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Website : <https://adi-journal.org/>

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FOREWORD FROM CHAIRMAN OF ADI

By saying thanksgiving, Alhamdulillahrabbi 'Alamin,

It is a reputable Scientific Publication Media aim to foster research finding that concentrate on recent innovation and creativity to support advancement in global civilization and humanity, Adi Journal On Recent Innovation (AJRI) is continuously published by referring to the principles of journal writing. AJRI is a scientific journal published by Asosiasi Dosen Indonesia (ADI), to facilitate and accommodate the results of scientific journals of qualified academics in the field of Multidisciplinary.

According to the vision and mission of the AJRI Journal, In 2022, ADI Journal On Recent Innovation (AJRI) becomes a journal publisher who succeeds in accommodating information on the development of Multidisciplinary throughout the world, contributing to researchers in promoting information on Multidisciplinary in the world. Therefore, AJRI always supports the Ministry of Research, Technology and Higher Education, Revised Implementing Rules And Regulations (RIRR) to prepare as early as possible the generation of the nation to face the education revolution era, one of which is through the quality ADI Journal On Recent Innovation (AJRI) journal, digitally packaged and based on Open Journal System (OJS).

AJRI is published 2 (two) times a year, in March and September. Insya Allah, the quality improvement will be achieved by registering AJRI in the journal indexation with the national reputation Science and Technology Index (SINTA) and the international level indexation of Scopus.

It is expected that through this journal AJRI, the downstream of education in the field of Multidisciplinary science can be realized better so that it can be beneficial for the entire academic community in ADI in particular and the global community in general in order to increase knowledge of Multidisciplinary science.



Indonesia, September 2020

Dr. Dino Patti Djalal
Chairman Of ADI

<https://bit.ly/ForewordFromChairmanofADIV3N1>

FOREWORD FROM HEAD EDITORIAL

Bismillahirrahmanirrahim praise and gratitude we pray over the presence of the Allah SWT who has given grace and guidance so that it can be finished publishing the AJRI Volume 3 Number 1 September 2021. Where the publication of this journal can be defined as media documentation and scientific information that can help lecturers, students and researchers in publishing research results, opinions and scientific studies to a wide scientific community. Publication of the AJRI Volume 3 Number 1 contains 10 papers, which evolves in the field of Multidisciplinary. Expected to be beneficial to a wide scientific community.

As for 10 (ten) journal published in this edition are:

1. Leon Yudi Haryanto
Abdul Hayat
Abdul Hamid Arribathi
Multicam Studio Design Using Vmix As A Learning Media In SMK Bina Am Ma'mur
2. Muhammad Wira Akira
Hanuna Haritsah
Anne Zulfia
Ekavianti Prajateljista
Mechanical and tribological properties of nano-sized Al₂O₃ particles on ADC12 alloy composites with Strontium modifier produced by stir casting method
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Analysis of the Hajj Fund Management Based on the Fatwa of the National Sharia Council (DSN) Number 122 Concerning the Management of BPIH Fund and Special BPIH Based on Sharia Principles
4. Mustafa Danaci
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Muhammad Ali Abbasi
Discussion of Agile Software Development Methodology and its Relevance to Software Engineering

On this occasion, we invite researchers to submit a manuscript to our editorial summary. Finally do not forget we say many thanks to all those who have helped the publication of this journal, in particular to participate in sending articles to our editors. May be useful for all of us.



<https://bit.ly/AJRIV3N1>

Indonesia, September 2021

Professor. Jalel Ben-Othman
Editor in Chief

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Multicam Studio Design Using Vmix as a Learning Media in Smk Bina Am Ma'mur

Leon Yudi Haryanto¹, Abdul Hayat², Abdul Hamid Arribathi³
Raharja University^{1,2,3}

e-mail: Leon.yudi@raharja.info , Abdul.hayat@raharja.info , Abdulhamid@raharja.info



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Abstract

The media is a tool that intersects in the process of teaching and learning for the achievement of educational goals in general and learning objectives in schools in particular. The media is also a means of transporting messages or information that is instructional or contain teaching purposes and is therefore called learning media. Many benefits can be taken from media management from what we know so far. The practical benefits of instructional media in the teaching and learning process are learning media that can clarify the presentation of messages and information so as to facilitate and improve the process and learning outcomes. The use of instructional media with multicam studio design using vmix can increase student motivation and can also affect student achievement or learning outcomes. It is expected that the results of this learning media will have an impact on increasing students in learning the basics of multimedia systems, as well as a question and answer activity to increase student activity in the learning process.

Keywords: Studio, Multicam, Vmix

I. INTRODUCTION

Along with the times, the level of need for information and changes in the technology cycle is increasing for society. Technological developments are more sophisticated than before. People have started to adapt to technological developments and have begun to explore things they never imagined before (Diat Prasajo, 2011).

Technology has long been used in the world of education. The invention of paper, printing machines, radio, film, television, computers and others was used for education. In essence, these tools are not made specifically for educational purposes, but these tools can actually be used in the world of education (Budiman, 2017).

The development of information technology which is increasingly rapid in the current era of globalization cannot be avoided anymore its impact on the world of education. Global demands require the world of education to always and constantly adjust technological developments to efforts to improve the quality of education, especially adjusting its use for the world of education, especially in the learning process (Budiman, 2017).

Indirectly, various types of technology have emerged, with the internet as the cog. The problem that will be resolved in this research is how the application is able to send information and receive information quickly, effectively, stably, and easily to use to send information from one sending computer to one or many receiving computers via a computer network (Prayitno, 2015).

According to Putra and Vella Carisa (2019: 65) [14] "Media is a tool, means, intermediary and liaison to spread, carry or convey a message and ideas to the recipient." Meanwhile, according to Sanni, et al (2019: 23) [15] "Deviation of messages or one of the advertising communications carried out by certain media, such as television, newspapers, magazines, radio, internet, profile books, outdoor media, transit advertisements and direct mail. ." In its use, media is one component of the learning system. For its main component, the media should be an integral part and must be in accordance with the learning process as a whole. Therefore, the selection of media in learning activities allows students to interact with the media we choose.

According to Tawaerubun (2015) streaming video is a technique used to transfer data so that it can be processed regularly and repeatedly. Streaming video utilizes a streaming server to transmit digital video over a data network so that video playback can be done immediately. Video is a very complete means of delivering information and can be implemented using streaming technology.

General description SMK Bina Am Ma'mur is a vocational school in the Tangerang district. This school was founded on August 27, 2007 with an accreditation having its address at Jl. Raya Serang KM. 12,5. Cikupa District, Tangerang Regency. Broadly speaking, SMK Bina Am Ma'mur has the duties and responsibilities of implementing education for a certain period of time according to the type and nature of the school. Carry out education and teaching in accordance with applicable obligations, carry out guidance and counseling for students at school, foster the Intra-School Student Organization (OSIS), carry out administrative matters (TU), foster cooperation with parents of students, school boards, communities, and related agencies.

In accordance with the chance obtained by the author, Vocational High School Bina Am Ma'mur has provided the chance to make observations about the design of a multicam studio using the vmix application as a student learning medium.

From the above background, the writer is interested in conducting research entitled "Multicam Studio Design Using VMIX as a Learning Media at SMK BINA AM MA'MUR".

II. ANALYSIS OF THE WORKING SYSTEM

To obtain and complete the data needed in writing a thesis report related to the design of a multicam studio using vmix as a learning medium, using several research methods. The methods used are as follows :

Observation

Observation Is collecting data, through observation and carrying out systematic recording of the elements that have been researched with the aim directly to the system of mechanisms that exist in Smk Bina Am Ma'mur.

Interview

Interview is a technique of collecting data face-to-face with the interviewee, to obtain a clearer picture of the production system related to the object in the study.

Literature review

Literature Study Is a collection of data on theories of how to read, study, and understand textbooks and notes related to the discussion of writing a thesis report on the concentration of Multimedia Audio Visual and Broadcasting (MAVIB).

Media Design

The making of a multicam studio at SMK Bina Am Ma'mur is a learning support medium for students of SMK Bina Am Ma'mur which is designed based on the needs raised by stakeholders, which is then designed using the vmix switcher.

WORKING SCHEME

1. Doing Room Control Room Set
2. Make an Input Cable - Output Image The following is an explanation of the cable groove in the image below:
 - a. White cable: use the amphenol jack to jack bnc, to input the camera image into the vmix.
 - b. Green cable: Uses the RCA to RCA jack, to output the image to the TV.
3. Performing a set of production tools
 - a. Select Add Input.
 - b. Then select a camera.
 - c. Here you can choose the video source that you will use, just choose Conexant USB Video Capture because it uses Video capture
 - d. At a flat resolution, the resolution is in accordance with the resolution recommended by your video capture, here I am using 1280x720 HD size but with this resolution 720x480 we can use it when streaming video.
 - e. Don't forget to check the interlace box.
 - f. In the frame rate I use Pal 50i, you can also adjust this to the resolution supported by the USB Capture you are using. If it doesn't match, an error will appear.
 - g. Only this video format is Default or use H264 as a standard broadcast Cobec.
 - h. Audio Device select USB Capture.
4. Briefing
the most effective and fast face-to-face communication to carry out daily tasks. Leaders always use briefing communications, to convey their needs and information directly to employees. The nature of briefing communication is short, clear, concise, measurable, direct, face-to-face, dialogue, direct feedback, and direct interaction. Briefing communication enables leaders and employees to interact directly with each other, to complete daily priorities and responsibilities.
5. Determining the Concept

Understanding the concept prioritizes the points that want to be conveyed and that can make students understand clearly. To form a conceptual understanding, good and interesting story ideas are needed so that students can be interested in watching or seeing the shows that they want to convey.

6. Make a Studio Plan

The studio plan describes the studio area with facilities such as the exit, the facilities in the room, the shooting area, the control room area, and the storage area.

7. Production

Production is an activity to create or add value to an item to meet needs. The activity of increasing the usefulness of an object without changing its form is called service production.

8. Editing Process

the process of moving and arranging a video shot / recorded image into a new and nice to see recorded image. In general, editing work is related to post-production processes, such as titling, color correction, sound mixing, etc. The term Editing has been widely known and many people provide their own understanding. But in this lesson we agree that editing is related to the work below:

- a. Organize, add or move video clips or audio clips.
- b. Apply color correction, filters and other enhancements.
- c. Create transitions between clips.

9. Broadcasting

Show a video Talkshow about teacher activities outside of teaching or display information about schools and music videos.

III. RESULTS AND DISCUSSION

Visualization Program

1. Box vmix mixer

Box vmix mixer is a tool and software that takes advantage of the latest advances in computer hardware to provide live HD video mixing. Vmix is also a live video production software solution complete with live mixing, switching, recording, and live streaming features. This application also makes it easy to add and edit titles from the many build-in templates using graphics or vector editing software with transition effects. Meanwhile, when using large-scale multicam or a simple webcam, a product can display, record, and live stream all at the same time.

2. Camera

One of the most important parts of making this studio, and it is an image capture tool.

3. Cables

One of the most important parts of creating this studio, and is the image delivery tool that will appear in the vmix software.

4. Audio
Function to capture voice that is being recorded.
5. Studio
Serves to carry out multicam learning activities, and can also be used to create news, talk shows, etc.
English

Project List

During the research process, here is a list of projects at SMK Bina Am Ma'mur:

1. Make IPA (Early Break) and IPS (Afternoon Break) events
2. Create a Talkshow
3. Create teaching events (chat and study)
4. BAM Journal

Project Background and Concept

Make IPA (Early Break) and IPS (Afternoon Break) Programs

1. A program that composes music from within the country and abroad, which will accompany your rest time with your friends at school. Packaged in a cool and different theme every day. Happy Monday, Tuesday romance, upset Wednesday, old Thursday, religious Friday.

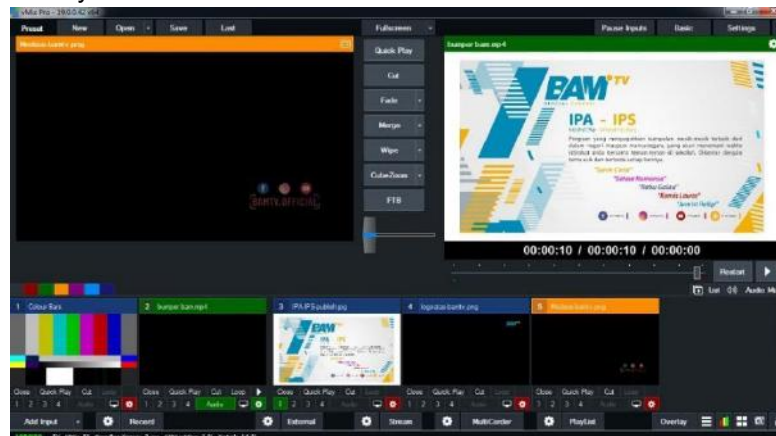


Figure 4.1 IPA (Early Break) and IPS (Afternoon Break) Program

2. Creating a Talkshow Event
One of the formats often used by television in presenting "serious" discourse is talk shows. Talk show is a broadcast discourse that can be seen as a media product or as talk oriented continuously. As a media product, talk shows can become a cultural 'text' that interacts with the audience in the production and exchange of meanings. As a dialogue process, the talk show will pay attention to the issue of efficiency and accuracy, on the following aspects: host control, participant conditions and audience evaluation events.



Figure 4.2 Talkshow

3. Make Ngajar Events (Chat and Learn)
Podcasts are a form of audio recording that anyone can listen to or publish. At first glance it is similar to radio, but what is played on the radio is live, whereas podcasts are recorded.



Figure 4.3 Teaching Events (Chat and Learning)

4. BAM Journal
It is a documentary program that is presented through an interesting story from a different point of view.



Figure 4.3 Teaching Events (Chat and Learning)

IV. CONCLUSION

Based on the analysis conducted by the author at SMK Bina Am Ma'mur according to the problem points presented in the problem formulation contained in the CHAPTER I report and the media design produced by the researcher, several conclusions can be drawn as follows:

1. Multicam studio design using vmix can work effectively in learning at SMK Bina Am Ma'mur
2. The target to be achieved in this multicam studio design students can practice directly using vmix as a learning medium
3. The design of this multicam studio is in accordance with live and shooting standards so that it is right when used, the steps are as follows:
 - a. Using vmix software, mixer.
 - b. White cable: use the amphenol jack to jack bnc, to input the camera image into the vmix.
 - c. Green cable: Uses the RCA to RCA jack, to output the image to the TV.

V. SUGGESTION

With this multicam studio, the authors suggest:

1. Increase the computer network or wifi so that the information search process can be easily obtained.
2. New innovations are needed to continue to expand student learning activities.

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Mechanical and Tribological Behaviour of ADC12 alloy reinforced by Nano- Al_2O_3 Particles with Addition of Al-Sr and Al-5Ti-B Produced by Stir Casting Method

Muhammad Wira Akira¹, Hanuna Haritsah², Anne Zulfia^{*3}, Ekavianti Prajateljia⁴
Institut Teknologi Bandung^{1,4} Universitas Indonesia^{2,3}
e-mail: akirawira@gmail.com, hanunaharitsah@gmail.com, anne@metal.ui.ac.id,
ekaprajateljia@gmail.com

*corresponding author



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Abstract

Nano- Al_2O_3 particles were incorporated into ADC12 alloy with the addition of Al-5Ti-B, Al-Sr, and Mg to achieve high performance in mechanical and tribological properties. In this study, varied nano- Al_2O_3 was used from 0.25 vf-% to 0.5 vf-% through stir casting methods to discover the optimum amount to obtain high performance. Besides, the inclusion of grain refiner Al-5Ti-B and microstructure modifier Al-Sr is expected to improve performance to the next level. However, porosity and agglomeration still be a concern in Aluminum alloy matrix composite fabrication. The presence of spinel phase MgAl_2O_4 in the interface area between nano- Al_2O_3 particles and ADC12 alloy is relied upon to minimize this porosity and agglomeration issue. The optimum of tensile strength and hardness was found at 0.35 vf-% Al_2O_3 and wear rate at 0.4 vf%. Although, the optimum point of wear found at 0.4 vf%, porosity began to increase at 0.4 vf% as well. As a result, 0.35 vf% addition of the nano- Al_2O_3 gives the best performance for the composite.

Keywords: aluminium matrix composite, ADC12 alloy, nano- Al_2O_3 particles, stir casting, strontium modifier.

I. INTRODUCTION

Aluminum Matrix Composites (AMCs) with excellent physical and mechanical properties are increasingly in demand for high-performance applications such as automotive, military, aerospace, and electricity industries. The excellence of Aluminum matrix composites (AMCs) compared to the conventional Al and its alloys are preferable since they have a higher strength-to-weight ratio, stiffness-to-weight ratio, wear resistance, creep resistance and thermal durability [1, 2].

Presently, nano-sized ceramic particle reinforcements were developed in metal matrix composites and proven that the effect of decreasing size of ceramic particle reinforcements is distinctly improved the mechanical properties [3]. Sajjadi et al. on their work, revealed that reducing reinforcement particle size in aluminum composite affect the increase of hardness and compressive strength remarkably, which make them attractive for numerous industrial applications. The Al-Si-Cu alloy ADC12 was chosen as a matrix due to its excellent material properties, namely high cast-ability, low density, high productivity, low shrinkage rate, and relatively high strength. Equally important, nano-sized Al_2O_3 particle was employed as inert ceramic reinforcement, which has high specific stiffness, superior high temperature, and excellent mechanical properties [1, 4, 5].

The mechanical properties of composites are not only influenced by reinforcing particles but also grain size, secondary dendrite arm spacing (SDAS) and the size and morphology of the eutectic silicon structures formed, as well as the type of defects that emerge [6]. The microstructure of silicon crystal hypoeutectic Al-Si as cast (ADC12) whose morphology is relatively rough and needles or beams form can produce parts that have a higher stress level provided that lessen its strength and toughness [7].

However, the development of nano-sized particle reinforcements remains challenges. A few studies reported the existence of agglomeration and high porosity being the biggest challenges in nano-sized AMCs [4]. The agglomeration phenomenon occurs due to the increase of energy on the surface between reinforcement and matrix, therefore causing poor wettability at the interface and ununiform nano-particle distribution. Ununiform distribution can lead to differences hardness in some areas [8]. As the most critical aspect of adhesion in metal matrix composites, wettability is measured by contact angle θ which depends on the surface energy of solid/liquid γ_{SL} , liquid/vapour γ_{LV} , and solid/vapour γ_{SV} according to Young's equation 1.

$$\cos\theta = \frac{\gamma_{SA} - \gamma_{LS}}{\gamma_{LA}} \quad (1)$$

Good wettability can be achieved if the contact angle has a tendency $\theta < 90^\circ$. In the previous study, Al_2O_3 wettability has been investigated by sessile drop method, which shows that Al_2O_3 particles have a poor wettability on molten aluminum [9]. In research conducted by Ali et al. contact angle $\theta < 90^\circ$ of Al_2O_3/Al composite will achieve by the addition of 5 wt% reactive elements Magnesium for 400 seconds. Wettability is affected by the reaction between magnesium and alumina at the metal-oxide interface to form $MgAl_2O_4$, where this phase can break the oxide layer on the surface of the molten aluminum, as a result, a wettability enhanced [10].

Herein, the merits of Al-5Ti-B as a grain refiner and Al-Sr as a modifier agent will lead to remarkable enhanced mechanical properties of nano-size AMCs. Reduced grain size will affect strength and material resistance to deformation. It is caused by dislocation pile-up around the grain boundary then accumulated to produce a large dislocation density [11]. The investigation of grain refiner effect on Al-Si alloy by Garcia et al. has proved that Al-5Ti-1B master alloys are suitable grain refining agents for the Al-Si - ceramic particles composites leading to the more uniform distribution of reinforcements particles. They revealed more amount of Ti-B gives a smaller grain size. In this case, Al-5Ti-1B ternary master alloy with 0.15 wt% Ti and 0.03 wt% B composition shows the optimum result with fine equiaxed grains with the average 450 μm in diameter [12]. Correspondingly, the modifying agent was added that aims that improve the mechanical properties by altering the structure of the eutectic silicon. Saeed et al. have discovered the addition of 0.4% Al-Sr on ADC12 alloy change

sharp-rough Al-Si eutectic phase turn into fibrous and enhanced tensile strength of its alloy [13].

Fabrication of nano-size AMCs was performed by stir casting method, which relatively simple and low-cost process. Gowrishankar et al. observed that stir casting is an effective method for manufacturing aluminum composites. It shows better matrix-particle bonding- due to the formation of a vortex while during stirring action of particles into the melts. Thus a uniform distribution of reinforcements and hardness on the entire cross-section was achieved [14]. This study will examine the ideal volume fraction of nano-size Al_2O_3 on ADC12 composite with the addition of modifier agent Al-Sr along with grain refiner Al-5Ti-B on its mechanical and tribological properties.

II. METHODE

Material Preparation

ADC12 aluminum alloy was used as matrix composites that have chemical composition given in Table I.

Si	Cu	Mg	Fe	Ni	Mn	Zn	Al
10.5	2.33	0.21	0.86	0.08	0.23	0.64	Res t

Table I. Chemical Composition of ADC12 Alloy

Nano- Al_2O_3 particles prepared as reinforcements was given in varies of volume fraction; 0.25 vf%; 0.3 vf%; 0.35 vf%; 0.4 vf%; 0.5 vf%. Wetting agent Mg, grain refiner master alloy Al-5Ti-B ingot, and modifier agent Al-Sr also used into the composite a number of 5 wt%, 0.15 wt%, and 0.04 wt% respectively. Nano- Al_2O_3 particles have a range of particle sizes 27 – 35 nm with nearly spherical morphology as shown in figure 1. Nano- Al_2O_3 particles were prepared by mixing with 3% stearic acid ($\text{C}_{18}\text{H}_{36}\text{O}_2$) for a certain time. Subsequently, the mixture was diluted in alcohol using ultrasonic vibrator for 6 minutes. The solution contains nano- Al_2O_3 , stearic acid ($\text{C}_{18}\text{H}_{36}\text{O}_2$), and alcohol ($\text{C}_2\text{H}_5\text{OH}$) was heated in a muffle furnace at 1000°C for 1 hour to evaporate alcohol content. Your paper must be in two column format with a space of 8.5mm (0.34") between columns.

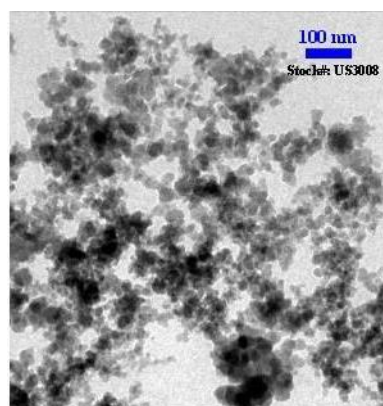


Figure 1. SEM image of nano- Al_2O_3 particles size.

