justify why other options are not as correct. In previous studies of the GRM at the university level, students demonstrated increased engagement with the course material suggesting the GRM was a valuable pedagogical strategy for instructors. Yet, the GRM relies on the intricacies of language to differentiate the best answer from the worst. It was hypothesized that students who did not have English as a first language would be negatively affected by this type of assessment model. As a result, research was conducted with a small first-year class of students to determine whether English Language Learners (ELLs) were adversely affected by the GRM. In leading up to the 20-question test, students were all given the same preparation. A guest speaker delivered the rationale and practice questions were completed as a group. This was followed by a practice test and group discussion. While the findings from this study are still being analyzed, preliminary data suggest that students who have been in Canada for more than five years and native English speaking students are better able to complete the GRM than students who have less than five years of residency in an English speaking country. Outcomes from this research add to the literature that already exists on assessment practices in the university context.

Keywords: Graded Response Method.

The Effects of nursing College Students Mentoring Activities on Their College Life Adaptation and Learning Attitudes

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This study was conducted to verify the effect of a mentoring program on college life adaptation and learning attitudes of nursing students. Data was collected from college students who participated in senior-junior mentoring activities from Mar. to Jun., 2018. The data from 233 students was processed to evaluate the effect of senior-junior mentoring program for single research. College Life Satisfaction of Ki-woong, Kim(2008) and Learning Attitude of Jeong-sun, Kim(2014) were used as the research tools and the collected data was processed by SPSS Win 18.0 program with descriptive statistics such as real numbers, percentage, average and standard deviation. Moreover, the differences of variables according to general characteristics were implemented by T-test and ANOVA and Scheffe test was used for post-test. The relationship among the variables was handled by Pearson correlation. In this study, students who have been involved in mentoring activities for a long time have greater ability to adapt to college life. The numbers of participation, advice and motivation also significantly affected their college life adaptation ability. In addition, the longer they attended the Mentoring Activities, the better their learning attitudes became. The mentoring program is regarded to affect the college life adaptation and learning attitudes of nursing students significantly. As a result, it is suggested that nursing departments make good use of mentoring activities, which will positively help nursing students to adapt their college life.

Keywords: Mentoring Activities , Learning Attitudes, Life Adaptation.

The Politics of North Korean Patriotic Songs

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Juche, the state ideology of the North Korea, governs every aspect of the life in the country - from politics and economy, to the arts and sports. Because of that it can be considered as the most fundamental factor in maintaining the country and mobilizing the masses, except for those from the highest echelons of the regime who shape, change, and implement the ideology. This makes Juche a very interesting area of study, especially considering that it is probably the longest-lasting ruling ideology inspired by Stalinism and, possibly, fascism. Understandably, this has led to a very large number of articles and monographs analyzing Juche. However, the vast majority of them either try to explain the philosophical basis of North Korea's perplexing ideology or how the said ideology influences the country's politics and economy. Considering that Juche is promoted by the regime as an ideology that permeates every aspect of the North Korean life, this very narrow analysis of the ideology has been detrimental for our understanding of the country. Luckily, in the last decade or so there has been a steady expansion in the scope of Juche studies, mainly in the fields of fine art, cinema, but also music and even sports. Yet, the majority of the texts, including the ones dealing with the implementation of the ideology in music, have always left something to be desired. For example, most works on Juche Realist music have been written by musicologists who focus on the development of melodies and musical instruments rather than on the lyrics on which the melodies are based. Also, there has been an overemphasis on the Socialist Realist influences on Juche Realism with a disregard to the equally important, and in some cases even stronger, Confucian ones. Moreover, the majority of the researchers have omitted the most crucial aspect of music in North Korea, namely how Juche thought has shaped the music and how the latter was used as one of the most effective means for political propaganda by the regime. This paper is a step towards fixing this.

Keywords: Politics, North Korea.

Roles of Storytelling on International Consumers Acculturation and Country Images: A Focus on U.S. TV Shows

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This study aims to investigate media content effects from international branding perspectives. Using Korean college students as a sample, we explore various storytelling dimensions of U.S. TV shows and their effects on international consumers attitudes toward U.S. TV shows, acculturation, and their attitudes toward the country such as the United States. We find that story dimensions of U.S. TV shows are categorized into American values, emotion, happy ending, competition, and science fiction. By employing a structural equation model, we further find that American values, happy ending, and competition influence attitudes toward U.S. TV shows, and American values and emotion are linked to the level of acculturation of international (e.g., Korean) audiences. More specifically, happy ending is negatively connected to attitudes toward U.S. TV shows. Moreover, attitudes toward US TV shows affect acculturation, and both attitudes toward U.S. TV shows and acculturation are linked to attitudes toward U.S. country brand. We discuss implications and recommendations for future research.

Keywords: TV shows, Storytelling, Acculturation, and Country images.