Composite Fabrication

Initially, the temperature of tilting crucible furnace was heated gradually to 800°C for melting process then the ADC12 ingot was placed into a furnace with an appropriate amount. At the same time, mould and stirrer were coated with a mixture of zirconia powder and thinner to easily the casting product to be removed. The mould was preheated at 400°C to avoid thermal shock and also evaporate the moisture content. After the aluminum was melted, slag at the surface of molten metal was skimmed and immediately purged argon to molten for 2 minutes. After that, 5 wt% Mg ingot, 0.15 wt% Al-Ti-B ingot, and 0.04 wt% Al-Sr were added sequentially. The molten mixture was stirred for 2 minutes at a rate of 600 rpm followed by addition of nano- Al_2O_3 particles. Then the degassing process is carried out again for a minute. In a moment, the molten mixture was poured into the mould followed by cooling down at room temperature at a certain time.

Characterization

Metallography investigation was conducted using ASTM standard E3 – 11. Samples were prepared by the ground the surface through #800 to #1500 using sandpaper and polished using TiO_2 paste on velvet fabric. The etching was performed using Keller's reagent. Microstructural was observed by Optical Microscopy (OM, Zeiss Primotech). The elements were also investigated using Optical Emission Microscope (OES, Spectro APL 3460), Energy Dispersive Scanning which equipped form SEM (SEM, JEOL JSM-6360 LA) and X-Ray Diffraction (XRD, Shimadzu XRD-70 10). The interface between matrix and reinforcements investigation was conducted using SEM (Scanning Electron Microscopy). Tensile tests were performed based on ASTM: B557M – 02 (UTM Gottech AL-7000 LA). Hardness tests were performed using Rockwell B method based on ASTM E18-11 (Rocky model). Wear tests were performed with parameter:- the sliding distance at 400 mm, load 3.16 kgf, and speed 1.97 m/s (Ogoshi model). The experimental density of the composites was measured by the Archimedes principle. Density tests by the law of Archimedes were carried out to determine the density of a sample.

III. RESULT AND DISCUSSION

Mechanical properties of ADC12 nano- Al_2O_3 composites

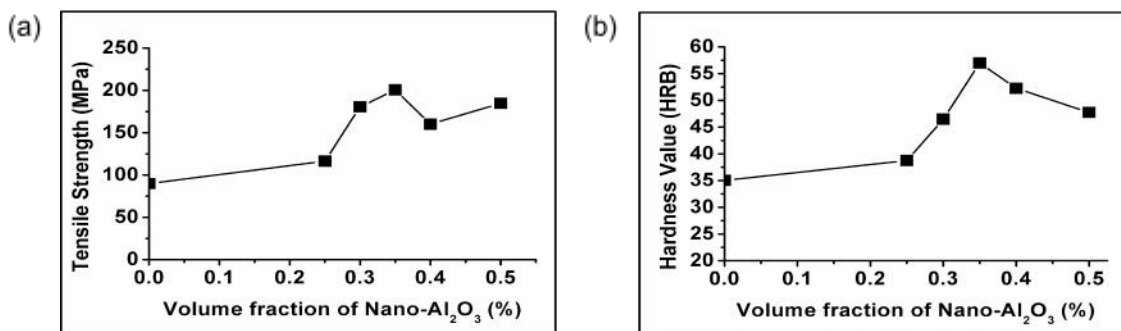


Figure 2. Effect of nano- Al_2O_3 volume fraction addition on (a) tensile strength and (b) hardness properties

Figure 2a shows tensile strength increase gradually with an increasing volume fraction of nano- Al_2O_3 particles from ADC12 alloy up to 0.35 vf% then decrease besides of 0.4vf% to 0.5vf%. Figure 2b shows hardness value which has an identical trend with tensile strength graph. Hardness increase with the addition of volume fraction of nano- Al_2O_3 up to 0.35 vf% then began to decrease besides 0.4 vf% to 0.5vf%.

Increasing the volume fraction of nano- Al_2O_3 particles will increase the dislocation pile-up, thus increasing the tensile strength of the composite. As the volume of nano Al_2O_3 fraction

increases, the load transfer from the matrix to reinforcement is getting better. However, tensile strength reduces if the reinforced particle volume fraction is given excess,-; it forms porosity and agglomeration due to the uneven distribution of particles. The difference in thermal expansion between the aluminum matrix and the Nano- Al_2O_3 particles results in debonding at the interface and decreases the tensile strength of the composite. The addition of magnesium can reduce the surface tension with the presence of MgAl_2O_4 spinel phase which acts as interfaces that shows the ability to increase the strength of the matrix to make the load can transfer more effective [15]. Furthermore, Mg_2Si intermetallic phase which has high melting point, low density, high hardness, and high elastic modulus, also has a role as a reinforcing mechanism as a dislocation barrier on the ADC12 alloy matrix [16].

Tribological properties of ADC12 nano- Al_2O_3 composites

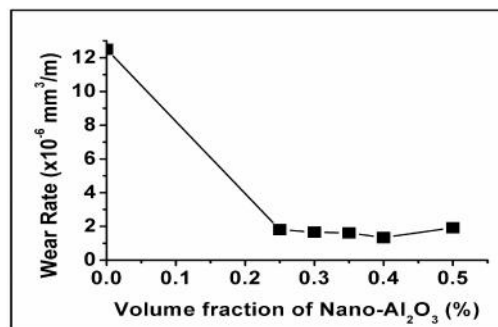


Figure 3. Effect of volume fraction nano- Al_2O_3 addition on the wear rate of ADC12 / Al_2O_3 composite

The results of the wear rate test are shown in figure 3. ADC12 alloy has wear rate at $1.25 \times 10^{-5} \text{ mm}^3/\text{m}$, is decreased significantly with the addition of nano Al_2O_3 particles up to 0.5vf%. Nano- Al_2O_3 particles act as reinforcement to increase wear resistance and hardness of composite materials with some mechanisms such as orowan strengthening, grain-refined strengthening, and dislocation strengthening [17]. Besides, silicon in the ADC12 matrix content can increase wear resistance. Through the solidification process, $\alpha\text{-Al}$ emerges in dendrites form and silicon form into 3 phase-: primary, binary, and ternary. First silicon acts as a load-bearing phase during wear so that it will increase wear resistance in the material [18]. The lowest wear rate achieved at 0.4 vf%. Moreover, on the subsequent addition at 0.5 vf%, wear rate is increased due to agglomeration and porosity.

The porosity of ADC12 nano- Al_2O_3 composites

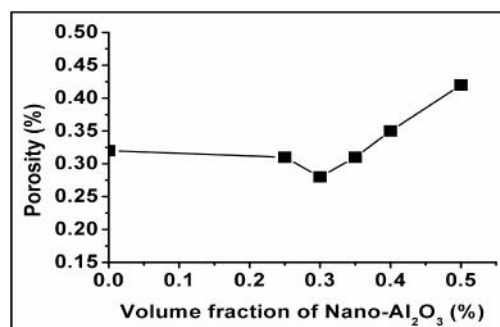


Figure 4. Effect of volume fraction nano- Al_2O_3 addition on % porosity of ADC12 / Al_2O_3 composite

The presence of porosity did not differ significantly between ADC12 alloys with ADC12 / nano- Al_2O_3 composites with the addition of 0.25 vf% to 0.35 vf% nano- Al_2O_3 particles, while significant porosity increases began with the addition of nano- Al_2O_3 of 0.4% to 0.5% as shown in figure 4. MgAl_2O_4 phase was able to cover all nanoparticles up to 0.35 vf%. While on the addition up to 0.4 vf%, MgAl_2O_4 phase unable to cover Al_2O_3 nanoparticles hence nanoparticles that are not covered by the spinel phase, have low wettability and produce a small gap in the interface. Gap between the particles was arising further as a result of low wettability which tends the particle to agglomerate.

Fractography analysis

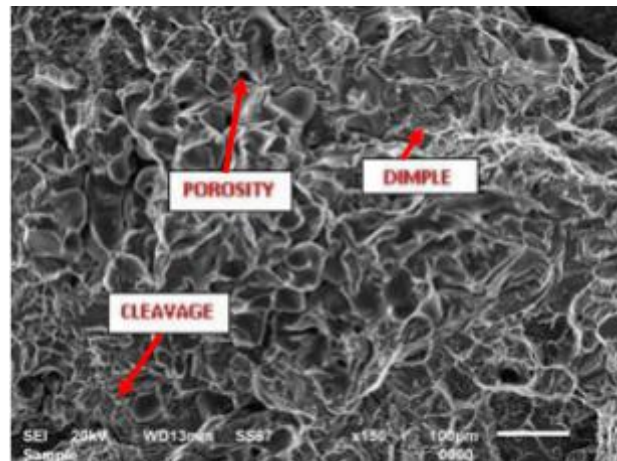


Figure 5 SEM images of 0.35 vf% Nano- Al_2O_3 on ADC12 / Nano- Al_2O_3 Composite Fracture Surface

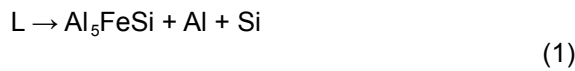
The results of ADC12 / Nano- Al_2O_3 composite fractography observations with 0.35 vf% nano- Al_2O_3 particle employed by SEM characterization 150x magnification are shown in Figure 5. It can be seen that there is a mixed type of fracture, namely irregular large dimples and cleavage, which is called Quasi-brittle fracture. Quasi-brittle fracture often occurs in materials, especially in composite materials. The main characteristic of this type of fracture is the combination of 2 types of fractures, namely dimples and cleavage which describe ductile and brittle fractures respectively.

This type of fracture that occurs is also controlled by the addition of the element Sr, which is useful as a modifying agent for Mg_2Si primaries and binaries. Binary Mg_2Si will change to be more globular and fibrous while for primary Mg_2Si there is a change from irregular to more compact [19] which will increase the ductility properties of the composite so that it can compensate for the resulting hardness due to the addition of reinforcing elements. Though the combination of ductility and hardness, the resulting material has good toughness. Typically, the presence of dimples on the fracturing surface is induced by the release of the bonds between the matrix and the reinforcing particle. The fracture occurs along the grain boundary so that it does not cut the grains or particles so that it shows the fracture surface that juts in as if it forms a basin.

From this figure, it can also be seen that there is porosity on the fracture surface. The work by Sajjadi et al. explained the behavior of increased porosity corresponding with the addition of Al_2O_3 particles in the aluminum matrix composite [20]. Inadequate interface wetting and particle agglomeration at higher volume fractions are noteworthy considerations for the formation of porosity in composite materials. Therefore, porosity is avoided in AMC composite materials.

Microstructure analysis

Figure 6a shows ADC12 alloy microstructure without the addition of Al-Sr, Al-5Ti-B, and Mg, observed α -Aluminum presented in white background phase and silicon eutectic shown in sharp-rough net-like dark gray phase are emerged as the main phase due to 10.5 wt% silicon elements contents. Along with those, other phases also have seen such Al_5FeSi and Al_2Cu in needle-like and small gray plate morphology respectively. This phase is typical of the ADC12 alloy because the ADC12 alloy has 0.86 wt.% Fe and 2.33 wt.% Cu content respectively. Therefore, according to the Al-Si-Fe phase ternary system, solidification reaction that occurs as follows : [21]



The addition of 5% magnesium was derived ADC12 alloy ternary system from Al-Si-Cu into Al-Si-Mg. As a result, the intermetallic compound of Mg_2Si was emerged and formed in primary, binary, and ternary structure during as cast, as shown in figure 6b-f, which lead to improve mechanical properties [19, 22]. This seems to be associated with quasi-binary Al- Mg_2Si derived from the Al-Mg-Si ternary diagram [23].



The number of phases of Mg_2Si would be directly proportional to the addition of magnesium itself. Due to its characteristics such as low density, high melting point, hardness, and modulus of elasticity, Mg_2Si intermetallic compounds are one of the important strengthening mechanisms to improve the mechanical properties of these alloys. This intermetallic compound acts as a barrier to the movement of dislocations, thereby contributing to increasing the value of tensile strength. Fine and evenly distributed microstructure Mg_2Si hinders the movement of dislocations efficiently. However, the emergence of intermetallic compounds also has its drawbacks, the intermetallic compounds in the alloy can also increase porosity [24]. Sharp-rough net-like Al- Mg_2Si eutectic phase in dark gray color spread on the α -Al matrix, shown in figure 6a, changes into finer and more fibrous after addition of 0.04% Al-Sr, shown figure 6b-f. Research was performed by M. Tebib et al., on the shape transition of the eutectic binary Mg_2Si defined that the addition of 0.04 wt. % Sr element resulted in a modification of eutectic Mg_2Si that could be seen from the shifts in the closer distance between their net-like branches shape [25]. The decrease in the distance between these lines can be due to the influence of the amount of undercooling that occurs when a material is combined with strontium.

Strontium critically reduces the eutectic temperature or temperature growth (T_g) of the molten alloy. Higher undercooling occur along with a decline in T_g , which allows the phase generated to be comparatively finer. This morphology phase is closely related to the lower r^* (r critical) value, according to equation 2

$$r^* = \frac{2\sigma}{\Delta G_r} = \frac{2\sigma x T_m}{L_m x \Delta T} \quad (2)$$

Where r^* is the critical nucleus radius, σ is the interfacial energy per unit area, T_m is the temperature starting to crystallize, L_m is the latent heat and ΔT is the amount of undercooling that occurs. Subsequently, when undercooling is high, it allows the r^* value to be smaller and increases the possibility of the nucleus forming and consequently the Mg_2Si produced in the matrix is more abundant and finer [26]. The refinement and modification process only occurs in composite materials with an elemental content of 0.04 wt% Sr. Another mechanism is the low solubility of strontium in magnesium, which induces a lot of strontium to segregate in front

of the growing interface of the eutectic binary Mg_2Si phase to impede the growth process of the eutectic binary Mg_2Si itself.
Grain size also decreases with the addition of Al-5Ti-B and nano- Al_2O_3 as seen in figure 6f compare with ADC12 alloy in figure 6a. Nano- Al_2O_3 not only serves as an obstacle for dislocation but also the place where the grain initiation grows.

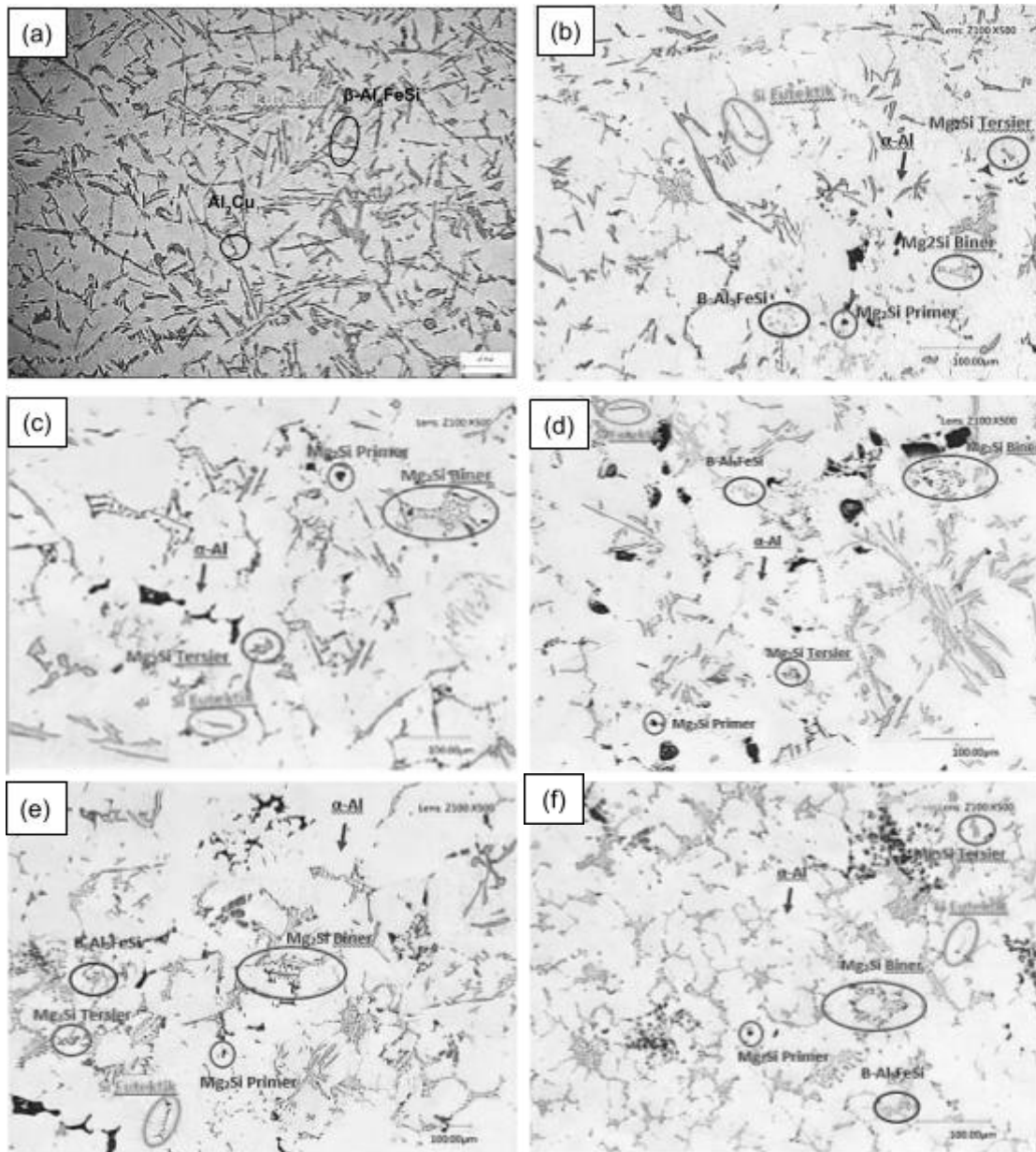


Figure 6. Microstructure observation by Optical Microscope (a) ADC12 alloy by magnification 200x [22], ADC12/nano- Al_2O_3 composites with addition of nano- Al_2O_3 particles by 500x magnification (b) 0.25 vf% (c) 0.3 vf% (d) 0.35 vf% (e) 0.4 vf% and (f) 0.5 vf%

EDS was performed on samples with an optimum amount of 0.35 vf% nano- Al_2O_3 addition % with a magnification of 300x carried out at 10 different points to observe spinel phase MgAl_2O_4 and other intermetallic phases, as shown in figure 7 and result shown in table II. Mg_2Si phase is estimated to exist at points 012, 013, 014, and 015. Blocky morphology former point characterizes the primary Mg_2Si phase, while the remaining points have irregular fine-grained morphology. The indication for the MgAl_2O_4 spinel phase is shown at point 016. The phase morphology at that point is not very clear, but there is a difference in color contrast with the matrix. The MgAl_2O_4 phase will damage the oxide layer of Al_2O_3 so that it will increase the contact between the reinforcing particles and the matrix. With a good bond between the matrix and the reinforcing particle, the transfer of charge from the matrix to the amplifier is getting better [27]. At points 011, 017, and 020, they contain ample Fe and lower magnesium which enables the formation of the intermetallic phase Al_5FeSi with a gray morphology and commonly in the form of faceted platelets.

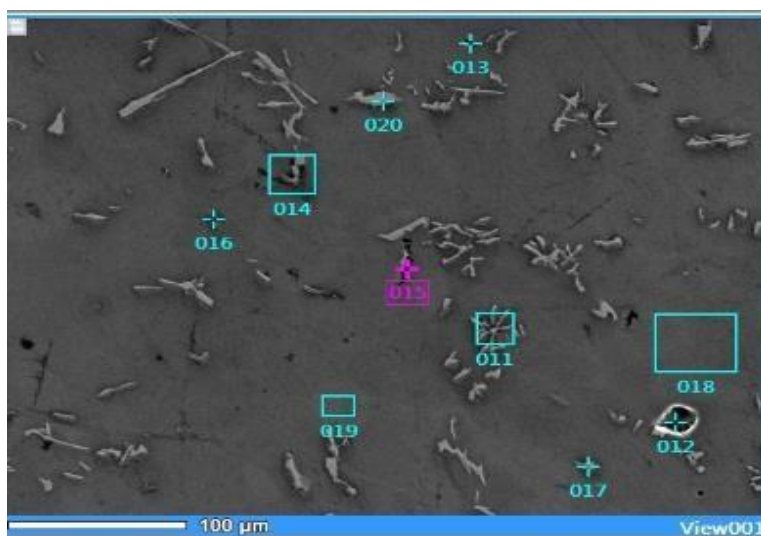


Figure 7. SEM observation on ADC12/Nano- Al_2O_3 composite with the addition 0.35 vf% nano- Al_2O_3 with magnification 150x. addition of nano- Al_2O_3 particles by 500x magnification (b) 0.25 vf% (c) 0.3 vf% (d) 0.35 vf% (e) 0.4 vf% and (f) 0.5 vf%

No.	Elements (wt%)						
	O	Mg	Al	Si	Ti	Fe	Cu
011	54.18	1,81	28,80	0,16		1,58	
012	55.64	2,43	25,93	0,17		0,06	
013	53.46	2,41	30,37	0,15		0,03	
014	53.92	2,34	29,65	0,13	0,01	0,82	
015	54.80	15,36	9,36	4,76		0,08	0,17
016	52.62	2,55	32,94	0,11			0,02
017	53.35	1,64	29,66	0,14		2,24	
018	53.20	2,70	31,74	0,12	0,01	0,03	
019	53.06	2,74	32,15	0,14	0,00	0,02	0,00
020	52.62	0,94	25,43	0,10		7,04	

Table II. EDS result corresponding SEM images in figure 7. on ADC12/nano- Al_2O_3 composite with the addition 0.35 vf% nano- Al_2O_3 with magnification 150X

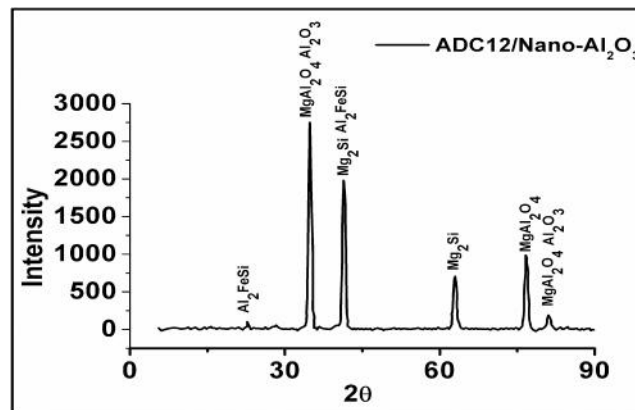


Figure 8. XRD spectra of ADC12/Nano-Al₂O₃

In detail, XRD was carried out to confirm that the MgAl₂O₄ spinel phase emerges on ADC12/Nano-Al₂O₃. MgAl₂O₄ and other phases that have been stated in table II, has proven formed as can be seen from figure 8.

IV. CONCLUSION

Addition of nano-Al₂O₃ on ADC12 alloy has revealed remarkable mechanical properties of composites such as tensile strength and hardness. Correspondingly, the wear rate showing a promising result. Despite porosities and agglomeration have a critical role in reducing mechanical and tribological properties, spinel phase MgAl₂O₄ perform its function properly. An optimum amount of nano-sized particle addition was determined in this study; thus, the spinel phase can cover all regions interface between matrix and nano-Al₂O₃ particles. Furthermore, the addition of Al-5Ti-B and Sr has also enhanced the performance by reduced grain size and modified eutectic silicon form respectively. This study confirms that nano-Al₂O₃ incorporated in ADC12 alloy with Al-5Ti-B, Al-Sr, and Mg addition generate high-performance materials and gives a constructive way ahead towards advanced material development.

V. ACKNOWLEDGMENT

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Analysis of the Hajj Fund Management Based on the Fatwa of the National Sharia Council (DSN) Number 122 Concerning the Management of BPIH Fund and Special BPIH Based on Sharia Principles

Ilham Maulid¹, Amirsyah²

^{1,2}Syarif Hidayatullah State Islamic University, Jakarta, Indonesia
e-mail: ilhammaulid.26@gmail.com¹, amirsyahtambunan@yahoo.com²

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Abstract

Badan Pengelola Keuangan Haji (BPKH) has the full authority to manage the existing Hajj pilgrimage funds. However, the current issue is how to oversee the management of the Hajj pilgrimage funds, which have crossed 100 trillion. The monitoring of these funds management is not simple, particularly because the source of the funds comes from the ummah, where it belongs to the ummah, especially the pilgrims, and the benefits should be returned to the pilgrims representing the ummah and also for the benefit of the people and nation. This study aims to describe the fatwa of the National Shariah Board No. 122 concerning Funds Management of BPIH and Special BPIH based on Sharia Principles and to analyze whether the management of Hajj Pilgrimage Funding Costs (BPIH) is under the fatwa. This research used qualitative data. The research that produces descriptive data in the form of non-numeric data, which is a symptom, data information, based on facts obtained from the field, then conclusions are drawn. The result showed that the management of the hajj Pilgrimage Cost (BPIH) was by following the DSN-MUI fatwa. The suitability of Sharia in the management of hajj funds can be seen from the government transferring these funds to the halal sector as confirmed in the Law no. 34 of 2014 emphasizes that the management of hajj funds must comply with sharia principles, namely the sector that is avoided from maisir, gharar, usury, and other.

Keywords: Fatwa, National Sharia Board (DSN), Hajj Fund

1. Introduction

The Indonesian economy has shown positive developments. During 2010 - 2014, the Indonesian economy grew by an average of over 6.0 percent. The positive macroeconomic

development was followed by an increase in the welfare of the population. In 2014, per capita income was IDR 31.3 million or an increase compared to 2010 which was IDR 21.6 million.

Also besides, the poverty rate has decreased in 2014 by 27.73 million people or 11.0 percent of the population, a decrease compared to 2010 of 31.02 million people or 13.3 percent of the population. Increased welfare allows people to be involved in economic, social, and, religious activities more broadly. One of the religious activities that require financial capacity for the Muslim community is carrying out the pilgrimage.

The pilgrimage is different from several other forms of worship that are included in the pillars of Islam, namely that it costs a relatively large amount of up to tens of millions of rupiah. The nominal value of that size for the people of Indonesia can be said to be quite expensive, the majority of the Indonesian population has a level of welfare below the poverty line. For those who are well off financially, going on the pilgrimage is certainly not a problem. However, those who do not have enough money must try their best to work and save money to be able to carry out the pilgrimage. Many Muslims save in banks for years or do other businesses such as selling jewelry or livestock so that they can carry out the dream of many Muslims in this world, namely the pilgrimage to the holy land of Mecca. Even though the majority of Indonesia's population has a low level of economic capacity, every year we see hundreds of thousands of Indonesian Muslims go on the pilgrimage to Saudi Arabia.

Along with the increase in community welfare, the number of prospective pilgrims applying for pilgrimage continues to grow from year to year. In March 2016, the number of prospective pilgrims registering for pilgrimage has reached 3 million and the quota for Indonesian pilgrims is around 170,000, the longest waiting period for departure is up to 37 years. In 2004, the Ministry of Religion began implementing Hajj registration using initial deposits. In 2010, the Government set an initial deposit for regular hajj of IDR 25 million. The high enthusiasm of Indonesian Muslims to register is not balanced with the quota of prospective pilgrims who depart every year, thus making the waiting list for Hajj departures longer. This creates an increase in the accumulation of funds deposited by prospective pilgrims in accounts of the Ministry of Religion. The increase in the accumulation of deposits for hajj deposits prompted the policy of placing hajj deposit funds to be expanded from current accounts to time deposits, purchasing State Sharia Securities (SBSN) / Sukuk, and investing in shares in Bank Muamalat Indonesia.

Data from the Ministry of Religion stated that the balance of the initial deposit funds on May 31, 2015, reached IDR 73.9 trillion. Funds of that amount have been stored in Sukuk

amounting to IDR 32.2 trillion, deposits IDR 37.2 trillion, and demand deposits IDR 4.5 trillion. Currently, Indonesia is faced with challenges in providing infrastructure. The 2015-2019 RPJMN states that there is a financing gap of IDR 922 trillion. Therefore, the government needs various sources of financing to cover the gap in infrastructure financing needs. The large amount of funds accumulated for the initial deposit of Hajj raises challenges in managing Hajj finances. To meet financing needs, some parties have suggested the use of Hajj funds as a source of infrastructure financing. On the other hand, the quality of the Hajj implementation in the current year is still faced with obstacles as reflected in the survey results of the Central Statistics Agency. The level of satisfaction in the implementation of the Hajj in 2015 was still 82 percent.

The large number of funds deposited for Hajj can be used productively and will be able to bring benefits to the congregation in the form of decreasing the cost of going on the pilgrimage and improving services. Some parties argue that the hajj fund can be developed through infrastructure financing instruments to obtain a greater benefit value. However, some think to believe that the hajj fund investment in infrastructure financing is high risk. Even though the potential returns from investment in infrastructure financing investment are greater, Hajj funds should be prioritized on safer investment instruments. The use of the accumulated funds for the initial pilgrimage for infrastructure financing creates a dilemma.

The suitability of hajj fund management (investment) policies in infrastructure financing is linked to Law Number 34 of 2014 concerning Hajj Financial Management (Law 34/2014). The existence of this suitability will give confidence that the interests of the prospective pilgrims are always prioritized, as well as can provide benefits for the people/society.

Hajj is the fifth pillar of Islam is not only aimed at increasing the piety and spiritual values of the perpetrators but also for saving great economic potential, then whether the Ministry of Religion is responsible for organizing Haj and Umrah. So far, has it been optimal in exploiting the potential for Hajj funds, which flow so much every year in the account of the Minister of Religion? Has the Hajj fund investment management been by following per under sharia law regulated by the National Sharia Council (DSN)? Has the management of Hajj funds provided many benefits and improved the welfare and services of Indonesian pilgrims? and is it possible if the hajj funds are managed optimally through a Sharia financial institution that specifically regulates all hajj financial governance to have many impacts and benefits for all parties involved in it. national?

Article 2 of Law no. 34 of 2014 emphasizes that the management of hajj funds must comply with the principles of sharia, prudence, benefit, non-profit, transparency, and accountability. The Indonesian Ulema Council (MUI) through the National Sharia Board (DSN) has stipulated four conditions for managing hajj financial funds which have settled due to the waiting list for the Hajj pilgrimage for up to 20 years. This was stated in the 2012 MUI Fatwa through the *ijtima'* forum at one of the Islamic boarding schools in Tasikmalaya, in July 2012. The *ijtima'* forum was attended by the Central MUI Fatwa Commission, the Provincial MUI Fatwa Commission throughout Indonesia, fatwa institutions and Islamic organizations at the level of the center, as well as the leaders of Islamic boarding schools and representatives of universities throughout Indonesia who become the basis for fatwa decisions.

In principle, Islam provides rights protection for all people, every right owner can claim the fulfillment of his rights. If there is a violation or destruction of rights, the right owner can demand compensation or compensation that is equivalent to his right.

Everything has an impact, whether the impact is positive or negative, to see the impact of hajj fund management, it is necessary to examine more deeply about sharia law in managing hajj funds, because the board that is authorized to supervise and regulate Islamic financial institutions to comply with Islamic sharia is the Council. National Sharia (DSN).

Based on the problems stated above, the research problem is formulated into several questions as follows:

1. What about the National Sharia Board Fatwa No 122 concerning Funds Management of BPIH and Special BPIH based on Sharia Principles?
2. Is the management of the Hajj Pilgrimage Cost (BPIH) following the Fatwa of the National Sharia Board (DSN) No 122?

This research used the qualitative data, that is, it is a research that produces descriptive data in the form of non-numeric data, which describes a symptom, data, information, based on facts obtained from the field, then conclusions are drawn.

The research method in general is a description of how research is carried out. This research was conducted to analyze the facts, symptoms, and events that occurred in the field as there were spatial and temporal contexts and natural environmental situations, therefore this study used a case study research method. This method is used to achieve the objective, namely to present an empirical picture of the analysis of hajj fund management based on the fatwa of the National Sharia Board (DSN) Number 122 concerning Funds Management of BPIH and

Special BPIH Based on Sharia Principles, so the results of this study, researchers must get a complete picture. and details on how and the suitability of the fund management of the Hajj Pilgrimage Cost (BPIH) with the fatwa at the National Sharia Board (DSN) office.

Data are writings or notes regarding everything the researcher hears, sees, experiences, and even thinks of during data collection activities and describes the fatwa of the National Sharia Council (DSN) Number 122.

This research data consists of primary data and secondary data. Primary data is all data taken or collected from the research location in the form of interviews and documents. Data and information are obtained by using interview techniques that are tangible with social actions and the words of the parties involved in the research problem directly. To obtain primary data, this was done through interviews and documentation in the field. Secondary data is data obtained from books and journals as well as articles related to sharia law and literature to complement and support primary data or all data (interviews and documents) taken from the research location.

2. Description of fatwa DSN no 122 concerning funds management of BPIH and special BPIH based on shariah principles

The background factor for the fatwa of the National Sharia Board (DSN) Number 122 was at the time of Ijtima 'Ulama of the Indonesian Fatwa Commission IV of 2012 regarding the ownership status of BPIH deposit funds which was on the waiting list in Cipasung.

The hajj deposit funds that are accommodated in the account of the Minister of Religion whose registrants are included in the syar'i waiting list belongs to the registrant (prospective hajj). Therefore, if the person concerned dies or there is a syar'i obstacle that causes the candidate to fail to leave, the hajj deposit funds must be returned to the prospective hajj or their heirs. BPIH deposit funds for pilgrimage candidates who are included in the waiting list in the account of the Minister of Religion may be forwarded for productive (profitable) matters, including placements in Islamic banking or invested in Sukuk.

There is a fatwa from the National Sharia Board (DSN) Number 122 with a sociological background, namely that there are questions from the public regarding the status of ownership of funds for pilgrims that are included in the waiting list, according to one version of the funds that have been deposited belongs to the government in this case, namely the Ministry of Religion. the use of it was handed over by the Ministry of Religion, and according to another version the funds belonged to the prospective pilgrims, therefore the fatwa decision

confirms that the funds belong to the prospective pilgrims, its characteristic is that if the pilgrims fail to leave the deposit funds the hajj must be returned. And behind this fatwa is the difference of opinion regarding the status of the fund ownership of the candidate pilgrims who are included in the waiting list which is the background for the fatwa of the National Sharia Board Number 122.

As well as other things behind the fatwa of the National Sharia Board (DSN) Number 122, namely the law that gives authority to the Badan Pengelolaan Keuangan Haji (BPKH) must be sharia-explained about the ownership of funds, the position of the BPKH in managing funds, the position of fund owner, the mechanism for managing funds by the BPKH, and the contract that regulates the relationship between parties.

And it is not known whether the fatwa of the National Sharia Board (DSN) Number 122 is effective or ineffective in the management and BPIH because it is not measurable, meaning that there is no information about the effectiveness of the BPKH. And the fatwa only provides the direction and limits of the sharia in the management of Hajj funds.

If the BPIH is not under the value of the sharia, it will be straightened out by sending a letter from the National Sharia Board (DSN) to the Badan Pengelolaan Keuangan Haji (BPKH). The National Sharia Board (DSN) will remind and reprimand from the aspect of its sharia if there is a fatwa violation. And the National Sharia Board (DSN) is a fatwa authority, not a supervisory authority, and not a regulator, therefore it does not have the authority to oversee the Badan Pengelolaan Keuangan Haji (BPKH).

Provisions related to the contract on the management of the Hajj Pilgrimage Cost (BPIH) is a wakalah that applies until funds of the BPIH and special BPIH belonging to prospective pilgrims are spent by the government in the framework of the pilgrimage. The object or work authorized (mahall al-wakalah) to the government carried out by the manager must be clear and specific among others include:

1. Funds development of BPIH and Special BPIH through placements and restricted investments (al-muqayyadah) with investment activities by following per under sharia principles, prudential principles, and security.
2. Sharing of investment returns to prospective jama'ah haji.
3. Payment of the cost of organizing the pilgrimage.
4. Refund of the excess and on the account of the prospective jama'ah haji in terms of the current year's BPIH and Special BPIH funds balance.
5. Refunds of all BPIH and BPIH Special funds if the prospective pilgrims die or cancel

their departure.

Provisions regarding administrator rights:

1. Candidates for jama'ah haji as muwakkil agree and agree that a portion of the investment returns on BPIH and BPIH Special funds is used as the right of the manager by taking into account the main interests of the prospective jama'ah haji.
2. The manager is obliged to share the proceeds from the investment to individual prospective pilgrims proportionally.
3. If the manager allocates hajj finance which is equivalent to the need for 2 (two) times the cost of organizing the haj pilgrimage and of these costs are stored in the account and generate profits, the manager may share the proceeds with prospective pilgrims.

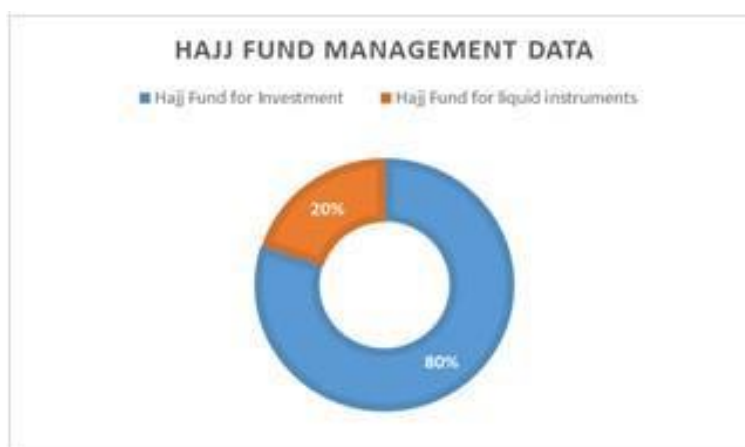


Fig. 1 Data Sources for Hajj Fund Management and BPKH Strategic Plan 2017

And to give confidence and trust to prospective jama'ah haji that and BPIH and Special BPIH are managed and developed by the government as representatives with attention to aspects of security, prudence, and value of benefits, the government may guarantee all BPIH funds. In Article 2 of Law no. 34 of 2014 mandates that the management of hajj funds must comply with the principles of sharia, prudence, benefit, non-profit, transparency, and accountability.

3. Analysis of haji fund management based on fatwa DSN no 122

Hajj finance is all the rights and obligations of the central government which can be valued in terms of money related to the implementation of the haj pilgrimage and all forms of wealth in the form of money or goods that can be valued in money as a result of the

implementation of these rights and obligations, both from the pilgrims and other sources that are legal and not binding.

The increase in prospective pilgrims every year due to spiritual encouragement increased understanding that Hajj is mandatory, there are many trends in ustad's lectures which then make the Muslim ummah excited for the pilgrimage, and also the facilities from financial institutions to establish Hajj.

In-Law no. 34 of 2014 concerning Hajj Financial Management can be categorized as three types of hajj fund ownership; first, the hajj funds belong to participants who have registered for hajj with a waiting list status. Second, the remaining use of the hajj funds allocated to the Umat Endowment Fund (DAU) is purely the property of the people which must be used for the benefit of the ummah. Third, the hajj management funds invested belong to the BPKH.

Based on these three things, the Hajj Financial Management Agency has the full authority to manage haj pilgrimage funds where funds are available, the problem is how to oversee the management of haj pilgrimage funds, which has now reached 100 trillion. Supervision of the management of these funds is not easy, especially since the source of the funds comes from the people, basically belong to the people, especially the pilgrims, the benefits should return to the pilgrims representing the people and also for the benefit of the people and the nation.

Will the supervision be effective so that implementation is also effective? The answer depends on the BPKH implementing body consisting of Ajar Susanto Broto, along with members consisting of Rahmat Hidayat, Anggito Abimanyu, Beny Witjaksono, Acep Riana Jayaprawira, Iskandar Zulkarnain, Hurriyah El Islamy.

The congregation posed many questions in various media, ranging from extreme questions to moderate questions such as: Are the supervisory board and implementing agency able to manage these funds effectively and efficiently? The answer to this question will be able if the duties and responsibilities of the two agencies are carried out in synergy with the following conditions; first, the Supervisory Body which must be able to prove its performance, so that its integrity is tested in carrying out its duties; second, the executing agency must work professionally in managing Hajj funds; third, the system to be established in managing Hajj funds by the institution must be based on good institutional governance.

For this reason, the first step that must be taken is the need for a comprehensive and integral understanding of these three matters based on the mandate of the Law on the Hajj Financial Management Agency, namely the Hajj financial executing agency has a very strong function, among others, emphasized in article 28, namely planning, implementing, taking

responsibility. , and hajj financial reporting.

The pros and cons surrounding the use of hajj funds for infrastructure have become viral in various media because the public's understanding is not yet complete about the MUI Law and Fatwa. Therefore, in article 13 it is explained that the expenditure for the placement and/or financial investment of Hajj as referred to in Article 10 letter c is implemented after obtaining approval from the supervisory board.

In line with the management of hajj funds in article 48 section 1, it is emphasized that the placement or investment of Hajj finance can be made in the form of banking products, securities, gold, direct investment, and other investments. Sukuk is a form of investment instrument, so BPKH places its investment in the form of deposits in Islamic banks, while there are four (4) placement of hajj fund management investments in Sharia Banks, placements in Islamic banks that we can call Sukuk, are in gold, direct investment, and others, and in the meantime, we are still placing maal (assets) in sukuk, both sukuk issued by the State and Islamic Sukuk issued by the private sector.

Sukuk issued by the State are SBSN (Surat Berharga Syariah Negara), so securities sukuk are issued by the government that can be traded, meaning that when BPKH needs the funds, they can be sold. The difference means that direct investment is riskier and BPKH has not yet entered into that investment.

Currently, BPKH has not entered into direct investment and is still in the exploration process and even if it does, it can take the form of BPKH to create its own company, or then buy shares in someone else's company, or buy a building. it is still being explored and it is still not being realized because it is still measuring the risk and return aspects.

In paragraph (2) The placement and/or investment of Hajj finance as referred to in paragraph (1) shall be carried out by sharia principles by taking into account the aspects of security, prudence, benefit value, and liquidity. The problem is that these funds cannot be used before there is a Government Regulation that regulates them.

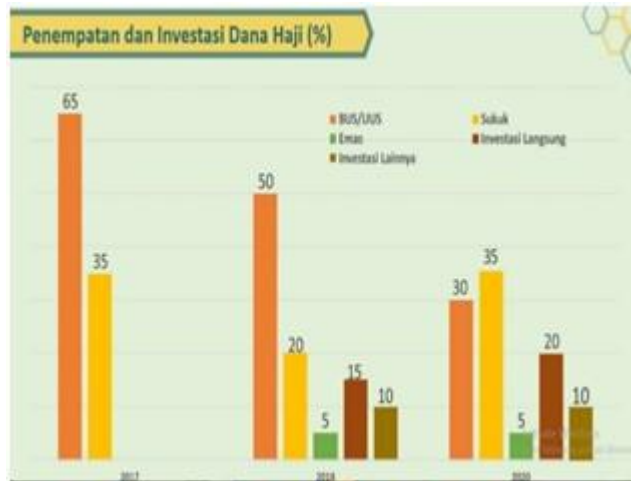


Fig. 2 Data Sources for Hajj Fund Management and BPKH Strategic Plan 2017

To give confidence and trust to prospective jama'ah haji that the BPIH and the Special BPIH are managed and developed by the government as representatives with attention to aspects of security, prudence, and value of benefits, the government may guarantee all BPIH funds. The BPKH is an institution established by the government that guarantees in the form of a law, and that BPKH is a professional institution. In Article 2 of Law no. 34 of 2014 mandates that the management of hajj funds must comply with the principles of sharia, prudence, benefit, non-profit, transparency, and accountability. Hajj Financial Management by the Badan Pengelolaan Keuangan Haji (BPKH) is carried out in a corporate and non-profit manner.

Hajj Financial Management aims to improve:

1. Quality of Hajj Pilgrimage Implementation;
2. The rationality and efficiency of using BPIH;
3. Benefits for the benefit of Muslims.

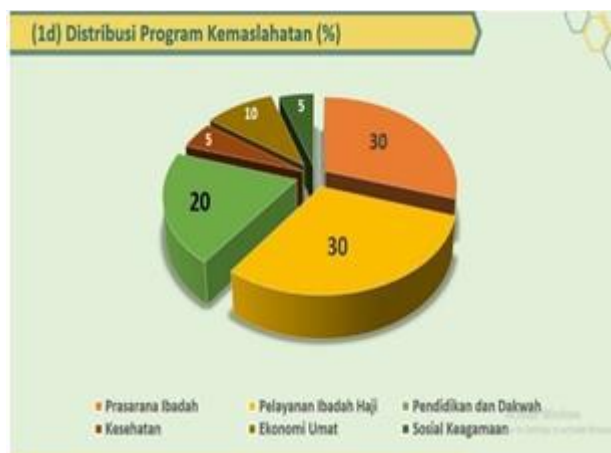


Fig. 3 Data Sources for Hajj Fund Management and BPKH Strategic Plan 2017

For the program for the benefit of the Ummah, specifically from the investment profits in the Ummah Endowment Fund, and the figures are not far from that, that is the profit from the management of the Ummah Endowment Fund which will be intended for the benefit of the Ummah program. In general, the benefit of the BPKH ummah has some types of groups that may receive, the distribution is determined, and BPKH collaborates with benefits partners such as amil zakat institutions, social institutions, and waqf institutions, so BPKH synergizes with existing institutions because they are more experienced.