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THEME: ENGINEERING & APPLIED SCIENCES

Sorption characteristics of Sr²⁺ and Co²⁺ ions on modified kaolinite

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¹³⁷Cs⁺ and ⁹⁰Sr²⁺ radionuclides are the main nuclear fission product largely remain in the cooling wastewater, while ⁶⁰Co²⁺ is the product of nuclear reaction neutron activation. Therefore, the three nuclides are the main targets of nuclear waste. In comparison with the synthetic adsorbents, natural minerals are low-cost, abundant and environment friendly, which are suitable for treating massive radioactive wastewater. Due to the excellent removal effect of Cs⁺ ions on zeolite, the aim of this work is to explore promising natural adsorbent which is available to improve the uptake efficiency of Sr²⁺ and Co²⁺ ions. Earth abundant natural kaolinite was applied for the decontamination of Sr²⁺ and Co²⁺ ions. To modified the structural and composition of kaolinite but also to enhance the adsorption capacity, post treatment, such as heating, acid and basic activation processes were employed. The variations of structural coordination and chemical composition in correlation with the adsorption efficiency were carefully examined. This work also generalize the key factor that determine the uptake capability of Sr²⁺ and Co²⁺ for the purpose of facilitating the selection of appropriate adsorbents for the decontamination treatment of wastewater. According to the experimental results, the ionic exchange capacity strongly depended on the proportion of free-valence bonds, which was effectively modified by the post-treatment and as a consequence enhanced the adsorption efficiency. The adsorption effect of Sr²⁺ ions is positively correlated with the content of free valence bond, while Co²⁺ ions tend to exchange with high-coordinated Na⁺ ions. Based on the isotherm batch adsorption experiments, it showed that the uptake efficiency of Sr²⁺ and Co²⁺ of the raw and modified kaolinite increased from 7.55 to 181.49 and 21.18 to 121.95 mg/g, respectively.

Keywords: Sorption.

Application of Graphite Matrix Materials as Counter Electrode Catalyst for Copper-based Electrolyte System Dye Sensitized Solar Cell under indoor Light Conditions

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We reported the electrocatalytic activity of graphite matrix materials for the reduction of [Cu(II/I)(dmby)₂]TFSI₂/1 redox couple (dmby is 4,4',6,6'-tetramethyl-2,2'-bipyridine), and further applied to counter electrode catalyst(CEC) of Dye-sensitized solar cells(DSSCs). In this study, CECs were fabricated by pencil drawing, physical vapor deposition(PVD) of carbon rods and drop-casting multi-wall carbon nanotubes(MWCNTs), respectively. And each kind of CEC was made in two different thicknesses. First, the coverage and thickness of CECs were confirmed by SEM, and also the structure of CECs were verified by Raman spectrometer. Cyclic Voltammetry(CV) was performed to understand the electrocatalytic activity and theoretical limit current(I_{max}) of CECs. The charge transfer resistance(RCT) for the reduction of Cu²⁺ at the interface of the CEC/electrolyte was investigated by Electrochemical Impedance Spectroscopy(EIS). The results showed that when the coverage of the carbon material increased, the electrons had less chance to recombine (leakage) at the counter electrode. However, when the thickness increased, the electron transmission distance also lengthened, which had a negative effect on the current. In addition, a well electrocatalytic activity of CEC must have both a good electron transport path and a defect location that provided electrolyte contact. The electrocatalytic activity and I_{max} of the CEC were compared by CV, among which CEC made by MWCNTs had the best performance. We considered that because MWCNTs not only had great electrical conductivity and sufficient dangling bonds or defects to contact copper electrolytes, but also had a high specific surface area, which could increase the chance of contact with electrolytes. The RCT measured by EIS also confirmed this view. MWCNTs had the smallest RCT, which meant electrons were easier to pass through the counter electrode and reduced the electrolyte. The results of analysis were reflected in the photovoltaic performance of DSSCs, MWCNTs achieved 20.2% photoelectric conversion efficiency when measured under indoor light (200 Lux).

Keywords: Dye Sensitized solar cells; graphite matrix materials; counter electrode catalyst;

[Cu(II/I)(dmby)₂]TFSI₂/1 redox couple; indoor light.

Non Parametric Kernel in Time Series Data of Composite Stock Pricing: An Application at Indonesia Stock Exchange

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In this paper, non-parametric kernel time series data is introduced so that it can be used to do IHSG forecasting for several future periods. The Composite Stock Price Index (IHSG) is one of the stock price indices in Indonesia with time series data. We estimate non-parametrical composite stock pricing through the selection of optimum bandwidth by using cross validation with result of 305,1946. Nadaraya Watson's estimation and Gaussian kernel functions are used in kernel non-parametric regression. We compare multiple regression analysis and kernel non-parametric regression based on the Mean Absolute Percentage Error (MAPE) measurement in determining the best method with accuracy of 5,4%. Increasing the inflation parameters of one unit will increase the IHSG value. But an increase in exchange rates and interest rates in one unit will reduce the IHSG value. Exchange rate has a significant effect on the IHSG using non-parametric regression. These predictions can be used by investors to consider a policy of holding shares or selling shares of a company.

Keywords: Non Parametric, Kernel, Bandwidth, Nadaraya-Watson, IHSG.