Fig. 4 Data Sources for Hajj Fund Management and BPKH Strategic Plan 2017

The average profit of hajj fund management is 8.25% per year. In governance, the Hajj Financial Management Agency (BPKH) prepares a strategic plan for 5 (five) years, and Hajj Finance must be managed at a Sharia Commercial Bank or Sharia Business Unit. Placement or investment must be following sharia principles and consider security aspects. , prudence, benefit value, and liquidity. The placement or investment of Hajj Finance is carried out with the approval of the supervisory board. And for the administration of Hajj, the BPKH is required to manage and provide Hajj Finance which is equivalent to the need for 2 (two) times the cost of organizing Hajj.

The provisions related to the contract on the management of the BPIH are the wakalah contract which is valid until the BPIH and BPIH funds belonging to the prospective Hajj pilgrims are spent by the government in the framework of organizing the haj pilgrimage.

Candidates for jama'ah haji as muwakkil agree that a portion of the investment returns on BPIH and BPIH Special funds is used as the right of the manager by taking into account the main interests of the prospective jam'ah haji. Every citizen who is going to perform the hajj pilgrimage must open a savings account for the Hajj pilgrimage at BPS BPIH, then citizens who already have hajj savings pay the initial deposit for the BPIH or the Special BPIH according to the amount which has been stipulated as in Government Regulation No.5 of 2018 article 10 section (5). The initial deposit payment for the BPIH or the Special BPIH as referred to in Government Regulation No.5 of 2018 article 12 paragraph (3) is accompanied by filling and signing the wakalah contract form by the pilgrims.

And to give confidence and trust to prospective jama'ah haji that and BPIH and Special BPIH are managed and developed by the government as representatives by paying attention to aspects of security, prudence, and value of benefits, the government may guarantee all BPIH funds. And in article 53 of Law 34/2014, members of the implementing body and members of the supervisory board are jointly and severally responsible for any losses on the placement or investment of Hajj Finance as a whole arising from errors or negligence in its management.

Funds belonging to the pilgrims, when hajj deposits are accommodated in the account of the Minister of Religion whose registrants are included in the waiting list, in syar'i, belong to the registrant (prospective pilgrims). Therefore, if the person concerned dies or there is a syar'i obstacle that makes the prospective hajj pilgrims fail to leave, then the hajj deposit funds must be returned to the prospective pilgrims or their heirs. The fact is that all this time, the funds have been used and partially returned to pilgrims. This means that these funds are transferred for productive matters and are managed with high-risk mitigation, and therefore to maintain the conformity of sharia values in the management of the Hajj Implementation Cost (BPIH) fund on behalf of the owner, the government is allowed to transfer these funds to the halal sector as confirmed in article 2 of Law no. 34 of 2014 mandates that the management of Hajj funds must comply with sharia principles, namely sectors that are avoided from maisir, gharar, usury, and others, and Hajj Finance must be managed at a Sharia Commercial Bank or Sharia Business Unit as stated in article 46 paragraph (1) UU no. 34 of 2014, because indeed the mandate of Law No. 34 of 2014, hajj funds must be managed by sharia principles, the mandate of the law is that all implementation of hajj financial management must be under sharia in terms of placement, management, bank transfer, all of which must comply with sharia.

And if you let the hajj deposit funds that are stored in the account of the Minister of Religion whose registrants are included in the waiting list to settle in the government account is not considered wise and good.

So the proceeds from tasharruf belong to the prospective pilgrims who are included in the waiting list (among others, as an addition to the savings of prospective pilgrims or a reduction in the real/real cost of Hajj). Meanwhile, as the manager of the government (Ministry of Religion) after the establishment of the Badan Pengelolaan Keuangan Haji, BPKH has the right to receive reasonable / not excessive rewards (ujrah) as explained in ibn Umar's hadith regarding the rights of waqf managers. If the funds are managed optimally, then the people will have no difficulty in financing Community Organization (ORMAS).

4. Conclusion

There is a fatwa from the National Sharia Board (DSN) Number 122 with a sociological background, namely that there are questions from the public regarding the ownership status of the Hajj candidates' funds which are included in the waiting list, according to one version of the funds that have been deposited belongs to the government in this case, namely the Ministry of Religion. The use of it was submitted by the Ministry of Religion, and according to another version of the funds belonged to the prospective pilgrims, therefore the fatwa decision confirms that the funds belong to the prospective pilgrims, its characteristic is that if the pilgrims fail to leave the deposit funds the hadj must be returned. And behind this fatwa is the difference of opinion regarding the status of the fund ownership of the candidate pilgrims who are included in the waiting list which is the background for the fatwa of the National Sharia Board Number 122.

The fatwa of the National Sharia Board (DSN) has been late affirming the principles of BPIH based on sharia and if the management of the Hajj Implementation Fee Fund (BPIH) is not by the value of sharia, it will be straightened out by sending a letter from the National Sharia Board (DSN) to the Badan Pengelolah Keuangan Haji (BPKH). The DSN will remind and admonish from its sharia aspects if there is a fatwa violation. And the National Sharia Board (DSN) is a fatwa authority, not a supervisory authority, and not a regulator, therefore it does not have the authority to supervise the Badan Pengelolah Keuangan Haji (BPKH).

The provisions related to the contract on the management of the Hajj Pilgrimage Cost (BPIH) are the wakalah contract which is valid until the BPIH and BPIH funds belonging to the prospective Hajj pilgrims are spent by the government in the framework of organizing

the Haj pilgrimage.

And to give confidence and trust to prospective jama'ah haji that and BPIH and Special BPIH are managed and developed by the government as representatives by paying attention to aspects of security, prudence, and value of benefits, the government may guarantee all BPIH funds. The BPKH is an institution established by the government that guarantees in the form of a law, and that BPKH is a professional institution. In Article 2 of Law no. 34 of 2014 mandates that the management of hajj funds must comply with sharia principles, be careful, benefit, non-profit, transparent, and accountable.

Funds belonging to the pilgrims, when hajj deposits are accommodated in the account of the Minister of Religion whose registrants are included in the waiting list, in syar'i, belong to the registrant (prospective pilgrims). Therefore, if the person concerned dies or there is a syar'i obstacle that makes the prospective hajj pilgrims fail to leave, then the hajj deposit funds must be returned to the prospective pilgrims or their heirs. The fact is that all this time, the funds have been used and partially returned to pilgrims. This means that these funds are transferred for productive matters and are managed with high-risk mitigation, and therefore to maintain the conformity of sharia values in the management of the Hajj Pilgrimage Cost (BPIH) fund on behalf of the owner, the government is allowed to transfer these funds to the halal sector as confirmed in article 2 of Law no. 34 of 2014 mandates that the management of Hajj funds must comply with sharia principles, namely sectors that are avoided from maisir, gharar, usury, and others, and Hajj Finance must be managed at a Sharia Commercial Bank or Sharia Business Unit as stated in article 46 section (1) UU no. 34 of 2014, because indeed the mandate of Law No. 34 of 2014, hajj funds must be managed by sharia principles, the mandate of the law is that all implementation of hajj financial management must be following sharia in terms of placement, management, bank transfer, all of which must comply with sharia. Based on the results of the research, the management of Hajj Pilgrimage Funding Costs is following the DSN-MUI fatwa Number 122 concerning Management of BPIH and Special BPIH Funds based on sharia principles.

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Identification of Dynamic Models by Using Metaheuristic Algorithms

Mustafa Danaci¹, Fehim Koylu², Zaid A. B. Al-Sumaidae³

Faculty of Engineering, Erciyes University
kayseri, Turkey^{1,2,3}

e-mail: danaci@erciyes.edu.tr , fehmkoylu@erciyes.edu.tr ,
4013032001@erciyes.edu.tr



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Abstract

A modified versions of metaheuristic algorithms are presented to compare their performance in identifying the structural dynamic systems. Genetic algorithm, biogeography based optimization algorithm, ant colony optimization algorithm and artificial bee colony algorithm are heuristic algorithms that have robustness and ease of implementation with simple structure. Different algorithms were selected some from evolution algorithms and other from swarm algorithms to boost the equilibrium of global searches and local searches, to compare the performance and investigate the applicability of proposed algorithms to system identification; three cases are suggested under different conditions concerning data availability, different noise rate and previous familiarity of parameters. Simulation results show these proposed algorithms produce excellent parameter estimation, even with little measurements and a high noise rate.

Keywords: Dynamic Weighing System(DWS), System Identification(SI), Parameters Predicted, Genetic Algorithm (GA), Biogeography-Based Optimization Algorithm (BBO), Ant Colony Optimization Algorithm (ACO), Artificial Bee Colony Algorithm (ABC).

1. Introduction

Identification of structural dynamic models is quite an important region of study in mechanical and civil engineering fields. So, they have been used for a lot of different purposes such as production lines, transfer companies and building bridges, highways, etc. also have widely used in monitor nondestructive, evaluation, quality control, overload detection and filing or sorting of products, etc. the objective of system identification is to determine a model of a system so that its predicted response to a given input is close enough to the measured response from the real system.

Looking at the previous works, the widely used methods for identifying dynamic systems are adaptive filtering, nonlinear regression techniques (NLR), artificial neural network (ANN) models, and some of the metaheuristic algorithms. Considerable efforts have been made to develop methods for parameter identification and state estimation of dynamical systems that consider either a complete or partial set of input as well as output measurements such as, W. J. Shi, have used an adaptive filtering technique to measure dynamic weight system [1], and W. Q. Shu, used a nonzero start of the dynamic weight system [2]. While, M. Danacı, et. al., had estimated dynamic weight applied on model of system using non-linear regression method (NLR) [3]. Another work by M. Hamilic, et. al., used "kalman filter" to offer a better solution for mass with a dynamic weight system measuring [4]. M. Danacı studied parameter identification dynamic weight measurement system by using (NLR) method [5]. Gary J. Grayand, et. al., used genetic programming identifies parts of nonlinear equations that describe a dynamic system with numerical parameters [6]. M. Danacı, et. al., applied an estimated weight to noisy data for unknown starting conditions time by using modeling error method weight measurement system determined the model parameters at an early stage, then, they performed automatic prediction with (NLR) method treatment [7], and compared with adaptive filter technique [8]. M. Danacı, et. al., provided estimate by using the multi-layered architecture of artificial neural networks to find correct mass [9]. J. Li Zhou, et. al., prepared a prediction of dynamic weight measuring system overloaded masses by using Wavelet, Genetic algorithm and (ARX) [10]. C. Xiaoyan, et. al., used an artificial intelligence technique based on fuzzy logic, to eliminate the contradiction between accuracy rates and to improve the speed worked and organizing and self-learning skills [11]. H. Gao, et. al., made analysis errors and causes of the dynamic weight measurement system to make improvements on a neural network model [12]. Also, Q. Wu, et. al., prepared a signal processing platform for weight measuring system by building a hierarchical structure between Singular Spectrum Analysis and Learning Vector Quantization to noise-reducing and results showed significant improvement [13]. G. Liao, et. al., designed dynamic weight system measurement for an average mass of moving vehicles on roads, bridge and asphalt etc. to calculate damaged structures based on linear regression model by analyzing tools [14]. On the other side, W. Jeridi, et. al. studied the weight measurement process with filtering

techniques to improve and develop security analysis team and security risk analysis [15]. P. Hu, et. al., proposed a new smart control strategy between the accuracy and speed in the dynamic numerical weight measurement system proportional integral derivative (PID) control theory and neural network to solve contradiction [16]. Last but not least, J. Sun, et. al. proposed a new initialization approach with a (PID) controller known as PID-neural network and direct heuristic dynamic programming then they tested the effectiveness of the initiation approach based on the wheelbarrow model [17]. Z. Ying, et. al. conducted a study on the data processing method that includes the filter design finite impulse response and infinite impulse response. These studies provide better results as observed [18]. A. D. Martin, et. al., examine simulate vertical force. In the process of filling to extract the ordered mass of a milk powder bag suspended used milk as a function of time, powder mass estimation process by using Kalman extensions such as augmented-state Unscented Kalman Filter (UKF), non-augmented UKF, and particle filter [19]. M. Niedźwiecki, et. al., applied finite impulse response (FIR) model to the weighing system [20]. López-Ibáñez, et. al., presented the (IRACE) package, implementing the iterated racing procedure for the configuration of automatic algorithm [21]. Furthermore, Dunbing Tang, et. al., proposed a method for addressing the dynamic scheduling issue by reducing energy consumption and makespan for a flexible flow [22]. Oliver Nelles, elucidated how equational and output errors are dealt with in the neural network terminology as series-parallel and parallel model structures [23].

This part including some of the metaheuristic algorithms literature-work's, are also used in identifying the models of dynamic systems. D. Sendrescu, et. al., used particle swarm optimization and genetic algorithms to search the nine parameters of Monod law and Haldane kinetic model which is used to define the mathematical model of bacteria growth process [24, 25]. M. Ulinowicz, et. al., used Genetic algorithm for ship model identification [26]. M. Kumar, et. al., applied a bat optimization algorithm to design an adaptive (IIR) system [27]. and, S. Ryzhikov, et. al., used evolutionary optimization techniques with a new restart mechanism to solve inverse mathematical modeling for dynamic systems [28]. Frumen Olivas, et. al., used interval type-2 fuzzy logic to improve the convergence and diversity of the particles in PSO algorithm [29]. Muhammad Rizwan Tanweer, et. al., used incorporated a dynamic mentoring scheme along with a self-regulation scheme in the standard Particle Swarm Optimization [30]. In 2017, Yali Wu, et al., suggested adapted chaos and Kalman filter based Particle Swarm Optimization algorithm (SCKF-PSO) which is proposed to solve economic dispatch (ED) problem while minimizing the cost with different equality and inequality constraints [31]. Feifei Zheng, et al., proposed an innovative parameter-adaptive strategy for Ant Colony Optimization (ACO) algorithms based on controlling the convergence trajectory in decision space to follow any prespecified path [32]. Qiang Yang, et al., extends ACO algorithm to deal with multimodal optimization [33]. A. E. Baktir used optimization algorithms to predict displacement information in dynamic weighing systems [34]. Jhang Jyun-yu., et al., assessed the performance of type-2 fuzzy neural controller with dynamic

group PSO on the wall following behavior of mobile robots' navigation control method in an unknown environment [35]. Ruwang Jiao, et al. proposed dynamic constrained multi-objective evolutionary algorithm to model the antenna design problem which is defined as a constrained optimization problem. Algorithm is applied on three different antenna class and promised good results [36]. It is also worthwhile to note that Qinghua Wu, et al., confirmed that improved PSO algorithm could markedly enhance inversion precision as well as rendering high correlation coefficients linked with elastic parameters [37].

In reviewing the literature, system identification can generally be divided into parametric identification and nonparametric identification, depending on the type of structural model used. When system identification is done with respect to an assumed model defined by a set of physical parameters, such as mass and stiffness, it is referred to as parametric identification, while nonparametric identification is used to categorize methods that use purely mathematical representations of the system. Since the proposed algorithms have been proven to cope with large optimization problems, it is natural to compare their performance with structural parameter identification, taking into account the problems associated with the limitations encountered in real applications, such as incomplete sets of measurements and noisy data.

2. Meta-Heuristic Algorithms (Research Method)

Meta-heuristic algorithms are procedures that can create solutions without slope knowledge. Moreover, the rate of using meta-heuristic algorithms is increasing day by day due to their fast response, high computational power and reusability for different problems [38]. In this part, general information about the algorithms proposed in this paper has been explained to identify a dynamic weight system.

2.1. Genetic Algorithm

In 1975 John Holland [39], presented developed algorithms proposing genetic algorithm as a stochastic global search method mimicking the natural evolution wherein functions on a population of potential solutions administering the survival principle with the aim of developing a better generation gives individuals can adjust better than parents. To illustrate, cell have chromosome as a string of bit namely A and B and the chromosome have strings of DNA where the crossover exchange genetic material between two chromosomes or parents. Goldberg [40] describes the simple genetic algorithm (SGA) and uses it here for illustrating the basic components of the GA. A pseudo-code outline of the SGA is illustrated below. The population at time t is represented by the time-dependent variable P , with the initial population of random estimates being $P(0)$. The most prominent variations are:

- GA searches a population of points in parallel rather than a single point.
- GA make use of probabilistic transition rules instead deterministic rules.

- GA operates on an encoding of the parameter set except in where real-valued individuals are used.
- GA doesn't demand derivative or auxiliary information only the objective function and corresponding fitness levels affect the search directions.

Objective and Fitness Functions: The objective function is employed so that a measure of how individuals have performed in the problem domain could be provided. This raw measure of fitness is only benefited as an intermediate stage while determining the relative performance of individuals in a GA. Another function, namely, the fitness function, is, under normal circumstances, used so that the objective function value could be transformed into a measure of relative fitness [41].

Selection: is the process of how many times a particular individual is chosen for reproduction could be determined hence, the number of offspring that an individual is likely to generate. The selection of individuals could be seen as different processes:

- Determination of the number of trials an individual might take,
- Conversion of the anticipated number of trials into a discrete number of offspring.

The first part is related with the transforming raw fitness values into a real valued expectation of an individual's likelihood of reproducing and can be handled with in the previous subsection as fitness assignment. When it comes to the second part, it is the probabilistic selection of individuals for reproduction based on the fitness of individuals relative to each other and is also known as sampling. Many selection techniques make use such as roulette wheel selection methods, multi point crossover, uniform crossover, mutation and phenotypes[40- 43].

Genetic algorithm parameter's names and values that modified and used in this study are population size "30", number of steps "100", selection pressure "1", crossover probability "1", crossover inflation "0.1", mutation probability "0.02" and mutation rate "0.1".

2.2. Biogeography Based Optimization Algorithm

BBO is a nature-inspired algorithm which has roots in biogeography science it analyzes the distribution of species over time and space "research of the geographical distribution of biological organisms", in 2008, Dan Simon presented biogeography based optimization algorithm as an application of biogeography science to solve optimization issues [44, 45]. population based in which a population of candidate solutions " individuals " is employed to solve optimization issues, thus each possesses its own habitat suitability index (HSI) rather than fitness value to indicate the degree of its goodwill Whereas High-HSI habitat can represent a solid solution, low-HSI habitat may represent a weak solution, solution features range from high-HSI emigrating habitat to low-HSI immigrating habitat. it is Possesses operators namely migration "including emigration and immigration" in addition to mutation. One generation of the BBO approach could be described as:

- Find the fit test solution. Call this solution xi.
- Pick a random SIVs

- Choose the immigrating island x_j from a uniform probability distribution
- $x_j(s) \leftarrow x_i(s)$

steps of the algorithm are explained below the first approach is based on migration, immigration rates for each island, and probabilistically determine if to immigrate each SIV " solution feature " independently or not. The simulation outcomes which have been given in the original BBO paper [44] have been attained using this approach. The second approach is to base migration on emigration rates for each island, and probabilistically determine if to immigrate each SIV independently or not.

Biogeography based optimization algorithm parameter's names and values that modified and used in this study are population size "30", number of steps "100", keep rate "0.1", acceleration coefficient "0.5" and mutation probability "0.9".

2.3. Ant Colony Optimization Algorithm

In 1991 Dorigo and Coloni suggest a new approach to distributed problem solving and optimization based on the result of low-level communications between a numbers of cooperating simple agents who do not notice their cooperative behavior [46]. In reality, ants take random tours around when they find food they go back to the colony and lay down pheromone trails they probably will not continue to travel randomly rather they will follow the trail left by the ants which first used that path returning and reinforcing it on condition that they detect food on the other side. Day by day, the pheromone trail begins to evaporate hence diminishing its attractiveness the more time it takes for ants to go all the way down the path and return the more time the pheromones have to evaporate by comparison, the short path gets marched over faster, hence allowing the pheromone density to remain high the paths selected by the first ants would be highly attractive to those which follow them.

ACO is based on several construction steps on a dynamic memory structure which contains information concerning the quality of old results [47, 48]. Therefore, each one of the ants may represent a probable solution to the issue ants find out solutions taking existing pheromone trails into consideration and heuristic information available a prior a pheromone table is updated accordingly wherein higher the solution quality are taken if the more pheromone is deposited main frameworks are evaporation based and population based [49, 50] and the main distinction lies in the way pheromone is updated where the important variables of the framework are shown below. where probabilistic city selection and update pheromone explained in [51, 52]

- Trail intensity given by value of " τ_{ij} " which indicates the intensity of pheromone on edge (i, j)
- Trail visibility is " $\mu_{ij} = 1/d_{ij}$ "
- α Intensity in the probabilistic transition.
- β Importance of visibility of trail segment.
- ρ Trail persistence or evaporation rate.

- Q Constant and represents the amount of pheromone laid on a trail segment used by an ant.

Ant colony optimization algorithm parameter's names and values that modified and used in this study are population size "30", number of steps "100", sample size "40", intensification factor "0.2" and deviation distance ratio "0.9".

2.4. Artificial Bee Colony Algorithm

In 2005 D. Karaboga put forward Artificial Bee Colony algorithm (ABC) as a technical report for numerical optimization problems, ABC algorithm mimics the behaviour of real bees colonies [53]. Hence, ABC is a novel iterative improvement search paradigm, which is obviously an effective algorithm to solve combinatorial issues [54, 55]. Since its early days, various variations have been developed in parallel with last applications in many disciplines. It has been improved by simulating how honey bees behave while foraging.

A conventional ABC algorithm includes food sources each of which represents a possible solution to the issue. Types of bees which update food sources: Onlooker, Scout, and Employed bees. Each bee generates a new candidate food source position from the old one. In addition, ABC includes three control parameters:

- Population size (SN) is how many food sources exist (or solutions) in the population, SN is equivalent to the count of onlooker or employed bees.
- Maximum Cycle Number (MCN) refers to the highest number of generations.
- Limit is employed so that the search could be diversified. Moreover, limit is employed to determine the number of permissible generations for which every non-improved food source should be left.

Artificial bee colony algorithm parameter's names and values that modified and used in this study are population size "30", number of steps "100", onlooker bees count "30", maximum acceleration coefficient "0.9".

3. Findings

3.1. Identification Models

The identification models used in the process of system identification are classified according to the number of input/output parameters, time dependence, domain, linearity and confounding factors.

3.1.1. Number of input-output variables

These are models classified according to the number of input and output parameters. It is called models with one input and one output in return SISO(Single Input Single Output), models with multiple inputs and multiple outputs MIMO(Multiple Input Multiple Output), models with multiple inputs and one output MISO (Multiple Input Single Output). The most widely used

model for dynamical systems is the MISO model, where one output corresponds to multiple inputs. The parameters are more difficult to determine than in the SISO model [56,57].

3.1.2. Time dependence

It is the classification of models according to time dependence. While the internal dynamics of some models are time dependent and some systems are not affected by time, most dynamic systems have time dependence. The responses that the system gives vary as a function of time. To simplify the computation, it is common to use time-independent models [57].

3.1.3. Domain

System models are studied in two domains, the time domain and the frequency domain. While time domain is used for identification with differential and difference equations, frequency domain models are used for identification of systems such as spectral density or Bode curves [57- 62].

3.1.4. The condition of linearity factors

It is the modeling of systems according to the mathematical relationship between input, output parameters and disturbance variables. When the relationship between signals can be expressed with linear equations, these models are called linear models. The relationship between signals can be differential, exponential, logarithmic, trigonometric, etc. When expressed with nonlinear equations, these systems are called nonlinear models [57].