Determination of Overpressure Zone and Its Mechanism in Dhama Field Indonesia

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Study of pore pressure becomes crucial in drilling program and reservoir prediction. Objective of this research are determine overpressure depth and factors which influence overpressure development in the study area. Dhama Fields has eight exploration wells targeting a sandstone reservoir at Talangakar Formation. Prediction of overpressure zone used log data (gamma ray, sonic, density and resistivity) as main data to determine pore pressure, overpressure depth and its mechanism in each exploration wells, several supporting data also use to confirm pore pressure and top overpressure depth determination such as drilling report, mudlogging, core, and pressure (MDT / DST). Based on comprehensive study, overpressure began at 2545 m 2820 m TVD of depth in each wells. Based on log and seismic correlation, overpressure zone in the Dhama Field generally located in Baturaja Formation and Talangakar Formation. Pattern of subsurface pressure show that pore pressure becomes bigger than hydrostatic pressure in Baturaja Formation but not significant, this zone called mild overpressure zone, and pore pressure increase significantly in Talangakar Formation as a hard overpressure zone. Based on geological history, Talangakar Formation was formed in synrift with sandstone and shale as dominant lithology. Low permeability shale in Talangakar Formation trigger overpressure because fluid trapped in the rock and result increasing pore pressure significantly compare with hydrostatic pressure. Mechanism of overpressure interpretate by effective stress pattern. Effective stress relatively constant with increasing of depth indicates loading mechanism especially disequilibrium compaction becomes main mechanism of overpressure. Sedimentation in upper part of Talangakar Formation happen faster than fluid escape, based on Terzhagis principle (1925) where overburden of sediment increase however pore fluid is trapped so compaction couldnt happen normally, effective stres will be constant. Besides loading mechanism also was found the effect of unloading mechanism which is diagenesis of clay minerals (smectite to illite), it acts on pore pressure increase significantly in deeper part of the basin.

Keywords: overpressure, log, Talangakar, loading, unloading.

THE EFFECTS OF SOFT AND HARD FACTORS OF LEAN MANUFACTURING PRACTICE ON FIRM PERFORMANCE IN TEXTILE GARMENT AND APPAREL INDUSTRY

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Lean Manufacturing (LM) is an approach used by a firm to reduce and eliminate waste appeared in the production and then generate value from the processes. Most of companies focus to implement hard LM practices which are tools and techniques in their production and operation while there is also an increasingly emphasize of soft lean manufacturing practices on the human side to synergize with the hard LM practice. Toyotas excellent performance is the case of emphasizing both the soft and hard LM practices in their management, production and operation. However, most manufacturers are focusing in using hard LM practices and neglect soft LM practices. Thus, this research investigates both elements of soft and hard LM practices to find out what elements have significant effect on firm performance in textile, garment and apparel industry. Quantitative research with purposive sampling method has been carried out survey questionnaire distributed to executives, engineers, employees and senior managers. The data collected from the 122 respondents are analysed. It was found that soft LM practices are well implemented in textile, garment and apparel industry. Research also provides evidence with the used of correlation analysis and proves that both elements of soft and hard LM practices have moderate positive significantly effect on firm performance. Research also proves the hypothesis studied through regression analysis. This study has contributed to lean manufacturing body of knowledge by identified the correlation relationship and significantly effect of soft and hard LM practice on firm performance and suggested that manufacturers should implementing Lean for good firm performance.

Keywords: Manufacturing, Soft Lean Manufacturing, Hard Lean Manufacturing, Firm Performance.

Preliminary Insight into Recognizing of Mannose toward LSMT Protein: Molecular Docking and DFT Study

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A novel protein like-lectin (LSMT) was discovered inadvertently during elucidation of the button mushroom *Agaricus bisporus* tyrosinase structure. The present study is focused on investigation of interaction between Mannose and LSMT using molecular docking and Density Functional Theory (DFT). The molecular docking result revealed three possible positions, of which the first resembles the sugar-binding region in the structures of its homolog (HA-33 or CNL) and second is located in the interface region to the tyrosinase subunit. Another position is a new finding region that includes interaction with five amino acid residues. The molecule complex was modeled by truncation of five selected residues then the atom of peptide chain frozen. In the final study, the interaction energy was analyzed using DFT showed that Threonine 91 (Thr91) has the highest role of interaction between ligand and protein.

Keywords: DFT, Interaction energy, LSMT, Mannose, Molecular docking.

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VISION

Our Vision is to Promote Innovation
and Enhance Excellence through
Research and Development.

NON PARAMETRIC KERNEL IN TIME SERIES DATA OF COMPOSITE STOCK PRICING: AN APPLICATION AT INDONESIA STOCK EXCHANGE

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Keywords:

Non Parametric
Kernel
Bandwidth
Nadaraya-Watson
IHSG

Abstract. In this paper, non-parametric kernel time series data is introduced so that it can be used to do IHSG forecasting for several future periods. The Composite Stock Price Index (IHSG) is one of the stock price indices in Indonesia with time series data. We estimate non-parametrical composite stock pricing through the selection of optimum bandwidth by using cross validation with result of 305,1946. Nadaraya Watson's estimation and Gaussian kernel functions are used in kernel non-parametric regression. We compare multiple regression analysis and kernel non-parametric regression based on the Mean Absolute Percentage Error (MAPE) measurement in determining the best method with accuracy of 5,4%. Increasing the inflation parameters of one unit will increase the IHSG value. But an increase in exchange rates and interest rates in one unit will reduce the IHSG value. Exchange rate has a significant effect on the IHSG using non-parametric regression. These predictions can be used by investors to consider a policy of holding shares or selling shares of a company.

INTRODUCTION

The stock price index is an indicator that shows stock price movements. The movement describes the market conditions at a certain time [6,8]. In the capital market, an index is expected to have functions including indicators of market trends, profit level indicators, benchmarks for the formation of a portfolio and development of derivative products [4]. Our study contributes to the growing number of index investing strategies. In fact, effective index tracking strategies benefit not only passive investors but also active portfolio managers [2,8].

Financial markets have witnessed rapid developments in indexation funds. That is deliver returns for a benchmark index with low turnover, diversified portfolios and low expenses. The Proportion of total market capitalization of indexation funds quadrupled from 2% to more 8% [3]. Nonparametric kernel estimation method is used to track index models with a conditional value at risk (CVaR) constraint [6,9]. That model can effectively address computational difficulty when the sample size is large. Monte Carlo simulations can be used to examine the performance of nonparametric kernel method when sample size and portfolio size increase [2,4,8].

In a comprehensive empirical study of option pricing models, [2,5,6] examine several alternatives to B-S parametric model that take the following three factors into account: stochastic volatility, stochastic interest rates and random jumps [4,7,8]. The SV achieves the best hedging results among all the models studied, and its remaining hedging errors are generally quite small [4]. In various statistical problems, regression techniques are commonly used for modeling the relationship between response variables and covariates for both independent and time series data [2,4,9].

Our focus in this paper is to determine the best method in predicting the IHSG. Kernel regression is used to estimate conditional expectations of random variables using kernel functions. Smoothing Kernel is obtained from weighted averages of data that depends on bandwidth.

Researchers have developed a series of computational methods, such as the heuristic frameworks [2,3], mixed-integer linear programming [6,7], a hybrid genetic approach [5] and a cutting plane approach [4]. Review these computational methods in detail and conclude that an individual method can only address certain problems in term of index tracking [2,6,8].

Recent years have witnessed considerable approaches on nonparametric regression for spherical data. A classical and long standing technique is the orthogonal series methods associated with spherical harmonic [9], with which the local performance of the estimate are quite poor, since spherical harmonics are not well localized but spread out over the sphere. Localization methods, such as the Nadaraya-Watson line estimate [1,5,7], local polynomial estimate [1,9] and local linear estimate [2,5] are also interesting nonparametric approaches.

Kernel is used to map the data into a high-dimensional features space in which a learning algorithm is used to find linear patterns [2,4]. The design of kernel methods for incomplete data is discussed by [1]. Support Vector Machines and Gaussian Processes for classification values are cast in a general framework for kernel methods as an estimation problem using exponential families in feature space [7,9].

The estimation of μ from a sample of *i.i.d* replications of (X, Y) , say $\{(X_k, Y_k), k = 1, \dots, n\}$, is of main interest. For any fix $X \in S$, this operator is such that $\mu(X) = E(Y|X = x)$, and therefore captures most of the effect of the regressor on the response. The basic nonparametric regression estimator, the so-

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called Nadaraya-Watson estimator, can readily be generalized to the functional regressor case, and is given by:

$$\hat{\mu}(X) = \frac{\sum_{k=1}^n K((X - X_k)/h) Y_k}{\sum_{k=1}^n K((X - X_k)/h)} \quad (1)$$

with K a kernel function from $[0,1]$ to \mathbb{R} and h a bandwidth. Since it has been introduced, this estimator has been subject to many studies, both theoretical and practical. In addition to the rates of convergence derived in [5,7] and [2,3,8] established its asymptotic normality, while [7] derived explicit expressions for its bias and its variance if $\|\cdot\|$ is a norm.

Nadaraya-Watson Kernel Estimator

In non-parametric kernel regression, we are interested in determining a relationship between two variables X and Y , where X is the explanatory variable and Y is the response variable. If we have m observations $\{(x_t, y_t)\}_{t=1}^m$ for the two variables, we want to estimate a regression relationship between X and Y such that:

$$y_t = E[y_t | x_t = x] + \varepsilon_t = g[x] + \varepsilon_t \quad (2)$$

where $\{\varepsilon_t\}$ is a zero-mean white noise sequence denoting the variation of y_t around a smooth but unknown nonlinear function $g[\cdot]$

Multivariate Kernel Regression

The techniques for estimating the conditional expectation function m of the bivariate distribution of the random variables Y and X were presented. The conditional expectation function is an interesting target for estimation since it tells us how Y and X are related on the average. The response variable Y depends on a vector of exogenous variables, denoted by \mathbf{X} . This means we aim to estimate the conditional expectation.

$$E(Y|\mathbf{X}) = E(Y|X_1, \dots, X_d) = m(\mathbf{X}) \quad (3)$$

where as before $\mathbf{X} = (X_1, \dots, X_d)^T$. Consider the relation

$$E(Y|\mathbf{X}) = \int y f(y|x) dy = \frac{\int y f(y, x) dy}{f_X(x)}. \text{ If we replace the}$$

multivariate density $f(y, x)$ by its kernel density estimate

$$\hat{f}_{h, H(y, x)} = \frac{1}{n} \sum_{i=1}^n K_h(Y_i - y) \kappa_H(\mathbf{X}_i - x) \text{ and } f_X(x) \text{ by} \quad (4)$$

We arrive at the multivariate generalization of the Nadaraya-Watson estimator:

$$\hat{m}_H(x) = \sum_{i=1}^n \kappa_H(\mathbf{X}_i - x) Y_i / \sum_{i=1}^n \kappa_H(\mathbf{X}_i - x) \quad (5)$$