3.1.5. Disruptive effects

Models where the input signal is known and the output signal can be calculated exactly are called deterministic models, while models with random values that cannot be calculated due to external effects are called stochastic models. Many systems are identified with the stochastic model [57].

3.2. Structural Dynamic Systems

Accurate and fast operation of weight measurement is an important requirement in the modern world. Therefore, a dynamic system model for a weight platform is used in this study as shown in Figure 1. The system of mass (M), damping (C) and spring (K) is a widely used shock absorption system in mechanical systems, There are three types of responses depending on applied mass at damping system responses are called under damped, critical damped, and over damped [63, 64]. The most general form of weight system is the "Under Damping" system as shown in Equation 1, [65, 66]. The measurement of a weight system was modeled using the second differential equation expressed below in Equation 2. The parameter

"M" refers to the applied mass, the parameter "C" refers to the damping constant, the parameter "K" refers to the spring constant.

$$Y = M(g/k) - Ae^{-(c/2m)t} \sin(\omega dt + \phi)$$

$$F(t) = M(d^2y(t)/dt^2) + C(dy(t)/dt) + Ky(t)$$

$$F(t) = g * (M/K)$$

$F(t) = g * \frac{M}{K}$ where, "g" parameter is gravitational acceleration.

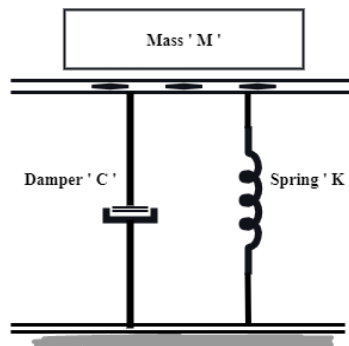


Figure 1. The model of the weight measuring system.

3.2.1. Preparation of System

GA, BBO, ACO, ABC algorithms are used to investigate the dynamic system and performance of the algorithms on predicting the parameters are compared on three parts of the nonlinear system with different parameter values and noise rates.

3.2.1.1. Identification System

The system response to the effect of data size on identification is studied; this part is for testing purposes and shows the identification performance of the algorithms.

In this section, the system response is performed to find the values of each 'M', 'C' and 'K'. The system parameters used for the response are mass(M) = 100 kg, damper constant(C) = 50 N/(m/s), spring constant(K) = 1000 N/m, number of samples(N) = 250. The system response is calculated for each 0.4 seconds and recorded for 10 seconds. The responses of the systems with 0, 1, 3, 5, and 10% are shown in Figure 2.

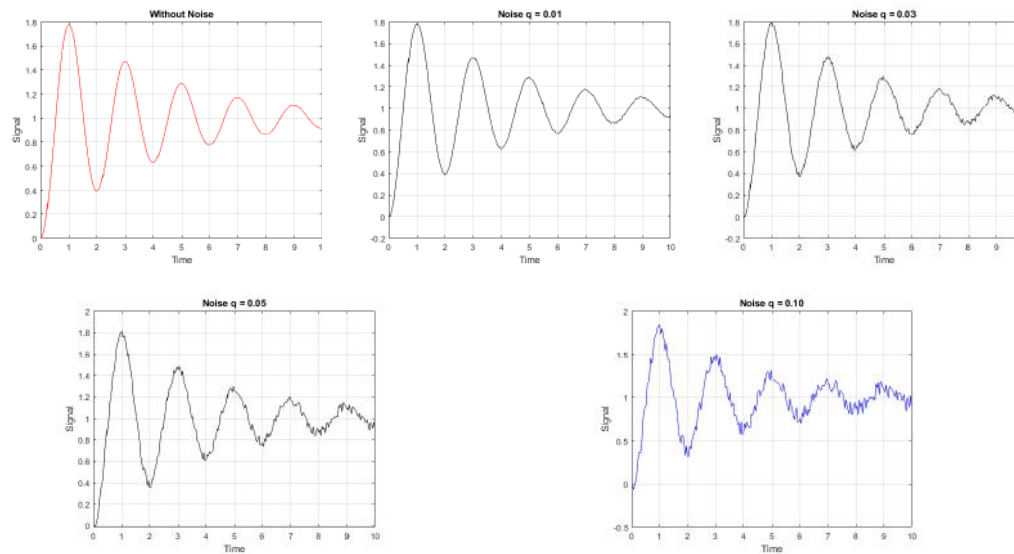


Figure 2. System response when mass =100, damper =50, spring =1000 with different noise rate (without noise, with 1% noise, with 3% noise, with noise and with 10% noise)

3.2.1.2. Prediction Damper (C) and Spring (K) System

In this experiments, Damper (C) and Spring (K) parameters are predicted as a function of Mass (M) within given bounds.

Mass datasets are prepared using different mass(M) values, such as 5, 20, 30, 45, 60, 70, and 90 Kg. The identified true values are 50 N/(m/s) for C, 1000 N/m for K, and 250 samples are collected. The system response is calculated for each 0.4 seconds and recorded for 10 seconds. The responses of the systems with 0, 1, 3, 5, and 10% are shown in Figure 3 and Figure 4.

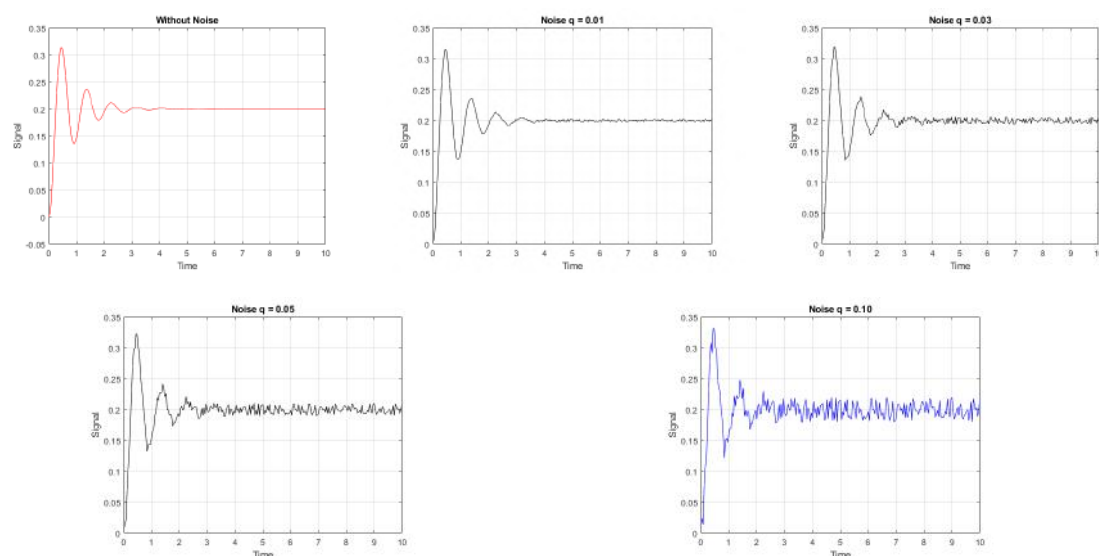


Figure 3. Damping graph of scaling device with 20 kg mass; without noise, with 1% noise, with 3% noise, with noise and with 10% noise.

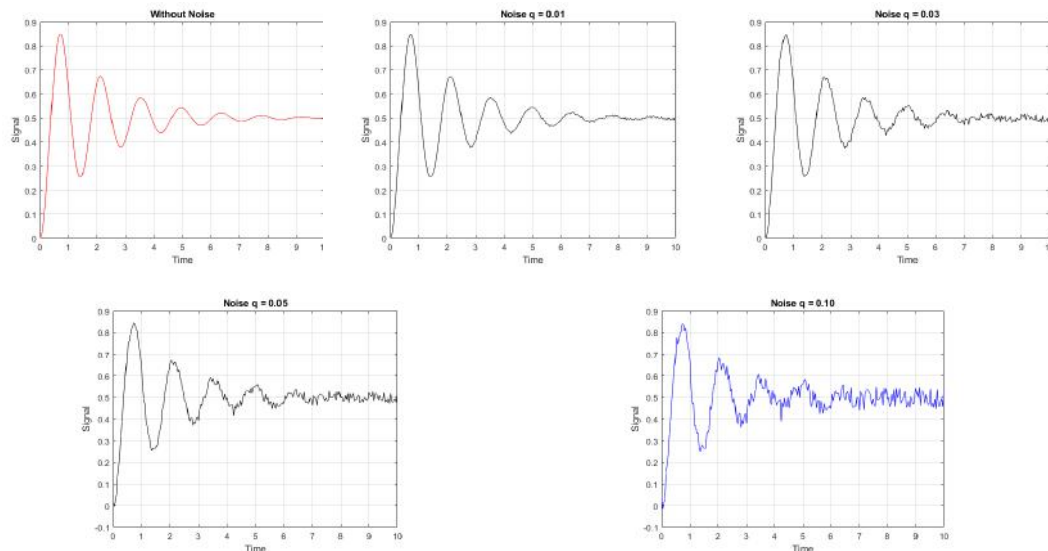


Figure 4. Damping graph of scaling device with 45 kg mass; without noise, with 1% noise, with 3% noise, with noise and with 10% noise.

3.2.1.3. Prediction Mass System

Prediction to determine Mass (M) of the range comparison of the system response part in which the pre-estimation process is performed with less data is done.

In this section, the mass constant (M) was predicted at an early stage, assuming that the values of the damper and the spring are known from the results of the identification in the second part (prediction of Damper Constant and Spring Constant). The determination process was completed by taking 10% of the system response, estimated min-max equal to 90%, the displacement of the system response $t = 0$ and 0, 1, 3, 5 and 10% noises.

Data generated in the simulation environment is used in the study. The system responses were obtained in the simulation environment by giving the model the parameter values known beforehand and called the reference system response. Using meta-heuristic algorithms, the found parameter values are designated as new system response by passing the data. These two outputs are compared with the sum of squares equation at each step to find the best parameter values up to the maximum number of steps. It is shown in following equation, [1, 63, 67-70].

- Here, the system is tested with different mass values.
- In each part of this study, "g = 10 m / s²", and "ms = 0".

$$\Delta y = \Sigma(y-y')^2$$

3.3. Dynamic Weight Measurement

Identified dynamic weight systems using the algorithms GA, BBO, ACO and ABC then make predictions for parameters with 0%, 1%, 3%, 5% and 10% noise rates.

3.3.1. System Response Results

In this section, the system response performance of each algorithm is shown, where system response conducted to find the values of each 'M', 'C' and 'K' as shown below the results for each algorithm show separately in Figure 5; In this section, the results of the system responses for the performances of the proposed algorithms are recapitulated to find each "M", "C" and "K" value with the least sum squared error (SSE), see tables below, the best result of SSE obtained by using the system responses with 0% noise ratios founded by GA was equal to 1.7421e-11 and the ACO algorithm was equal to 6.1848e-07. And the best result of SSE obtained with system responses with 1% noise ratio founded by GA was equal to 2.4825e-10 and ABC algorithm was equal to 0.0080641, 3% and 5% noise ratio founded by BBO was equal to 0.071939, 0.20352 and 10% noise ratio founded by GA was equal to 0.84236 and ABC was equal to 0.80609. Comparing the obtained parameter values by using the proposed algorithms with the original system parameter values, we found that BBO and ABC have high performance and give better results, but in GA and ACO there are serious deviations for the original value in finding the damper caused by using a small amount of data, and the same algorithms have high performance and give good results in finding the mass, damper and spring, have very small deviations for the original value caused by using a large amount of data.

Noise	GA				BBO			
	Mass 100Kg.	Damper 50N/ms	Spring 1000 N/m	SSE	Mass 100Kg.	Damper 50N/ms	Spring 1000 N/m	SSE
0%	105.96	52.918	1009.7	1.7421e-11	100.33	50.48	1003.2	0.00043496
1%	101.07	50.537	1010.7	2.4825e-10	100.23	50.23	1002.3	0.0076896
3%	104.95	47.482	950.43	0.075814	110.18	56.256	1101.6	0.071939
5%	106.92	53.476	1071.1	0.21059	99.22	48.516	993.03	0.20352
10%	102.71	50.8895	1025.41	0.84236	114.16	57.082	1142.2	0.89527

Table 1. System Response of GA and BBO to identification Mass (M), Damper (C) and Spring (K) with the results of Summation Squared Error (SSE).

Noise	ACO				ABC			
	Mass 100Kg.	Damper 50N/ms	Spring	SSE	Mass 100Kg.	Damper 50N/ms	Spring	SSE

			1000 N/m				1000 N/m	
0%	100.94	50.458	1009.4	6.1848e-07	100.97	50.427	1009.8	2.4121e-05
1%	102.84	51.357	1028.5	0.0088596	99.473	49.735	994.71	0.0080641
3%	97.345	48.561	973.46	0.079767	99.469	49.694	994.83	0.072548
5%	97.216	48.43	972.33	0.22153	100.83	50.423	1008.5	0.20155
10%	104.15	52.052	1044.8	0.88593	95.474	47.628	955.18	0.80609

Table 2. System Response of ACO and ABC to identification Mass (M), Damper (C) and Spring (K) with the results of Summation Squared Error (SSE).

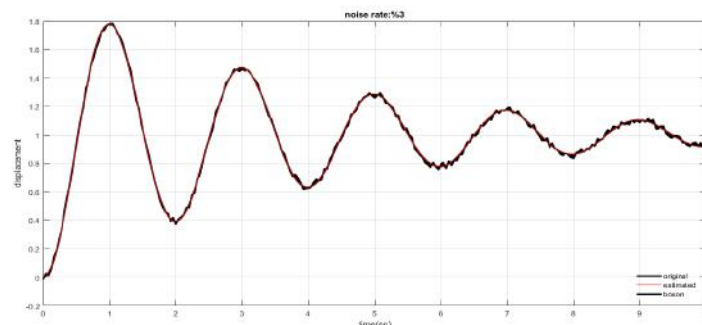


Figure 5. System response when mass =100, damper =50, spring =1000 with 3% noise rate.

3.3.2. Prediction Damper Constant and Spring Constant

In this part, the performance of the proposed algorithms for identifying the damper and spring values is shown by applying different values of mass, where the values of mass (M) are equal to 5 kg, 20 kg, 30 kg, 45 kg, 60 kg, 70 kg and 90 kg, the results of each algorithm are explained separately below.

Applied Mass	GA				BBO		
	Noise	Damper C 50N/ms	Spring K 1000 N/m	SSE	Damper C 50N/ms	Spring K 1000 N/m	SSE
5 Kg.	0%	49.999855	999.99996	2.0726e-14	48.390118	1000.217	2.5312e-06
	1%	49.786477	1000.1032	2.0196e-05	49.376407	999.86235	2.2317e-05
	3%	49.359871	1000.3084	0.00018176	49.831901	999.46719	0.00019893
	5%	48.933013	1000.5075	0.00050489	50.710647	999.13255	0.00055431
	10%	47.865495	1001.0151	0.0020195	48.319242	998.53407	0.0022098
20 Kg.	0%	49.997441	1000.0003	2.9481e-10	50.059334	1000.8689	8.4851e-06
	1%	50.093234	999.43696	0.00031343	50.031636	998.95862	0.00031918
	3%	50.288091	998.30894	0.0028208	50.962605	999.08292	0.0027837
	5%	50.486474	997.18016	0.0078351	51.831236	997.90506	0.0077383
	10%	51.026065	994.34652	0.031337	52.454183	996.95036	0.030965
30 Kg.	0%	50	1000	1.8985e-17	50.017286	999.99882	4.367e-08
	1%	49.933174	1000.1963	0.00079408	49.965364	1000.2725	0.000751

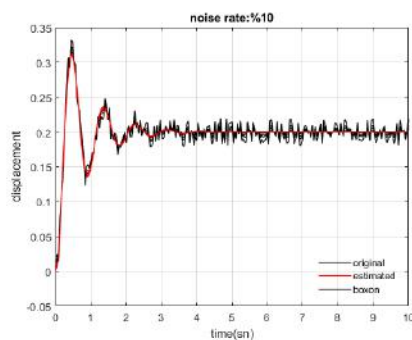
	3%	49.799004	1000.5871	0.0071467	50.01323	1000.7753	0.006761
	5%	49.664135	1000.9754	0.019852	50.702887	1003.8878	0.019068
	10%	49.32385	1001.9353	0.079408	49.699474	1002.2414	0.075104
45 Kg.	0%	49.999754	1000	2.9101e-11	49.90888	1000.0254	4.0356e-06
	1%	50.060663	999.89049	0.0017178	50.090689	998.81644	0.0017931
	3%	50.179664	999.76793	0.01546	49.859124	1001.2434	0.014735
	5%	50.301685	999.61695	0.042944	49.982525	1000.7681	0.040911
	10%	50.578621	999.25033	0.17178	49.08732	1003.2663	0.16365
60 Kg.	0%	52.366696	1003.4764	0.0077487	50.10165	1000.9646	0.0001605
	1%	50.040885	999.82236	0.0028513	49.81631	1000.9811	0.0033474
	3%	50.123434	999.46811	0.025661	50.834864	995.72167	0.034633
	5%	50.206817	999.11519	0.071282	48.282541	1015.321	0.11425
	10%	50.419303	998.23847	0.28513	49.634438	1002.9126	0.32554
70 Kg.	0%	49.99982	1000.0038	3.7844e-09	49.999252	1000.0045	6.0697e-09
	1%	49.978377	1000.0921	0.0042634	50.08091	1000.7095	0.0042631
	3%	49.935878	1000.2766	0.038371	50.806001	999.24606	0.036709
	5%	49.893249	1000.4622	0.10659	50.253417	998.99388	0.10005
	10%	49.794616	1000.9273	0.42634	49.600672	998.69952	0.40218
90 Kg.	0%	50.001479	1000	7.4903e-09	50.01418	1002.5333	0.003355
	1%	50.095384	999.97601	0.0066058	48.410358	990.11268	0.073142
	3%	50.285918	999.93234	0.059453	51.442259	1000.6134	0.059915
	5%	50.475786	999.89449	0.16515	50.841847	1000.4211	0.15959
	10%	50.950732	999.82538	0.66063	51.883219	1001.7712	0.63758

Table 3. Results of Prediction Damper (C) and Spring (K) by using GA, BBO with different Mass (M) and also different noise rate.

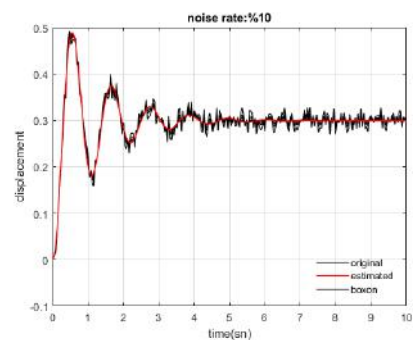
Applied Mass	ACO				ABC		
	Noise	Damper C 50N/ms	Spring K 1000 N/m	SSE	Damper C 50N/ms	Spring K 1000 N/m	SSE
5 Kg.	0%	50	1000	4.3333e-34	50.00012	1000.0005	1.7723e-13
	1%	49.496855	1000.6654	2.0262e-05	50.202405	1000.4958	1.8217e-05
	3%	48.503686	1001.9989	0.00018235	50.624659	1001.4995	0.00016395
	5%	47.526778	1003.3365	0.00050651	51.057885	1002.4974	0.00045541
	10%	45.145276	1006.7002	0.0020258	52.18623	1005.0092	0.0018215
20 Kg.	0%	50	1000	8.7052e-32	50.000553	999.99547	2.3655e-10
	1%	49.77266	999.30359	0.0003353	49.879053	1000.0806	0.00032533
	3%	49.316695	997.91301	0.0030175	49.634331	1000.2528	0.0029279
	5%	48.859144	996.52549	0.0083813	49.393144	1000.4199	0.0081332
	10%	47.709381	993.07063	0.033518	48.795694	1000.8899	0.032532
30 Kg.	0%	50	1000	0	50.000031	1000.0009	2.4054e-11
	1%	50.046888	999.94136	0.0007446	49.854536	999.88619	0.00078022
	3%	50.140308	999.82372	0.0067012	49.565402	999.66422	0.0070217
	5%	50.233259	999.70561	0.018615	49.26983	999.44508	0.019504
	10%	50.46363	999.40832	0.074459	48.529388	998.903	0.078011

45 Kg.	0%	50	1000	0	49.999852	1000.0002	1.3565e-11
	1%	50.103451	1000.3424	0.0016703	50.089971	999.87108	0.0016993
	3%	50.310326	1001.0293	0.015033	50.270334	999.60126	0.015293
	5%	50.51711	1001.7192	0.041758	50.451029	999.3305	0.042481
	10%	51.033254	1003.4567	0.16704	50.907104	998.64691	0.16992
60 Kg.	0%	50	1000	3.5314e-30	50.000668	999.99606	2.9615e-09
	1%	49.849704	1000.0578	0.0028016	50.073272	1000.3753	0.0031431
	3%	49.551379	1000.177	0.025215	50.218351	1001.131	0.028287
	5%	49.255998	1000.3014	0.070041	50.368172	1001.8962	0.078574
	10%	48.529842	1000.6343	0.28016	50.748679	1003.8251	0.31427
70 Kg.	0%	50	1000	3.6793e-30	49.999113	1000.0011	1.6436e-09
	1%	50.007325	999.70261	0.0037797	49.991115	1000.0481	0.0038159
	3%	50.022479	999.10598	0.034017	49.974146	1000.1451	0.034343
	5%	50.038284	998.50686	0.094489	49.9563	1000.244	0.095398
	10%	50.080505	996.99803	0.37794	49.908413	1000.4871	0.38159
90 Kg.	0%	50	1000	0	50.001972	999.99896	1.3877e-08
	1%	49.868261	1000.1087	0.0064954	49.89527	999.88091	0.0063895
	3%	49.605428	1000.3236	0.058458	49.688649	999.64365	0.057506
	5%	49.343461	1000.5351	0.16238	49.480796	999.40329	0.15974
	10%	48.692378	1001.0498	0.64951	48.97645	998.78067	0.63896

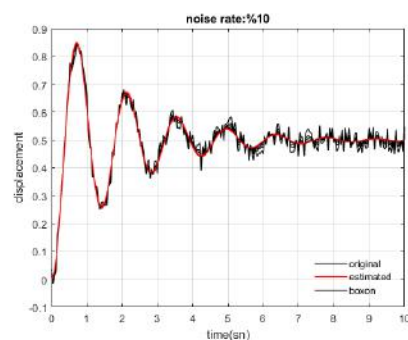
Table 4. Results of Prediction Damper (C) and Spring (K) by using ACO, ABC with different Mass (M) and also different noise rate.