The multivariate kernel regression estimator is again a weighted sum of the observed responses Y_i . Depending on the choice of the kernel, $\hat{m}_H(x)$ is a weighted average of those Y_i . The multivariate Nadaraya-Watson estimator is a local constant estimator. The definition of local polynomial kernel regression is a straightforward generalization of the univariate case. Let us illustrate this with the example of a local linear regression estimate. The minimization problem is here:

$$\min_{\beta_0, \beta_1} \sum_{i=1}^n \{Y_i - \beta_0 - \beta_1^T (\mathbf{X}_i - x)\}^2 \kappa_H(\mathbf{X}_i - x) \quad (6)$$

The solution of the problem can hence equivalently be written as

$$\hat{\beta} = (\hat{\beta}_0, \hat{\beta}_1^T)^T = (\mathbf{X}^T \mathbf{W} \mathbf{X})^{-1} \mathbf{X}^T \mathbf{W} \mathbf{Y} \quad (7)$$

using the notations $\mathbf{X} = \begin{pmatrix} 1 & (\mathbf{X}_1 - x)^T \\ \vdots & \vdots \\ 1 & (\mathbf{X}_n - x)^T \end{pmatrix}$, $\mathbf{Y} = \begin{pmatrix} Y_1 \\ \vdots \\ Y_n \end{pmatrix}$ and

$\mathbf{W} = \text{diag}(\kappa_H(\mathbf{X}_1 - x), \dots, \kappa_H(\mathbf{X}_n - x))$. In (7) $\hat{\beta}_0$

estimates the regression function itself, whereas $\hat{\beta}_1$ estimates the partial derivatives with respect to the components x . In the following we denote the multivariate local linear estimator as

$$\hat{m}_{H,1}(x) = \hat{\beta}_0(x) \quad (8)$$

Kernel Function

The kernel function's ability to smooth data hinges on the bandwidth or smoothing parameters. How this bandwidth is selected is of utmost importance in applied work and least square cross validation has proven a popular approach when discrete data are present given the lack of simple rule of thumb or plug-in bandwidths [1,8,9]. This study used Gaussian Kernel with form $k(u) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{u^2}{2}\right)$, $u = \frac{x - X_i}{h}$ so that the form is obtained:

$$\hat{m} = \sum_{i=1}^n \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2} \left(\frac{x - X_i}{h}\right)^2\right) Y_i}{\sum_{i=1}^n \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2} \left(\frac{x - X_i}{h}\right)^2\right)} + \varepsilon_i \quad i = 1, 2, \dots, n \quad (9)$$

Choice of Optimum Bandwidth

The choice of bandwidth according to smoothing parameters is an important part of nonparametric regression. A balance between variance and bias is needed by using the Nadaraya-Watson estimation. The relationship between bias and variance is Mean Square Error (MSE). The bandwidth of the kernel is a free parameter that shows a strong influence on the

predictions produced. If the bandwidth is not fixed but varies depending on the estimation or sample, it will produce a method known as additive kernel bandwidth estimation. The cross validation method is used by minimizing the value of bandwidth or the number of residual squares. The bandwidth value is close to zero, decreases $\hat{m}(X)$ to get the corresponding Y_i, \hat{e}_i approaches zero and the residual squared number decreases. The quality of $\hat{m}(X)$ can affect the value of the independent variable, this allows for conformity to minimize the variance of the number of residual squares, so that this is called cross validation.

$$CV(h) = \frac{1}{n} \sum_{i=1}^n \hat{e}_{i-1} M(X_i) \quad (10)$$

RESULTS AND DISCUSSION

Overview of Variables

The scatter plot presentation aims to get an overview of the IHSG, KURS, Inflation and Interest Rates data for the period of Januari 2016 to March 2019. The data used were 39 research objects. The index value of the composite stock price has a fluctuating data pattern with the lowest value of Rp. 4326.47 and the highest value of Rp. 6585.85. This fluctuating patters occurs because of the influencing factors, namely the rupiah exchange rate, interest rates and inflations.

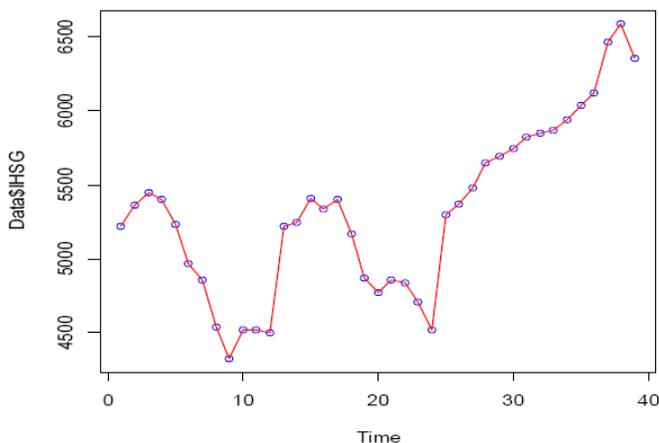


Fig. 1. IHSG Variable Data (Composite Stock Price Index)

The movement of the rupiah exchange rate againts the value of the US dollar has increased and decreased. The rupiah exchange rate selling againts the US dollar occurred in September 2016, which was Rp. 14468 and decreased in January 2016 amounting to Rp. 12461. The factor of the movement of the composite stock price index was also influenced by inflation in Indonesia. At the beginning of 2016 until the middle of the inflation rate in Indonesia is in the data interval of 4% - 3%. The inflation conditions in Januari 2016 to March 2019 are in the type of mild inflation due to the rating scale of < 10% per year. Mild inflation conditions can provide comfort among investors and company management as a policy to invest.

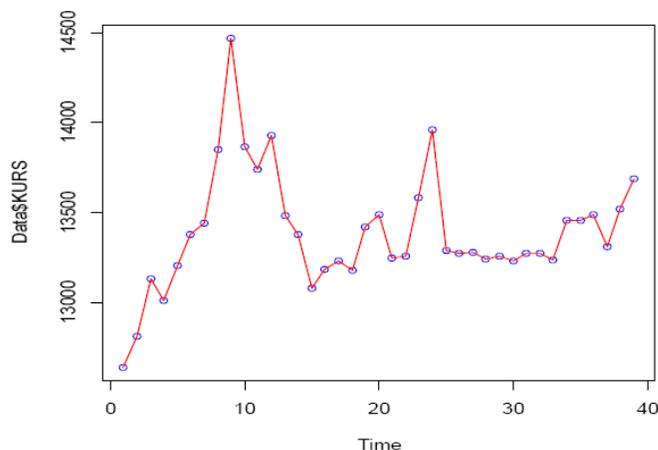


Fig. 2. KURS Variable Data Plot

The general description of Interest Rates in Indonesia during Januari 2016 to March 2019 seems to always decline. With the continued decline in interest rates in Indonesia, various parties can make use of investments. But, in conditions of increased interest rates can encourage someone to save with the aims of getting more profits.

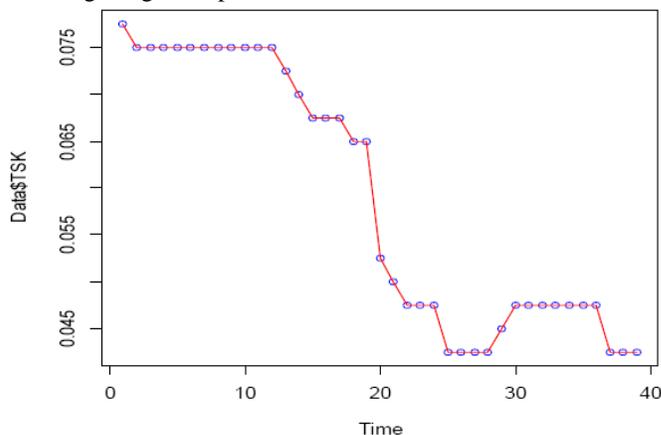


Fig. 3. Interest Rates Variable Data Plot

Multiple Linear Regression

Based on the parameter values obtained, the function of the equation model formed is:

$$IHSG = 1.5 \times 10^4 - 0.66(KURS) + 6.5 \times 10^3 (Inflation) - 2.8 \times 10^4 (Interest Rates) \quad (11)$$

Simultaneous testing is carried out to determine the feasibility of the model. Obtained $F_{\text{calculate}}$ value of 10.72. At the 5% significance level it can be said that the independent variables simultaneously have an influence on the dependent variable. Due to the value of $F_{\text{calculate}}$ more than the value of $F_{\text{table}} = 2.882$, the model obtained is feasible to use. Independent variable testing are reflected in Table 1:

TABLE 1
PARTIAL TESTING OF PARAMETERS

Variables	Coefficient	t _{-calculate}
Constanta	15554,21	5,329
KURS	-0.6620	-3,043
Inflation	6507,66	0,924
Interest Rates	-28162	-3,739

The KURS and Interest Rate variables have a significant influence on the IHSG with a t_{-table} value = -1.689. But the Inflation variable does not have a significant effect on the IHSG because the absolute value of t_{-calculate} is smaller than the absolute value of t_{-table}.

Testing of Classical Assumptions

Assumption of multiple regression analysis methods is reflected in Table 2.

TABLE 2
TESTING OF CLASSICAL ASSUMPTIONS

Type of Testing	P-Value	Alpha
Normality Test	0.9465	5%
Autocorrelation Test	2,2 x 10 ⁻¹⁶	5%
Heteroscedasticity Test	0.003092	5%

Residual testing on normality using the Jarque-Bera method while heteroscedasticity testing uses the Breusch-Pagan-Godfrey test. VIF value (Variance Inflation Factor) is used to test the correlation between independent variables. If the VIF value is > 10 or tolerance value < 0.1 then multicollinearity occurs. Multicollinearity and correlation tests are reflected in Table 3.

TABLE 3
MULTICOLLINEARITY TEST & CORRELATION VALUE

Variable	VIF	Correlation
KURS	1,010701	-0,4036
Inflation	2,179153	-0.3121
Interest Rate	2,178382	0,5647

Nonparametric Kernel Regression

The use of kernel nonparametric regression aims to forecast IHSG several future periods based on the KURS, Inflation and Interest Rate variables. The steps are choosing the optimum parameter for each variable, testing the suitability of the model, testing the parameters, calculating determination and forecasting for several future periods.

Optimal bandwidth (*h*) selection aims to start the curve estimated by using Cross Validation (CV). The optimum bandwidth value of each variables is reflected in Table 4.

TABLE 4
OPTIMUM BANDWIDTH VALUE

Variables	Bandwidth	Number of Data
KURS	302,0932	
Inflation	71135,15	39
Interest Rates	0,00289197	

Suitability testing of models in nonparametric regression using the goodness of fit test. Obtained the p-value for the model suitability test of 0.25815 which is compared with the 5%. So it can be concluded that the model used is not appropriate. But partial testing is done to examine the effect given by each independent variable for the dependent variable.