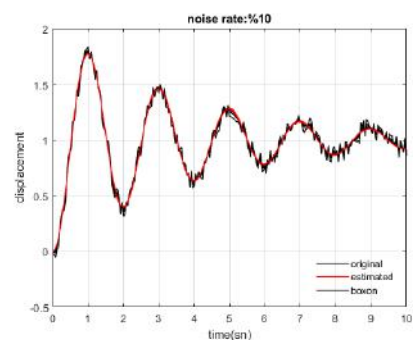
a) Mass 20 Kg.



b) Mass 30 Kg.



b) Mass 45 Kg.



b) Mass 90 Kg.

Figure 6. Response of Prediction Damper (C) and Spring (K) when mass =20,30,45 and 90 Kg.,with 10% noise rate.

The summary of the results for the proposed algorithms in this study to identification of the constants 'C' and 'K' to be assigned by taking the mean values of the found values when applying different mass values to the dynamic weight measurement system model separately within certain limits. The results of identifying the parameters 'C' and 'K' are shown in "Table V". Considering the values of GA and BBO it is found that the identification performance of the constants performed using the system response with a noise ratio of 0% is 50 for C, 1000 for K and 1.8985e-17 for SSE in GA when m = 30 kg. Whereas 49.999252 for C, 1000.0045 for K and 6.0697e-09 for SSE in BBO when m = 70 kg. The results of ACO and ABC are shown in "Table VI" respectively. The performance of identification with system response even at 0% noise ratio is 50 for C, 1000 for K and 0 for SSE in ACO when m = 30 kg, 45 kg and 90 kg respectively. Where 50.00012 for C, 1000.0005 for K and 1.7723e-13 for SSE in ABC; the results of GA and BBO as shown in the tables above, it can also be seen that the average performance of identification study with system response with %1,%3,%5 and %10 noise ratio, 49.99571054 for C, 999.6948975 for K and 0.07987367 for SSE in GA, while 50.17161807 for C, 1000.238145 for K and 0.082813005 for SSE in BBO. and 49.42941946 for C, 1000.087197 for K and 0.076403386 for SSE in ACO, while 49.99966457 for C, 1000.441206 for K and 0.077968008 for SSE in ABC. As (Swarm Intelligence Algorithm) it is seen that ACO has the best SSE values in %0 noise ratio followed by ABC with very little difference and as (Evaluation Algorithm) it is seen that GA has the best SSE values in %0 noise ratio. When the noise ratio equal to %1, %3, %5 and %10, it also seen that ACO has the best SSE values in noise ratio followed by ABC and GA.

3.3.3. Prediction to Determine Mass

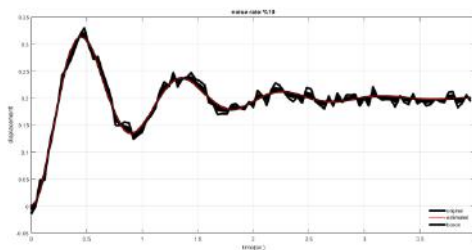
In this section, the mass constant "M" was predicted at an early stage, assuming that the values of the damper and the spring are known from the results of the identification in part (B. Identification Damper Constant and Spring Constant prediction). The determination process was completed by taking 10% of the system response, estimated min-max equal to 90%, the displacement of the system response t = 0 and 0%, 1%, 3%, 5% and 10% noises. The results are shown below in the tables as for all algorithms.

Original Mass	Comparison of Algorithms Results				
	Noise	GA	BBO	ACO	ABC
M=20 Kg.	0%	19.996	20.020	20.003	19.992
	1%	20.008	19.986	20.003	19.999
	3%	20.031	21.436	20.002	20.020
	5%	20.054	19.929	20.000	20.038

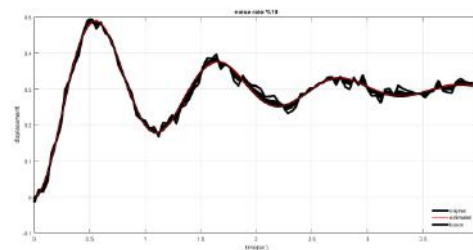
	10%	20.150	19.923	19.997	20.083
M=30 Kg.	0%	29.993	30.027	30.006	29.985
	1%	30.015	30.147	29.992	29.993
	3%	30.059	29.748	29.965	30.001
	5%	30.104	30.059	29.938	30.012
	10%	30.270	30.111	29.870	30.036
M=50 Kg.	0%	49.987	50.030	50.011	49.976
	1%	49.995	49.983	50.010	49.970
	3%	50.012	49.977	50.009	49.952
	5%	50.029	49.482	50.009	49.934
	10%	50.160	49.953	50.009	49.892
M=100 Kg.	0%	99.993	100.152	100.011	99.954
	1%	100.025	100.234	99.976	99.988
	3%	100.059	100.056	99.906	100.060
	5%	100.102	100.112	99.835	100.132
	10%	100.417	100.181	99.656	100.310

Table 5. Results of Prediction to Determine Mass (M) by using GA, BBO, ACO and ABC Algorithms

A summary of the results on the preliminary estimation answer for the determination of the mass and the performance of the proposed algorithms are explained. By looking at the tables, it can be seen that the performance of GA algorithm had good response values when the noise rate was equal to 0%, 1%, 3% and 5%, while the BBO algorithm had good response values when the noise rate was equal to 0%, 1%, 5% and 10%, with ABC and ACO algorithms having the best values at all noise rates equal to 0%, 1%, 3%, 5% and 10%. In the mass estimation studies, it was observed that the results of GA, ABC and ACO were very good at different noise rates to find different mass values, in the second class BBO gave successful results at different noise rates.



a) original mass =20 Kg.



b) original mass =30 Kg.

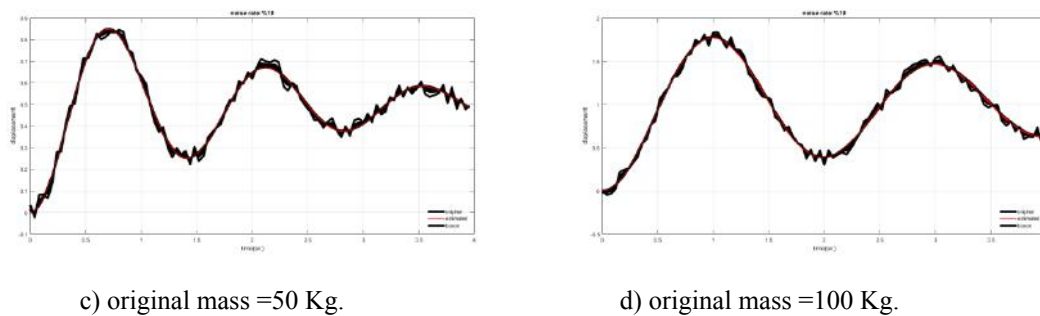


Figure 7. Response of Prediction Mass (M) when original mass =20,30,50 and 100 Kg.,with 10% noise rate.

4. Conclusion

A modified version of the GA, BBO, ACO and ABC algorithms has been presented in the context of structural systems identification. In order to investigate the applicability of these proposed techniques for the identification of systems with estimation parameters, nonlinear systems were studied under different conditions, taking into accounts such as the number of measurements used for the identification, noise signals and knowledge of the mass. In all the cases considered, the simulation results show that the proposed algorithms are successfully applied to identification system and estimate the mass, When the found parameter values are compared with the original parameter values, it was found that very successful results are obtained. Considering obtained results, in the mass estimation part, it has been observed that the GA and ACO have good parameter values with the system response with different noise ratio, and BBO, ABC yielded successful results at different mass values. The presented methods is effective, robust and efficient even with reduced partial measurements and high noise.

Meta-heuristic algorithms can be used as an alternative solution in parameter estimation procedures, especially in system identification procedures. If the algorithms used in the study are improved in terms of their response times, they can be used for online applications. For future studies, hybrid algorithms, parallel signal processing techniques can be used to improve the response times.

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Review of Responsive Design Concept Based On Framework Materialize On The Website



Muhammad Rehan Anwar¹, Marviola Hardini², Mey Anggraeni³
University of Agriculture Faisalabad (UAF)¹, Raharja University^{2,3}
e-mail: rehan749@gmail.com, marviola@raharja.info, mey.anggraeni@raharja.info

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Abstract

Responsive web design is a website design that can adjust each size on each device. Based on the results of several respondents, 60% of respondents agreed that some websites were not able to adjust the display size on the web, 50% of respondents agreed that design affects the convenience factor, 58% of respondents agreed that the main content and functionality of websites that are difficult to access via mobile devices, 53% of respondents agreed that the appearance of a website that was not attractive had a bad effect on the comfort factor of the respondents, 50% of respondents also agreed that the website was not able to adjust the size on every mobile device. From the results of this review, it can be concluded that an unresponsive website greatly affects the inconvenience of users in accessing information through the website.

Keywords: responsive design, website, mobile, respondent, review

I. INTRODUCTION

At this time information technology is developing rapidly in various fields of life. The increasing use of online websites is also caused by a number of internet users. This is a new challenge for developers in various ways that improve the quality of a website that provides information that is fast, precise and easily accessible to all people and can be accessed by various platforms and various media.

This is supported by the development of mobile devices which are increasing every year, especially in the use of smartphones. According to the results of a survey by the Indonesian Internet Network Providers Association (APJII) in 2016, it was revealed that 63.1 million people or around 47.6% accessed smartphones and only 2.2 million people or around 1.7% accessed computers. This encourages developers to improve the quality of responsive or attractive websites. However, the difference in size for each device is a factor of inconvenience for users. Increasing use of devices requires developers to create responsive and attractive websites.

Responsive web design is a website design that can adjust every size on each device. This responsive design application is combined with flexible grids, javascript CSS media queries and HTML. The benefit of responsive design is a website that can adapt to the layout of device sizes of various sizes, fonts, images and other components without having to do horizontal scrolling.

Literature Review

a. Web

(Tabratas Tharom, Marta Dinata and Xerandy, in Bertha, 2001: 64), said "The web is a collection of documents that are scattered on internet machines. Usually this document is called (HTML page). Each page contains links to other pages on the internet. A web page that points to another page is called Hypertext. The string linking to another page is called a hyperlink.

b. Fixed Width Design

(Knight, K, 2009), said that "Fixed width design (FWD) is applied to websites with fixed website layouts that have a wrapper with a fixed width, and the components contained therein have a specified width with a certain percentage. The important thing is that the wrapper element is set immovable. No matter what screen resolution website visitors use, visitors will see the same website width as other visitors ".

c. Responsive Design

Noah Daniels (2004) states "Responsive design is a website development by displaying an elegant design with the appropriate size on each device displayed. With this responsive design, it only requires one website but can be accessed by various devices with different screen sizes, can provide ease of maintenance and only requires one domain address.

Based on the UIE article entitled "Device Experience & Responsive Design", explaining responsive design is a technique that can make the process of designing applications and websites for various types of devices easier. This is because by using a responsive device, it is possible for designers to be able to implement solutions of various screen resolutions, densities, and aspect ratios on many types of devices. Responsive design has the ability to be applied into the design of a website so that the site can be accessed via a smartphone, tablet, desktop, or smart TV without showing too big a difference in terms of usage.

From the two meanings above, it can be concluded that responsive design is a website development by displaying elegant designs with various device sizes to be able to implement solutions for various screen resolutions, densities and aspect ratios on types of devices that can be accessed via smartphones, tablets, desktop or smart TV.

d. Materialize

According to Anirudh Prabu and Aravind Shenoy (2016), stated "Materialize is a framework that is similar to Bootstrap and Foundation which presents UI components. However, it has different functions because Bootstrap and Foundation are mobile based while Materialize follows Material Design which comes from Google.

e. CSS

According to Achmad Solichin (2013), "CSS or Cascading Style Sheet was first proposed by Hakon Wium Lie in 1994, then standardized by W3C. CSS provides a fairly easy and efficient way for programmers to determine the layout on web pages and beautify web pages with various elements and animations. Like HTML, versions of CSS are also evolving. The first version established by the W3C in December 1996 was CSS level 1, then in May 1998 it developed to CSS level 2, and in 2012 it was proposed CSS level 3. The version that is currently popular is CSS level 3 because it has many advantages compared to CSS. previous versions".

f. HTML

According to Achmad Solichin (2013), "HTML stands for Hypertext Markup Language. The first time HTML was developed by Tim Berners-Lee with the HTTP (Hypertext Transfer Protocol) protocol in 1989. HTML is also a web programming language that tells web browsers which to compile and present content on web pages".

g. Javascript

According to Achmad Solichin (2013) "Javascript was first developed by Netscape with the initial name LiveScript. The main function of Javascript is for the convenience of web functions. Javascript is more focused on processing data and presenting more attractive web components. Since the emergence of the concept of AJAX (Asynchronous Javascript and XML), Javascript has become increasingly popular, allowing interaction between the client and server to be more flexible.

h. JQuery

According to Aloysius Sigit W, (2011), "A query is a collection of ready-to-use Javascript code. The use of JQuery is superior to using Javascript, namely by simplifying the Javascript code by calling the functions provided by JQuery. Javascript itself is a scripting language that works on the browser side so that websites can be more interactive. JQuery was first released in 2006 by John Resig. JQuery has been used on world-class websites such as Google, Twitter, ESPN and others.

i. C# Programming

According to Shelly Cashman Vermaat (2016), "C # or read as C sharp is object-oriented programming developed by Anders Heljsberg who is the head at Microsoft and a great engineer. C # has also been accepted as the standard for XML-based web applications and services.

j. Media Queries

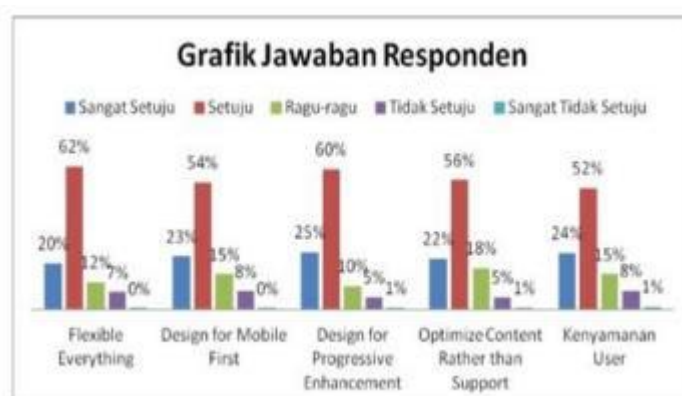
Media queries are a technique from CSS that can determine or adjust the appearance of each device based on its resolution. This is needed to determine the size of each font image at each device resolution which can make it easier for users to find info from the website effectively.

II. METODE

This study is based on quantitative method, which consists of data analysis based on statistical method. Our measurement or construct is derived from prior empirical research: Internet Addiction by Young et al (Young 2015). The construct was then modified and adjusted with condition in Indonesia. Final measurement model is in a five-point Likert-type scale ranging from “strongly disagree” to “strongly agree”. The question is then classified into several categories like “time”, “relationship”, “productivity” and “thought” based on deeply reading several prior research (Ashwini Veronica and Samuel 2016)(Buran Köse and Doğan 2019)(Şahin 2017). These classes then observed whether there is a significant relationship to social media and gadget addiction. All constructs of measurement are put on online form and spread out to selected audiences. In addition, additional information like age, sex, occupation, last education, and city is included in form information.

III. RESULT AND DISCUSSION

- 60% of respondents agree that some websites have not been able to adjust the display size on the web. Such as headers, footers, images and text fonts, which greatly affect the comfort of respondents.
- 50% of respondents agree that the design affects the comfort factor in reading text, images and menus.
- 58% of respondents agree that the main content and functionality of websites that are difficult to access via mobile devices greatly affect the convenience of respondents.
- 53% of respondents agree that an unattractive website display has a bad effect on the comfort factor of the respondents.
- 50% of respondents also agree that websites that have not been able to adjust the size of each mobile device affect the activity of the respondent when accessing the website.



Graphs 1. Respondents' answer graph

The results of the image above show that currently users who are accessing the website on a mobile device with an unfocused display or desktop version, user comfort will decrease when accessing the website.

- Provides convenience for users when accessing the website via mobile devices.
- Prevent horizontal scrolling when users access the web via mobile devices.
- Only users of one domain address, the website can be accessed on all mobile devices.
- Can adjust the size or appearance of the website on each device accessed.
- Ease of maintenance is an advantage for the owner or company.

IV. CONCLUSION

Based on the conclusions from the above review that:

1. Based on the results of several respondents stated, 60% of respondents agreed that some websites were not able to adjust the display size on the web, 50% of respondents agreed that design affects the convenience factor, 58% of respondents agreed that the main content and functionality of websites that are difficult to access via mobile devices , 53% of respondents agreed that the appearance of the website that is not attractive has a bad effect on the comfort factor of the respondents, 50% of respondents also agreed that the website has not been able to adjust the size on every mobile device.
2. Based on the results of the respondents above, it is stated that the inconvenience of users when accessing websites that have not been able to adjust the appearance of each device greatly affects the comfort of the users.
3. One of the advantages of responsive design is that it avoids horizontal scrolling when accessing the website via mobile devices and the size of the website which can adjust the display at each screen resolution.

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Social Media Factors and Teen Gadget Addiction Factors in Indonesia

AJRI



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Alwiyah¹, Efa Ayu Nabila², Nesti Anggraini Santoso³
Universitas Wiraja Sumenep¹, Raharja University^{2,3}
e-mail: alwiyahmahdaly@yahoo.com, efaayunabila@raharja.info, nesti@raharja.info

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Abstract

Social media users in Indonesia are growing rapidly since its emergence. In 2019, one of the largest social media platforms, Facebook has 3 billion users worldwide as well as 130 million users from Indonesia. Moreover, other social media such as Instagram also experienced significant growth with most of its users being teenagers. Massive use of social media is caused by more than 100 million active users using gadgets or smartphones to open apps such as social media. Widespread use of social media and gadgets not only has a positive impact but also negative impacts such as mental and behavioral disorders if the user is already addicted. Therefore, the need to know the factors that influence social media addiction and gadgets in Indonesia is necessary to prevent the occurrence of social media and gadget addiction. In this paper, the influence factors of social media addiction and gadgets in Indonesia are examined using several techniques such as data science, partial least square, and structural equation modeling. Research result: Time, Productivity and Relationships are factors that influence social media addiction and gadgets, whereas Mind is not a factor that affects social media addiction and gadgets.

Keywords: *Social Media, Gadgets, Negative Impact*

I. INTRODUCTION

Social media has been widely used all over the world, especially in Indonesia. This can be seen from one of the social media platforms, Facebook, which Indonesian users ranked fourth highest in the world in 2018 (Millward 2018). Similar to Facebook, another popular social media, Instagram, reaches 60 million users in Indonesia. The massive use of social media is caused by more than 100 million active users using gadgets or smartphones to open apps such as social media. The widespread use of social media and gadgets not only has a positive impact but also negative impacts such as mental and behavioral problems (Kempa 2015), and decreased academic motivation (Prabandari and Yuliati 2016) if users are already addicted. This latest negative impact is seriously a threat to children and adolescents (Ashwini Veronica and Samuel 2016). Therefore, the need to know the factors of social media addiction and gadgets in teenagers in Indonesia is necessary to prevent the occurrence of social media and gadget addiction. In this work, we conduct research on factors that influence social media addiction and gadgets, especially in Indonesia. This research contributes to practical problems and theoretical problems. For theoretical problems, we investigate the factors that influence addiction in the use of social media and gadgets whether there is a significant relationship between those factors with addiction. For practical problems, this study tries to provide best practice to stakeholders to prevent dependence on social media and gadgets. The outline of this paper is as follows: (1) Introduction, (2) Literature Study, (3) Research Methodology, (4) Results, (5) Discussion and (6) Conclusion.

Literature Review

Based on prior research by Young et al about addiction of the internet (Young 2015), there are twenty questions or constructions that can indicate someone who is addicted to the internet. Based on twenty questions, we classify four categories like "time", "relationship", "productivity" and "thought". Time is defined by Sahin et al (2017) as preferring to spend much time on the internet including social media and gadgets and affect life dissatisfaction. Based on this definition, indicators Q1, Q2, Q5, and Q6 are categorized as time variables. Relationship is defined by Veronica (Ashwini Veronica and Samuel 2016) as the usage of social media and gadget can be influenced by relationship with friends, hence the user can easily use social media and gadget influenced by influencer. Based on this definition, indicator Q3, Q4, Q13 are categorized as relationship variables. Productivity is defined as the laziness of doing real-life activity as well as wasting much time for unimportant things (Prabandari and Yuliati 2016), hence indicator Q7, Q8, Q14 and Q15 are categorized as productivity variables. The last, Thought is defined as confidentially thought, negative thought, and fear thought of real-life. Hence indicator Q9, Q10, Q11, Q12 is categorized as thought variables. The remaining indicator: Q16, Q17, Q18, Q19, Q20 are categorized as social media and gadget addiction. Based on above explanation, Hypothesis is proposed as follow: H1: Time is positively related with Social Media or Gadget Addiction
H2: Relationship is positively related with Social Media or Gadget Addiction
H3: Productivity is positively related with Social Media or Gadget Addiction
H4: Thought is positively related with Social Media or Gadget Addiction

Four hypotheses are then observed whether there is correlation or not with social media addiction. Propose model of influence factors of social media addiction can be seen as follow:

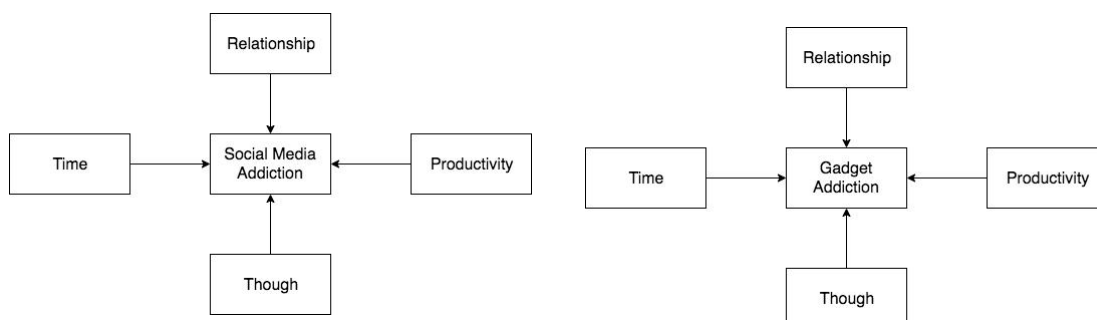


Figure 1. (Left) Influence Factors of Social Media Addiction propose model. The model consists of four factors that will be observed whether there is a relationship to social media addiction. (Right) Influence Factors of Gadget Addiction propose a model. The model consists of four factors that will be observed whether there is a relationship to gadget addiction.

II. METODE

This study is based on quantitative method, which consists of data analysis based on statistical method. Our measurement or construct is derived from prior empirical research: Internet Addiction by Young et al (Young 2015). The construct was then modified and adjusted with condition in Indonesia. Final measurement model is in a five-point Likert-type scale ranging from “strongly disagree” to “strongly agree”. The question is then classified into several categories like “time”, “relationship”, “productivity” and “thought” based on deeply reading several prior research (Ashwini Veronica and Samuel 2016)(Buran Köse and Doğan 2019)(Şahin 2017). These classes then observed whether there is a significant relationship to social media and gadget addiction. All constructs of measurement are put on online form and spread out to selected audiences. In addition, additional information like age, sex, occupation, last education, and city is included in form information.