Based on partial testing of parameters, it was concluded that the parameters that influence the nonparametric kernel regression model are the KURS variable. This is because the p-value of the KURS variable of (2x10⁻⁶) is smaller than alpha (5%). While the Inflation and Interest Rate variables have no effect in the kernel nonparametric regression model because the value of the p-value of the two variables is greater than alpha (5%). The value of parameter testing is reflected in Table 5.

TABLE 5
PARAMETER TESTING VALUE

Variables	Alpha	Value of t _{-calculate}
KURS	5%	2 x 10 ⁻⁶
Inflations	5%	0,72682
Interest Rates	5%	0,10777

Nadaraya-Watson's estimation $\hat{m}(x)$ is used in model formation using the Gaussian function. Obtained the value of $\hat{m}(x)$ is 208,495.2. Then the nonparametric kernel regression model that is formed is $IHSG = KURS(208.495,4) + \varepsilon$. Based on the results of the analysis, it is known that the KURS variable. has an effect on the IHSG variables. The coefficient value of 208,495.4 explains that when the value of the KURS variable increases by Rp. 1, then the value of the IHSG variable will increase by Rp. 208,495.4. And vice versa if there is a decrease in the value of the KURS variable of Rp. 1, then the value of the IHSG variable will decrease by 208,495.4.

Based on the calculation of optimum bandwidth selection, a nonparametric regression model is obtained using the Gaussian Kernel function as follows:

$$Y_i = \frac{\sum_{i=1}^n \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{x-X_i}{302,0932}\right)^2\right) Y_i}{\sum_{i=1}^n \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}\left(\frac{x-X_i}{302,0932}\right)^2\right)} + \varepsilon_i \quad (12)$$

The coefficient of determination of multiple linear regression and kernel nonparametric regression is shown through the Adjusted R-Square value of the model that influences the independent variable on the dependent variable. In the multiple linear regression model the value is 0.4790 and in the nonparameteric kernel regression is 0.5765. The meaning of the value gives the diversity of the dependent variable on the model able to be explained by the independent variable of 47.90% while that of 52.10% is explained by other variables not in the model. Nonparametric kernel regression provides a higher value compared to multiple linear regression.

Prediction Result of Composite Stock Prices Index with Multiple Linear Regression and Kernel Nonparametric Regression

The Following are the result of predictions for several periods based on the result of multiple linear regression analysis and kernel nonparametric linear regression using variables that affect the Composite Stock Prices Index on the Indonesia Stock Exchange is reflected in Table 6. The difference between predictive and actual data from both methods is presented in Fig. 4 and Fig. 5.

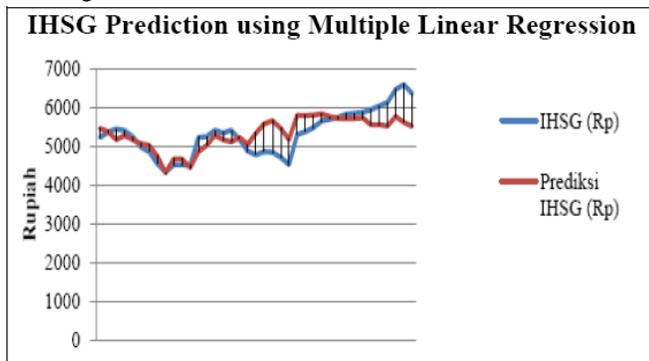


Fig. 4. Plot of actual data and predictive data using Multiple Regression Methods

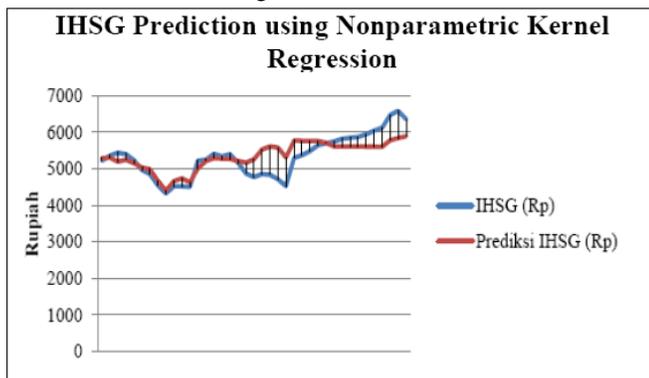


Fig. 5. Plot of actual data and predictive data using Nonparametric Kernel Regression Methods

The IHSG data prediction using nonparametric kernel regression method is not much different from the multiple linear regression method. However, kernel nonparametric regression method is better at predicting IHSG compared to using multiple linear regression method. In determining the best method to predict

IHSG, it can use the Mean Absolut Percentage Error (MAPE) calculation each method. The smaller value of MAPE means the ability to predict the data is very good. On the contrary, if the MAPE value is greater, the predictive ability is bad. The calculation value of MAPE in the two methods is less than 10%, which means that the ability of the method in prediction of IHSG for the next few periods is very good. Comparing the MAPE calculation value, nonparametric kernel regression less than multiple linear regression. Then, it is obtained that the best method in predicting IHSG data is nonparametric kernel regression method. The MAPE value is reflected in Table 7.

Discussion

We present a framework for estimating nonparametric kernel time series data to forecast Composite Stock Prices Index. In this work, we use IHSG data from January 2016 up to March 2019. Nonparametric regression is used since it doesn't require assumptions, so it is more flexible with data patterns. Kernel functions are assumed to use independent samples with estimates that depend on data and bandwidth. Optimal bandwidth values using the Gaussian function. The estimator under study is the extension of Nadaraya-Watson estimator to this particular case, based on general semi-distance (\cdot) measuring the proximity between two radom elements of the functional space.