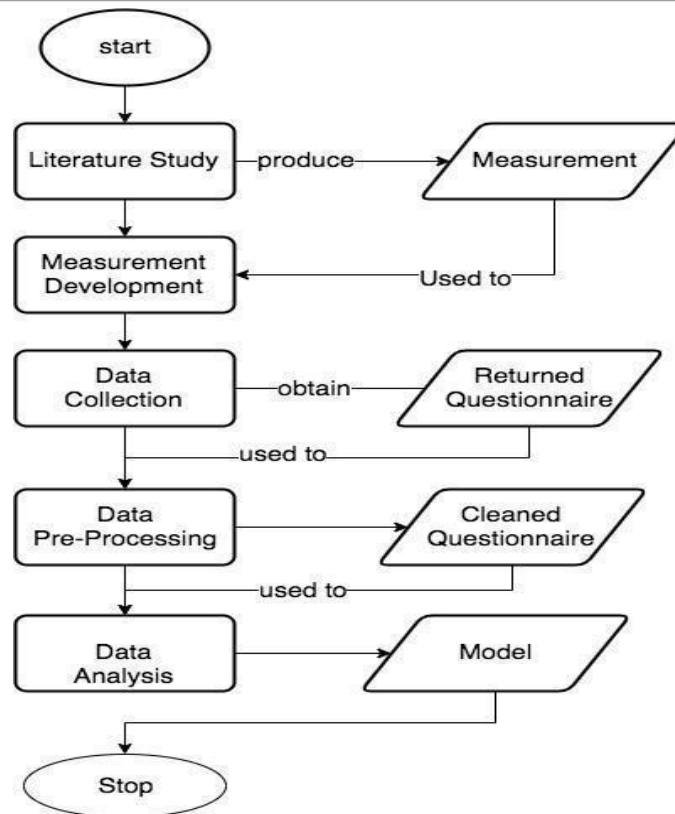


Figure 2. Research Methodology

The first step of research is to study literature by reading prior research papers including journal, conference paper, news then measurement or construct is established. Measurement is then modified and adjusted with the Indonesia environment. The next step is the measurement spread out to targeted audience then returned questionnaire in data collection. Then the questionnaire is used in data pre- processing to remove inappropriate data. The last step, cleaning data is used in data analysis to obtain model influence factors of social media and gadgets in Indonesia. Data is collected from respondents who have experience in using social media and gadgets. The criteria of respondents are having experience in using social media and gadgets, the average of using gadgets more than 6 hours per day, and the average of using social media more than 5 hours per day.

After gathering data, the data should be pre-processed in order to obtain cleaned data. We used data science techniques running on Python programming like feature selection (Ng 2004), and tabular pre- processing (Challenge and Scenes 2013) to select appropriate features used in data analysis. 18Jurnal Sistem Informasi (Journal of Information System), Volume 16, Issue 1, April 2020 In this research, combination of Structural Equation Modelling (SEM) (Hox and Bechger 1998) and Partial Least Square (PLS) (Hox 2010) is performed to accept and reject hypothesis. We used several variables output that can determine validity and reliability of a model based on prior research (Pratama et al. 2017) like Alpha Cronbach, Correlation, Average Variance Extracted, Discriminant Validity, Consistent Reliability, and others. In this research, a combination of Structural Equation Modelling (SEM) (Hox and Bechger 1998) and Partial Least Square (PLS) (Hox 2010) is performed to accept and reject hypotheses. We used several variables output that can determine validity and reliability of a model based on prior research (Pratama et al. 2017) like Alpha Cronbach, Correlation, Average Variance Extracted, discriminant validity, Consistent Reliability, and others.

III. RESULT AND DISCUSSION

Data Collection

After performing measurement development, we obtained twenty questions complete measurement that can be accessed in appendix A. All of the questions are derived from Young et al (Young 2015) strengthened by (Griffiths et al. 2016)(Kurniasanti et al. 2019) then modified based on condition in Indonesia. Based on literature study, the questions are classified into four categories: Time, Relationship, Productivity and Thought.

Sex	
- Male	- 65%
- Female	- 35%
Occupation	
- Student	- 70%
- Lecturer	- 20%
- Worker	- 10%
Age	
- 10 – 24 years old	- 70%
- Other	- 30%

Table 1. Demography

The data was collected on November 11th 2019 – November 20th 2019 from respondents who have experience in using social media and gadgets. We used data science techniques to select appropriate data. From 1782 returned questionnaires, the average of respondents is 27.34 years old with 1089 male and the rest are female. Most of the respondents are students with 890 audience, the others are lecturer, and workers. Most of the students are senior high school students with 713 data. We select merely student occupations for this work. Based on prior research, most addiction people are dominated from between ages 10 – 24 years old and also categorized as adolescent, hence we select only this audience, hence we omit other respondents. We also used L1 feature selection to apply penalty over coefficients that multiply each of predictors. After performing feature selection techniques as well as tabular data pre-processing, we obtained final cleaned questionnaire 385 data. This data is used in analysis.

Social Media Addiction

First step, we tested the construct whether feasible to be used using outer model analysis. because none of instrument lower than threshold 0.6, hence none of indicators or instrument should be deleted. We measure validity of model using Convergent Validity by utilizing Average Variance Extracted (AVE). Complete AVE score can be seen in Table 2.

Variable	Indicator	Loading Factor	AVE	CR
Time (H1)	Q1	0.622	0.602	0.856
	Q2	0.831		
	Q5	0.791		
	Q6	0.839		
Relationship (H2)	Q3	0.877	0.730	0.890
	Q4	0.861		
	Q13	0.824		
Productivity (H3)	Q7	0.555	0.667	0.776
	Q8	0.659		
	Q14	0.722		
	Q15	0.778		
Thought (H4)	Q9	0.758	0.667	0.889
	Q10	0.795		
	Q11	0.829		
	Q12	0.880		

Table 2. Loading Factor Social Media Addiction

In order to ensure our model is valid, we use additional measurement, discriminant validity and compare AVE square root with each instrument. For example, in Thought AVE square root (0.817) is greater than other, productivity AVE square root is also greater than others. Complete discriminant validity can be seen in Table 3. For ensuring our model reliability, we used two variables: Composite Reliability (CR) and outer loading. All of CR scores are greater than threshold 0.7, hence our model fulfills internal consistency reliability.

	Thought	Productivity	Relationship	Time
Thought	0.817			
Productivity	0.630	0.684		
Relationship	0.742	0.654	0.855	
Time	0.632	0.563	0.662	0.776

Table 3. Discriminant Validity Social Media Addiction

For the last step, a structural test using Structural Equation Modelling is performed to test hypothesis models. Bootstrap is performed to generate random sampling to our construct. Final result can be seen as follow:

Hypothesis	Path Coef	Sample Mean	STDEV	t	Sig
H1 □ AMSG	0.195	0.207	0.08	2.25	*
H2 □ AMSG	0.172	0.161	0.124	1.39	*
H3 □ AMSG	0.475	0.488	0.093	5.114	*
H4 □ AMSG	-0.09	-0.08	0.112	0.805	NS

Table 4. Bootstrapping Social Media Addiction

Based on computational using SEM techniques, hypothesis H4 (Thought) is rejected because it did not meet $t > 1.972$ with significant level 0.01, 0.05 or 0.1. Other hypotheses, based on result, factors that influence social media addiction of adolescents in Indonesia are H1 (Time), H2 (Relationship), and H3 (Productivity).

Gadget Addiction

Similar with social media addiction, the construct is evaluated whether feasible to be used using outer model analysis. because none of instruments lower than threshold 0.6, hence none of indicators or instruments should be deleted. We measure the validity of a model using Convergent Validity by utilizing Average Variance Extracted (AVE). For ensuring our model reliability, we used two variables: Composite Reliability (CR) and outer loading. All of CR scores are greater than threshold 0.7, hence our model fulfills internal consistency reliability. Complete AVE score can be seen in Table 5.

Variable	Indicator	Loading Factor	AVE	CR
Time (H1)	Q1	0.777	0.642	0.878
	Q2	0.831		
	Q5	0.782		
	Q6	0.815		
Relationship (H2)	Q3	0.922	0.780	0.914
	Q4	0.892		
	Q13	0.834		
Productivity (H3)	Q7	0.693	0.623	0.814
	Q8	0.782		
	Q14	0.666		
	Q15	0.746		
Thought (H4)	Q9	0.666	0.688	0.849
	Q10	0.709		
	Q11	0.808		
	Q12	0.867		

Table 5. Loading Factor Gadget Addiction

Similar with social media addiction, discriminant validity is also evaluated. Complete discriminant validity can be seen in Table 6.

	Productivity	Relationship	Thought	Time
Productivity	0.702			
Relationship	0.438	0.883		
Thought	0.469	0.722	0.767	
Time	0.566	0.549	0.609	0.802

Table 6. Discriminant Validity Gadget Addiction

For the last step, a structural test using Structural Equation Modelling is performed to test hypothesis models. Bootstrap is performed to generate random sampling to our construct. Final result can be seen as follow:

Hypothesis	Path Coef	Sample Mean	STDEV	t	Sig
H1 □ AMSG	0.119	0.117	0.091	1.13	*
H2 □ AMSG	0.405	0.404	0.093	4.365	*
H3 □ AMSG	0.346	0.355	0.15	2.773	*
H4 □ AMSG	-0.078	-0.072	0.111	0.700	NS

Table 7. Bootstrapping Gadget Addiction

Discussion

From 1782 returned questionnaire, 1397 data is omitted and remaining 385 data because of several reasons: (1) the audience is not fulfilled the desired target (age, occupation). We omit occupations like civil servant, workers and others. We merely select students as an audience. (2) the audience fills the questionnaire multiple times, (3) the audience is not consistent with the answer. This filtering result is produced from L1 feature selection. Based on analysis of data, H4 (Thought) is rejected because it does not significantly affect social media and gadget addiction. The reason of rejected as follow: (1) defensive and confidential thought sometimes is not significantly affected to social media and gadget addiction, it could be because someone needs privacy on using his gadget or social media, (2) social media and gadget sometimes did not provide well information, hence the user can think negatively when accessing social media and gadget. H1 (Time) is accepted as a factor of influencing social media and gadget addiction because when someone abandons real-life activity and tends to use more social media and gadget, it can be categorized as addiction, resulting in spending much time in using gadget and social media. H2 (Relationship) is accepted as a factor of influencing social media and gadget addiction because sometimes the use of exaggerated social media and gadget in daily activities is influenced by colleagues or friends. H3 (Productivity) is accepted as a factor of influencing social media and gadget addiction because sometimes when people are unemployed, they tend to use their gadget or social media more than employed people hence resulting in addiction.

IV. CONCLUSION

Social Media and Gadget addiction not only have positive impact but also have negative impact like mental or behavior problems, as well as decrease of academic motivation. Hence the requirement of knowing factors of social media and gadget addiction of adolescents in Indonesia

is required in order to prevent addiction of social media and gadget. We investigate influencing factors of social media and gadget addiction by constructing Partial Least Square and Structural Equation Modeling. The result, Time, Productivity and Relation are the factors of influencing social media and gadget addiction, meanwhile Thought is not the factor of influencing social media and gadget addiction.

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STAGES OF USING WARD AND PEPPARD METHODS IN INFORMATION SYSTEM STRATEGIC PLANNING

Anggy Giri Prawiyogi¹, Aang Solahudin Anwar²

Universitas Buana Perjuangan Karawang^{1,2}

Jalan Ronggo Waluyo Simabaya, Puseurjaya, Kec. Telukjambe Tim., Kabupaten Karawang, Jawa Barat 41361

e-mail: Anggy.prawiyogi@ubpkarawang.ac.id, aang.solahudin@ubpkarawang.ac.id



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Abstract

In an organization, there are three main targets for the application of information systems and information techniques that will be applied. In the information management process, automation is needed. This will help work efficiency. It is necessary to fulfill the need for information that will be used in decision making in management to increase effectiveness. There needs to be a change in the style and way of doing business in the company in order to increase competitiveness with competing companies. The goals or goals of a company and strategies in IT will enable us to achieve the 3 targets above, therefore it is necessary to have the right organizational business strategy that leads to the company's goals, as well as support that comes from designing IT infrastructure that is in accordance with the organization's business strategy in IT strategy. An understanding of the organization's business strategy needs to be mastered in order to be able to develop an appropriate IT strategy so that it can be a supporter of achieving the company's vision and mission. The ward and peppard methodologies will be used in the explanation of the following IT/IS strategic planning stages.

Keywords: Peppard and Ward methodology, information systems, alignment of business strategy with IS/IT strategy

I. INTRODUCTION

An organization has three main targets in their IT/IS implementation. In the information management process, automation is needed. This will help work efficiency. It is necessary to fulfill the need for information that will be used in decision making in management to increase effectiveness. There needs to be a change in the style and way of doing business of the company in order to increase competitiveness with competing companies.

Unfortunately, the effect obtained by the application of IT is often found to be less influential in improving both in terms of performance, success and competitiveness within the company. Applications that only focus on technology are the cause of the less influential IT implementations in the company. There needs to be a review of the business using business problem analysis to see changes and using IT as a solution in order to increase the effectiveness of the IT implementation that is built.

The productivity paradox is the term given to the problems faced by IT implementation, where there is the opposite nature of the implementation that is already good, such as in terms of transparency, human resources, as well as security and others in the application of IT [1]. As an example, the KPU, which expects the implementation of IT applications to perform calculations that are faster, transparent, and more accurate, by spending an amount of RP. 200 billion. Unfortunately, its use in counting votes is not good, so its usefulness is questioned in the next election, because quick calculations as desired are not followed by accuracy and transparency as expected. This is exacerbated by problems from other aspects, such as the availability of computer facilities in the sub-district and vulnerable security problems, coupled with poor management, making the productivity paradox still clearly visible in this KPU issue [1].

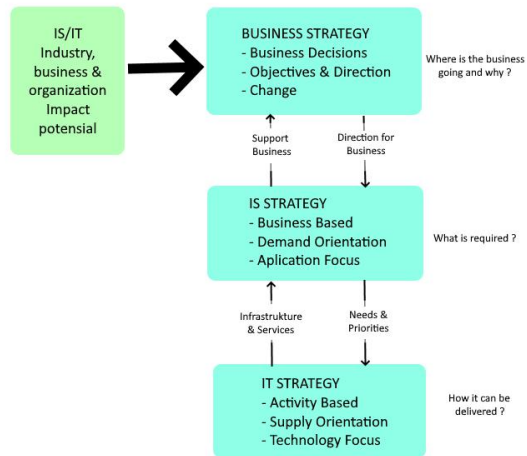
Another problem that needs to be faced is that the benefits provided by implementing IT are not commensurate with the amount of investment spent to build it. The amount of investment that is not in accordance with the benefits is often felt by company leaders who feel that they are not producing results as expected. Some of the uses of IT in a company include inventory control, accounting and finance, customer service, marketing operations, coordination with branches, production planning, lead time reduction, and smooth distribution and so on. However, the resulting output is not yet clear whether it has produced significant real usability.

Literature Review

A. IT/IS Implementation Strategy

An IT/IS strategy that is in accordance with the organization's business strategy is needed in order to get optimal benefits from the implementation of IT/IS that is built [2], [3]. What is certain will be beneficial for the company and in accordance with the value of the investment issued.

There is a difference between IS strategy and IT strategy. The difference lies in the difference in emphasis between the two. IS emphasizes the information systems needed by the organization. while IT emphasizes the selection of technology, infrastructure, and special skills. The answer to the question "what?" is the essence of SI, while the answer to the question "how?" is the essence of IT. To understand the picture, take an example: a company implements an Executive Information System in its marketing department. This affects the flow of information in the company vertically. Greater access to information on the part of upper management reduces dependence on information sources from middle management. With the telecommunication network, it will facilitate and speed up the flow of information between different departments and divisions. The following describes the relationship between IT strategy, IS strategy, and business strategy:

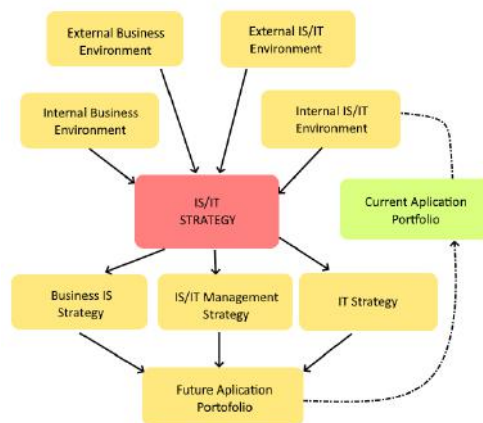


There needs to be an in-depth understanding of the company's business strategy to be able to create an IT strategy that can support the goals of the company. Some understandings that need to be understood include the following: How to achieve the goals and what changes are needed, the reasons for the business being run, where the goals or direction of the business are going, and when these goals will be achieved. Aligning business strategy with IS/IT strategy is a central issue in building an IT/IS strategy.

II. METODE

A. IS/IT Strategic Planning

To realize and implement business plans, the role of IT/IS as organizational support requires IS/IT strategic planning which acts as a process of identifying computer-based IS application portfolios[4]–[7]. The selection of strategic steps chosen by studying the influence of IS/IT on the company's performance and contribution is the meaning of IT/IS strategic planning[8]–[10]. In order to align IT/IS strategy with business strategy, the planning process also describes various tools, techniques, and frameworks for its management. This can also provide new innovations in the application of technology that open up new opportunities. The IS/IT strategic planning scheme can be seen in the image below.



IT strategic planning has several characteristics, including: having a main mission; competitive or strategic advantage related to business strategy; and There are directives sourced from users and executives or senior management. In addition, there is a combination of bottom-up development and top-down analysis and the main approach in the form of innovation that comes from users.

B. Ward and Peppard Version of IS/IT Strategy Planning Methodology

The use of methodologies is an important factor in the IS/IT strategic planning process[11], [12]. A collection of methods, techniques and tools used to create something is the meaning of methodology[13], [14]. To ensure that there is no dependence on individuals and the involvement of all interested parties, minimize the risk of failure, and emphasize the process and defined goals are the objectives of using the methodology in IT/IS strategic planning[15], [16].

Starting with IS/IT investment conditions in the past which were not able to support the company's goals as well as capture business opportunities, which was accompanied by the phenomenon of increasing competitive advantage of an organization that was able to utilize IT/IS to its full potential, this Ward and Peppard methodological approach was created [3], [17]. The focus of IT/SI strategy planning, which is more focused on technology than on business strategy, is the cause of the lack of benefits obtained from IS/IT even though the investment is quite large.

The input stages and the output stages are the stages owned by this methodological approach along with the input stages of this methodology:

1. Analysis of the internal business environment, which includes aspects of the current business strategy, processes, goals, resources, and culture of the organization's business values.
2. Analysis of the external business environment, which includes aspects of the company's competitive climate, economy and industry.
3. An analysis of the internal IS/IT environment includes the condition of IS/IT in the company seen from the current business perspective, its contribution to the running of the business, resources and technology infrastructure, the maturity of human resource skills, as well as the IS portfolio/IT that exists today.
4. Analysis of the external IS/IT environment, which includes technology trends and utilization opportunities, customers and suppliers, and the use of IS/IT by competitors.

Meanwhile, for the output stage, which will produce an IT/IS strategic planning document consisting of:

1. The IS business strategy includes an application portfolio and information architecture description, as well as how IT/IS will be useful for each business unit or function in order to achieve business goals.
2. IT strategy, which includes strategies and policies for the management of IS/IT technology and human resources.
3. IS/IT Management Strategy, which includes elements that are generally implemented by the organization, which functions to ensure the consistency of the required IS/IT policy implementation.

The methods/techniques used in planning IS/IT strategies With this methodology, there are several pieces of analysis, namely SWOT analysis, Five Forces Competitive Analysis, Value Chain Analysis, Critical Success Factors Method, Balanced Scorecard Method, and McFarlan's Strategic Grid.

III. RESULT AND DISCUSSION

A. Methods and Theories of IS/IT Strategic Planning Analysis

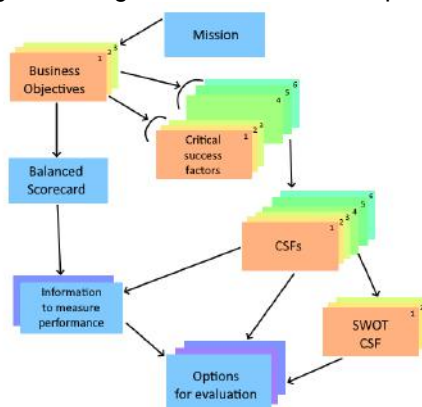
A.1. SWOT analysis

The results of the environmental analysis that have been mapped will be the basis of the SWOT analysis [18], [19]. By defining the company's strengths, you will know what strengths the company has to be able to continue and maintain the business. Companies that know their strengths will be able to maintain or even increase their strengths to become capital in order to compete. While the purpose of identifying weaknesses is to find out, understand and of course improve the weaknesses that the company still has in order to be better, because if the weaknesses are late or not known, it will be a loss for the company. The sooner you know the weaknesses, the faster the search for solutions will be. The same also applies to opportunities. The faster a company can find opportunities both now and in the future, the better prepared it will be to face the opportunities that exist. To seize these opportunities, the company can prepare plans and strategies to realize the opportunities that have been identified. There are many paths to both opportunities and threats that will disrupt the company's sustainability. For threats that have been identified, solutions can be sought so that they can be minimized.

A.2. Critical Success Factor (CSF)

The success or failure of an organization and its environment is influenced by the provisions of the CSF analysis in the company [20]. Determining the CSF can be done if the organizational objectives have been identified. The goal of the CSF is to interpret the objectives more clearly in order to obtain what information is needed and determine the activities that need to be carried out.

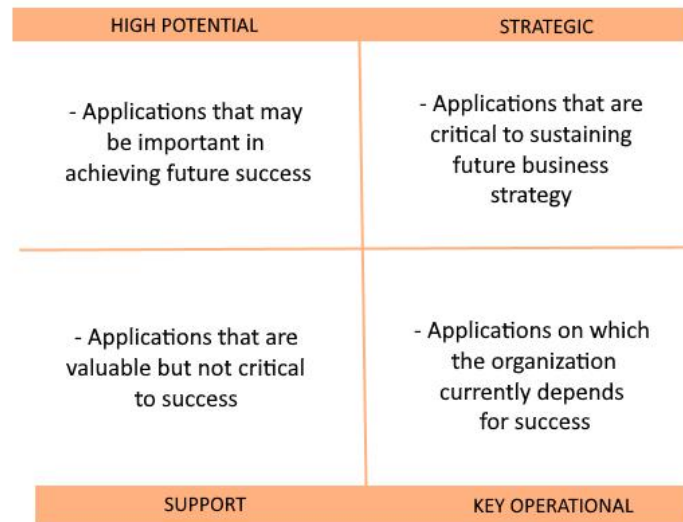
Being a bridge between the organization's business strategy and IS strategy is the role that FCS has in strategic planning. For more details, please see the image below. FCS also plays a role in prioritizing IS application proposals, focusing the IS strategic planning process on strategic areas, and evaluating IS strategies. For more details, please see the image below.