Future work on theoretical side could focus on develop other estimators, including Parzen Kernel Function, Quadratic, Triangular, Uniform etc and using variables from external factors that affect to IHSG. Application of kernel methods can be limit by presence of observation with one or more missing component values also referred to as incomplet data. However, some popular kernel such as Gaussian and Polynomials, kernel methods suffer from either a similar problem as the localization methods, or a similar drawback as the orthogonal series methods. Besides the good generalization capability, some real world application also require the estimate to the possess the smoothness, low computational complexity and sparsity. Kernel regularization schemes associated with the needlet kernel, including the kernel bridge regression and kernel lasso estimate.

TABLE 6
PREDICTION RESULT OF COMPOSITE STOCK PRICES INDEX

Month	Multiple Linear Regression		Kernel Nonparametric Regression	
	IHSG (Rp)	Prediction of IHSG (Rp)	IHSG (Rp)	Prediction of IHSG (Rp)
Jan'16	5220,57	5454,48	5289,92	5286,538
Feb'16	5360,58	5367,69	5305,51	5299,690
Mar'16	5443,36	5162,63	5200,92	5195,232

Apr'16	5398,29	5268,41	5255,22	5247,618
Mei'16	5232,22	5163,63	5157,44	5154,193
Jun'16	4967,81	5055,79	5027,24	5033,528
Jul'16	4856,56	5014,84	4973,07	4983,735
Agt'16	4540,78	4738,90	4643,55	4667,301
Sep'16	4326,48	4307,42	4396,94	4407,801
Oct'16	4517,16	4669,07	4635,71	4659,033
Nov'16	4518,39	4662,54	4714,32	4739,572
Dec'16	4501,80	4439,21	4603,98	4625,022
Jan'17	5217,68	4854,36	5017,07	5003,678
Feb'17	5245,67	5013,70	5222,46	5209,9
Mar'17	5405,67	5281,25	5293,72	5290,14
Apr'17	5336,82	5158,72	5280,28	5276,015
Mei'17	5401,24	5109,93	5273,40	5268,681
Jun'17	5166,09	5221,06	5217,08	5209,804
Jul'17	4870,49	5046,22	5165,57	5163,132
Agt'17	4769,43	5327,86	5180,17	5261,257
Sep'17	4852,67	5575,98	5486,79	5525,797
Oct'17	4930,63	5650,20	5503,12	5740,335
Nov'17	4708,6	5456,19	5579,56	5577,818
Dec'17	4520,44	5171,37	5251,06	5309,606
Jan'18	5294,86	5791,91	5779,54	5769,429
Feb'18	5370,01	5783,6	5773,62	5764,493
Mar'18	5478,67	5798,74	5775,14	5765,766
Apr'18	5649,75	5833,15	5762,98	5755,542
Mei'18	5692,10	5758,45	5706,63	5711,506
Jun'18	5744,55	5709,21	5621,35	5610,734
Jul'18	5821,85	5711,59	5622,00	5611,551
Agt'18	5844,49	5709,18	5622,00	5611,548
Sep'18	5865,23	5723,84	5621,49	5610,898
Oct'18	5941,4	5540,83	5610,61	5602,918
Nov'18	6038,16	5554,45	5610,45	5602,789
Dec'18	6121,17	5512,92	5605,37	5598,696
Jan'19	6465,09	5763,94	5786,89	5775,519
Feb'19	6585,65	5611,39	5868,27	5839,973
Mar'19	6355,09	5505,29	5936,19	5889,119

TABLE 7
CALCULATION OF MEAN ABSOLUTE PERCENTAGE ERROR (MAPE)

Type of Regression	MAPE
Multiple Linear	5,9%
Nonparametrik Kernel	5,4%

CONCLUSION

In this work, an original method to estimate the expected value of Gaussian Kernel. Based on our experimental result, the proposed approach to kernel estimation consistently performed comparably or better than other parametric and nonparametric approaches that are considered state of the art. It is important related to the impact of the performance in our study including the distribution of the models and data distribution estimation prodecure. In

future works we intend to extend the proposed formulation to include new distributions to model the squared distances and also evaluate the impact using different distribution estimation procedures. The result of prediction for several periods based on the result of multiple linear regression and kernel nonparametric linear regression using variables on the Indonesia Stock Exchange. The best method in predicting IHSG data is nonparametric kernel regression method based on MAPE value

and optimum bandwidth. Nadaraya-Watson estimation and Gaussian Kernel function are used in Nonparametric Kernel Regression.

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Symbols

$\hat{\mu}(X)$: Functional Regressor
 K : Kernel Function
 h : Bandwidth
 X : Explanatory variable
 Y : Response variable
 y_t : Regression estimate
 $\{\varepsilon_t\}$: Zero-mean white noise sequence
 $g[\cdot]$: Unknown nonlinear function
 \mathbf{X} : Vector of exogenous variables
 $m(\mathbf{X})$: Conditional expectation
 $\hat{f}_{h, \mathbf{H}(y,x)}$: Kernel density
 $\hat{m}_{\mathbf{H}}(x)$: The multivariate kernel regression estimator
 $CV(h)$: Cross validation.

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