A.3. MCFarlan Strategic grid

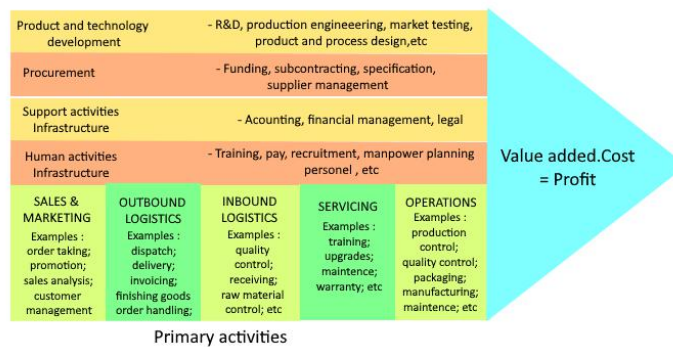
Mapping on IS applications based on their contribution to organisms is carried out using this MCFarlan strategic grid analysis. Quadrant four (strategic, high potential, key operations,

and support) is the place for mapping. An illustration of the contribution of an IS application to the organization and its future development can be seen from the results of the mapping. The following is a depiction of quadrant 4 :



A.4. Value Chain Analysis

The main activities and supporting activities are the two main categories of the overall work processes that occur in the organization, which are mapped using the Value Chain analysis method [20], [21]. The reference in the organizational document is carried out by observing the work process of each work unit, which includes the duties and functions of each work unit. The following is an example of the value diagram below.



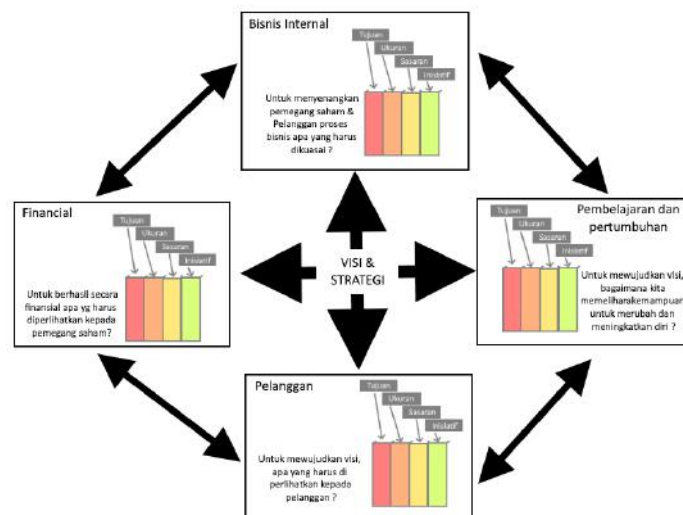
A.5. Balanced Scorecard

The people who published this analysis were Robert S. Kaplan and David P. Norton, who published it in 1992 in an article entitled "Balanced Scorecard Measures That Drive Performance". At its initial introduction, this analysis was introduced as an assessment and control management system that quickly, accurately, and comprehensively could provide managers with an understanding of business performance. The introduction has reached the level of the enterprise organization. The point of view of the assessment that does not only look at the financial aspect, but also pays attention to measures from the perspective of its contents such as customer satisfaction, internal processes and the ability to innovate as the basis for the analysis of this method.

The measurement or operational system is not the only function of the balanced scorecard

[22]. For companies that are quite innovative, the scorecard can be used as a strategic management system, which will be used to manage the company's long-term strategy and produce management processes such as:

1. Setting, planning, and aligning various strategic initiatives
2. Improved feedback and strategic learning.
3. Translating and clarifying the vision and strategy.
4. Linking and communicating various strategic objectives and measures.



IV. CONCLUSION

The function of IT/IS strategic planning itself is to align business strategy needs with IT/IS strategy in order to get greater benefits from an organization in terms of competitive advantage.

Starting from the basic environment of the organization, namely vision, mission and goals, identifying information needs for IS strategic planning, proceeding with identifying the IT/IS environment and the organization's external internal environment, which will produce information which will then be processed.

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Trust and Acceptance of E-Banking Technology: Effect of Mediation on Customer Relationship Management Performance

Ari Pambudi¹, Riya Widayanti², Primasatria Edastama³

Universitas Esa Unggul

Jl. Arjuna Utara No.9, RT.1/RW.2, Duri Kepa, Kec. Kb. Jeruk, Kota Jakarta Barat, Daerah
Khusus Ibukota Jakarta
Indonesia

e-mail: ari.pambudi@esaunggul.ac.id, riya.widayanti@esaunggul.ac.id, primasatria@esaunggul.ac.id

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Abstract

The application of E-Banking is a form of bank service to customers that was established in the 1970s and has started in Malaysia. There was a form of innovation that technology gave to electronics in 1981 into the world of the banking industry. The first was the introduction of Automated Teller Machines. On June 1, 2000, the Central Bank of Malaysia was officially established and gave permission to improve the form of service and convenience for customers when conducting online transactions which previously were done offline and could not be done anywhere. Banking in Indonesia has the advantage of instilling harmony in business ideals and values that lead to spirituality. A good relationship in building relationships is the standard for choosing a private bank. Where certain conditions banking is able to become mobile on online applications. It has been seen that there is less activity in bank lobbying in conducting transactions between customers and employees, because it has increased customer satisfaction, maintaining relationships with antecedent factors and marketing performance in the field. For this reason, CRM performance has a goal in building and maintaining good relationships, the nature of buyers and customer retention from the responses given. In a traditional commercial society, the physical form that can be seen is trust. The banking world is not far from the name of marketing and management as attracting forms of customer trust by providing products, services and buyer behavior by displaying employee performance. The application of strategies in marketing is a form of reference in attracting customers to become regular customers with the main purpose of this research paper being to analyze CRM performance as a form of trust in customer relationships to E-Banking without meeting bank employees, bringing convenience to customers in using banking e-banking services. accessible online.

Keywords: Customer Relationship Management Performance, E-Banking Adoption, Business

1. Introduction

The purpose of CRM practice is one of the core forms of marketing strategy, but there are still many people who do not know and are confused about the technology of CRM. There is an assumption that customers and service providers can act as major players [1]. Where the

concept has fair benefits for customers and organizations when used. The application of increasingly developing technology brings sophistication and impact in the current financial system that can be defined on the basic principles of CRM if the original authors adjust the marketing environment rationally [2]. Banking is required to be able to facilitate customers by providing services, the emphasis is on increasing the value of customer satisfaction, this paper aims to cover the organizational factors contained therein to be the main tool for CRM success [3]. There have been many previous studies discussing technology by linking the concept of customer satisfaction through electronic banking as a service medium used by banks. Studies conducted by Trust in the past have a foundation in providing banking services, not far from the role of internet E-banking. Customer relationships lead to success for long-lasting cooperation in the future and loyalty to the business in the future [4]. E-banking is the right target in providing facilities and making micropayments as a form of service provided by employees to customers as bank account holders. This paper brings public trust from CRM performance, in attracting customers' attention as e-banking users without the need for reports to come to the bank and can be used anywhere, anytime and easy to use [5].

2. Customer Relationship Management Performance

It can be seen that the company has the ability through concrete evidence in displaying customer responses to the services provided, which can be measured through CRM performance in the organization [6]. Physical forms that are displayed such as buildings, facilities, the role of supporting technology in it and employees. CRM performance measures can be seen in the work process given to consumers in providing speed of service, timeliness, no errors and sympathetic attitude among employees in the company. The trust given to the CRM performance of previous researchers with the same theme can be measured in how it is delivered clearly and easily understood by consumers with the information [7]. The nature of the customer can be seen from the source of value based on the company's potential to be able to improve relations in future income with the relationship of potential customers to continue using the company's services [8]. The opinion expressed by Grant and Schlesinger (1992) explains that providing service to customers can be provided through sincere attention with pleasant and sincere personality traits. And can show the benefits of CRM provided to customers (customers) in revenue to be relevant [9].

The loyalty given by a consumer to the product used can be seen by the absence of consumer hesitation in giving a positive response to the product, maintaining customer relationships, ease of sale and efficiency when marketing products as a matrix for evaluating CRM performance with relevant evidence. CRM performance can be seen in previous studies defining that the increase in customer achievement is seen in customer network relationships, the effectiveness of products sold and marketing efficiency achieved in implementing CRM technology in companies [10].

This study shows how the relationship between employees explains to customers in order to attract other new potential customers [11]. By providing an opinion of the product used regarding the advantages and disadvantages without exaggerating and hiding the truth. CRM performance has a concept that, based on previous research, certainly brings a new concept by introducing the customer base, so that it can become a benchmark as a basic source of company value for customer interest [12]. Regular customers, buyer decisions from information conveyed by word of mouth are the main indicators in the CRM performance of the product [13]. The chosen concept is also calculated from the CRM definition with the proposed CRM performance to be able to achieve success from the value creation provided by customers from the group of organizations that are joined. Have the same goals as improving the quality and relationships that exist [14].

Previous researchers also found that customer value has a material influence on CRM performance. Where the research paper groups customers into four groups, namely functional, social, emotional and sacrifice values given [15]. Therefore, this study also found functional value with a good relationship between CRM performance and customer behavior [16]. Not only that, previous researchers also found many customers as a value in terms of service components in terms of benefits with consumer behavior using e-banking to be able to examine the percentage of the number of e-banking system users [17]. There is still much to explore from

organizational values and factors to improvement with the main contribution that CRM makes to performance through customer value [3].

3. The Antecedent of CRM Performance

3.1 Trust

Depending on yourself to others when doing anything to get the best thing you want by daring to take risks is included in the definition of trust. Without coercion, of course, the party or individual is willing with understanding and assumptions in the hope that the party will give good things to him even though it cannot be denied that this other party can have a bad influence [12]. For example, trust can be defined in the thoughts, feelings, emotions and behavior (nature) of agents in selling their products to users (consumers) that look reliable with the actions they take in their daily lives to attract customer trust. Research that has been conducted on the same topic previously stated that there is evidence that describes a significant relationship of consumer trust in banks in using introduced products such as electronic banking or other products [2]. Graduation of relevant studies can be seen from the value of the level of banking confidence in changing the customer's direction in conducting offline transactions that can be done online such as providing web, applications and forms of telephone services.

However, the study still found shortcomings in online transactions, even though it can be seen that customers trust in online transactions such as buying products in the form of books. Increasing consumer confidence in conducting online transactions cannot be separated from the seller's attitude by being friendly, honest and familiar, which is a big attraction of course [14]. In Taiwan, it can be used as an increase in online transactions who believe they will buy their products even though they are far away. Technology provides a concept that can strengthen the relationship between the customer and the seller so that the level of trust is increased more than before [1]. The use of online transactions is already familiar to the community, even teenagers can do it without complicated procedures with electronic media such as ATM machines, messages and e-banking. Behind all that, wifi and wimax are the internet's biggest media in providing access and a stable network in facilitating online shopping on e-commerce [16]. Allows the market to expand to areas even to other cities without using conventional telephones anymore. There are challenges faced by online shops such as being able to sing more to consumers who are in the area to be able to use the services or products being sold.

The empirical survey conducted by Flavian and Guinaliu regarding loyalty to web media revealed in their study that loyalty from individuals can be seen in the way to enthusiasm for websites in responding and shopping to sellers and visible individual trust. Gaining trust also needs development so that it can attract customers to buy products that are displayed directly or indirectly, the influence of customers can be seen from purchases made effectively, preferences, incoming and outgoing costs and the number of visits [11]. Recent research with the theme of "trust" shows that the influence given is a reference to using online money exchange without abusing personal information because it is sensitive [17]. The aim of the researcher is to see how far the form of trust and satisfaction felt by customers on management performance, so that the relationships built with customers can be long-term and are willing to use the services provided in the future.

In India, Mukherjee and Nath also conducted a survey to examine customer behavior in using e-banking as a form of service provided by banks to customers, regarding customer psychological factors and customer opinions on e-banking in terms of service quality [10]. Make presentations on what can be a model in attracting customer trust in banking from the quality of e-banking services conducting online transactions. The study found that people are enthusiastic about using e-banking in the future. There is a relationship of trust that is felt between customers and employees by conducting online transactions. The commitment that has been set is the first step as the use of online banking technology tools [8]. The main factor in attracting customers to become customers is the trust that has been given to related parties.

Not only that, in the same year Rexha also conducted research on the impact of relational plans by adopting electronic (modern) banking. The operation of electronic banking is not far from the sense of trust given by customers to be the main factor. Although the satisfaction provided by current customers does not directly have a big impact [3], it is the basis for the transition to the use of electronic banking.

The lack of customer trust certainly shows that integration can damage partner relationships which cause problems, so these problems must be handled, such as the connection between the internet and e-commerce so that there are no obstacles when conducting transactions [14]. Customer distrust gives reasons why customers do not use e-commerce in shopping because they feel more confident when making purchases. Users of online services conduct transactions in order to choose the right and trusted vendor when shopping online. If distrust arises, transactions made online take a long time to be accepted by the community and develop rapidly [4]. Because building trust takes a long time. Trading conducted electronically from business to consumer still needs development, where this aspect affects trust in the market because it is still rare. It takes a concept that can attract customers through an approach to new customers to build trust and build relationships. It can be seen that building trust in the online environment requires a lot of processes not as easy as offline.

4. The Consequence of CRM Performance

4.1 Customer Relationship Management Performance and E-Banking Adoption.

CRM has a task in carrying out performance by providing services provided by banks when conducting transactions in the form of money and regarding requests for financial information, where the process creates final customer value when completed (by maintaining information on products purchased by customers informing other parties through word of mouth). This is one form of loyalty that is given by customers for satisfaction. The company is doing new things to create value as a form of strategy to be able to add and improve customer relationships [13]. The innovations provided by the company can make it easier for customers to make purchases and sales transactions, so that they can change the way customers view the company more personally. Marketing literature has a basic way of satisfying customers by meeting customer needs and desires.

The object of this research is to choose the idea of using technology into electronics to be more flexible so that customers can enjoy the results of CRM performance in the bank. Technology Acceptance Model 2 is the theory used in this study, customer attitudes become a factor in one aspect of the framework in influencing behavior from individuals to other customers regarding the attitudes, intentions and behaviors shown [5]. Electronic banking is a benchmark for research on customer behavior in using electronic banking system services.

Customer needs are contained in variables such as machine availability, convenient service, friendly interface, open, secure and updated with information. It is useful to make it easier when interacting between one technology with the frequency of the user, therefore the researchers want to know the extent to which the community is connected to become customers and regular customers in using online services and are willing to leave the old way (offline) without damage the quality and convenience of online bank customers. A visible condition can be seen in the use of the system in investigating the impact of relational plans on the use of electronic banking called Actual System Usage [14]. The research has respondents, namely individuals who are selected as accountants, financial managers, chief financial officers, financial controllers and financial directors (having positions and roles in banks), where they can provide information about problems and bank affairs (companies). They can see and assess the extent to which customers are satisfied with the existence of electronic banking.

Portugal became the study site in this research to be able to find customer satisfaction in using electronic banking on the performance of bank services with purposes such as analyzing how many people are interested in using banking in services. An important factor in influencing the existence of the process certainly does not escape the characteristics of

the customer, the type of financial operation identified [17]. The survey conducted by 2,000 Austrian online banking customers brings insight into the importance of how customers are relevant in the online banking business. There are similarities between previous studies, namely the research theme discussed the same about trust and not far from public opinion about the existence of services in the form of e-banking. And also a survey conducted empirically explaining customer trust and satisfaction is a form of loyalty given because it has given confidence to use the electronic banking service [12]. The form of loyalty given by customers is not material but behavior, nature and ethics when making product purchases and using services. However, in the application of e-services, loyalty to services has a role in the use of electronic-based technology in banking.

Previous research conducted by Methie and Nysveen explained that the use of technology is very easy for users to use themselves, because the technology is flexible, increases user expertise and can also be used to find out how banks in Norway can retain customers from their electronic banks [7]. The secret lies in how to provide the kingdom when providing services in an online banking environment such as an offline bank (physical market). Customer satisfaction can be seen from well-known brands, switching and search costs, although it is quite significant that strength has value. This study proves that CRM performance in attracting customers and building customer relationships to use e-banking is a form of work that is successfully done. Evidence of investigation data has five internet banking used by Australian consumers. The other goal is to measure what factors can affect internet banking users [1]. The sample is obtained from individual residents and business companies from Australia. Found the lack of awareness of internet banking and security to be a very prominent obstacle in implementing internet based banking in Australia [3]. The findings of this study can be used as a comparison that the concept of customer satisfaction is a factor in security problems and benefits from the availability of banking system services. The tendency of customers can lead to a lack of customer satisfaction in conveying feelings and body gestures for the security and benefits provided. This situation indirectly has a negative impact on the use of e-Services [5].

Furthermore, it can be seen that previous research conveys that customers' behavior in using electronics has a consideration of all other factors that will increase the skills possessed from the previous literature. There is an important area in the literature that is marketing by testing acceptance with innovation theory and TPB. It can be seen that this research prefers TAM, TRA and TPB which can be believed to be an easy theory and can be well accepted by customers for electronic systems [10]. TAM is part of Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB). The use of TAM is more in the model with acceptance in various circles of researchers to obtain information [13]. The literature review shows the proposal made by CRM in work as a factor for the adoption of e-banking among bank customers. Therefore, it makes it easier for researchers to examine e-banking on CRM performance.

5. The Mediating Effect of CRM Performance

What is needed is the impact of service quality, of course, looking at the sources of the divisions who work in the finance department and their role in mediating customers. Psychological influences can also affect the quality and safety of customers because their performance is guaranteed by the bank [9]. It is common knowledge that the target that banks want to get in finding customers has a strategy by approaching and providing the easiest way for customers to feel comfortable with the system they are promoting. They have conducted a survey of potential customers and could become customers. Storage by customers can be a mediator in influencing the quality provided by financial performance in service [1]. The research became the main topic of the investigation, namely the role of CRM performance in mediation carried out by the relationship between technology, processes and customer value for the use of electronic banking. CRM builds customer retention by providing mediation effects on the adoption of banking on electronic system services.

This study wants to know the role of customer satisfaction which can be used as a mediator between the service relationship with financial performance [9]. Where can be seen the position of customer satisfaction becomes a variable when mediating in a service relationship. The features contained in banking are the idea of CRM as a medium in strengthening customer relationships in technological factors such as trust, usability and user convenience in using electronic banking. Customer satisfaction is the main form of success that CRM provides [17]. Technology can influence the perception that customers provide with customer value and loyalty from a model based on cognition-influence-behavior. This has been tested with the support of several hypotheses and confirms the mediating role provided by customer satisfaction.

The relationship between the first and second variables has a major influence on customer satisfaction to be able to have a reciprocal relationship with customer value, service quality provided, satisfaction and behavior [10]. Where they found that the quality of service did not have a direct relationship with behavior, but its influence was shown indirectly to customer satisfaction by evaluating the value of service to customers. These findings have an effect on mediating customer satisfaction with the ongoing relationship of service quality and behavior.

The role of the relationship provided by the bank with the success of attracting customers is not far from the good relationship between the bank and the customer. This study is used to explain and confirm the role of factor floor plan banks in creating relationships in the customer and technological contexts that have a positive effect even though they are not face-to-face [3]. The research findings in this paper can have an impact on quality and relationship creation in providing successful customer satisfaction in a technology-based environment.

The literature reviews the empirical papers and has suggested that CRM performance allows mediation between the relationship with technology trust and e-banking adoption to be used easily.

6. Research Framework

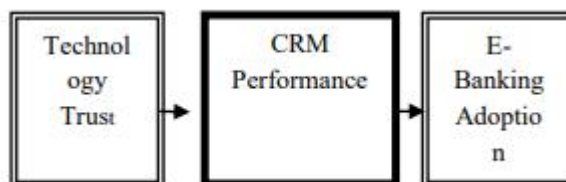


Figure 1: Overview of the relationship framework between Technology Trust-CRM Performance-E-Banking Adoption

Figure 1 shows that there is a causal relationship in building trust with technology, CRM performance and the adoption of e-banking.

7. Objectives and Methodology

In this research, the aim of the empirical study of the researcher is to be able to examine the relationship between technology trust and CRM performance [2]. There is a relationship between CRM performance and the use of e-banking and to conduct this research, of course, there is an indirect influence on CRM performance on the relationship of trust with technology and e-banking.

Questionnaires totaling 4,44,675 from banking were sent through faculties with three universities in North Malaysia [15]. The number is of course divided from 350 returned, there were 43 excluded because the required value was missing too much. A total of 307 questionnaires are relevant and valid, can be used as data in analyzing and provide a response of 45.5%.

8. Result

Table 1 shows a description of Cronbach's Alpha with a similar and safe size above the

lower limit of acceptability, which is described as > 0.5 . It can be said that all of these measures can be relied on well.

Table 1. Variable Reliability Coefficient in Study

Variables	Number of Items	Reliability
Electronic banking adoption	6	0.74
Customer relationship management performance	9	0.94
Perceived online trust	9	0.96

Table 2. Regression Analysis of the Effect of Customer Relationship Management on the Adoption of Electronic Banking

Independent Variable	B	SE B	β
CRM Performance	0.845	0.049	0.703

Note: $R^2 = 0.495$; $F = 298.396$; Sig. $F = .00$;

** $P < 0.01$

B= Unstandardized coefficient beta; SEB= Standard error of regression coefficient;

β = Beta coefficient

It can be seen that the F value is 298 396 ($p < 0.005$), providing an overview of the effectiveness given by customer relationship management to have an influence on the adoption of services from banking [7]. 49.5% is a number with variations in the implementation of e-banking, becoming a fairly strong relationship because of the effectiveness of managers in building customers. The number 0.70 is the result obtained on the influence of CRM performance and the dependent variable (Table 2).

Table 3. Regression Analysis for Factors Affecting Customer Relationship Management Performance (N=307)

Antecedents	Standard coefficient Beta (β)	t	Sig.	Collinearity statistics tolerance VIF
Perceived Trust	.408	6.75	.000	.375 2.67

The customer has control elements in the implementation that can influence to explore beforehand. The value of beta into use can be illustrated in the table above. It is necessary to increase the R-square with model 2 already explaining the variations in the development of the use of e-banking and the effect of management effectiveness on customer relations [14]. The

table above refers to the research that the relationship built between trust and the use of e-banking adoption by CRM performance (β changed from 0.395*** to 0.107).

Table 4. Hierarchical Multiple Regression Analysis on the Effect of Mediation on Customer Relationship Management Performance

Dependent Variable	Independent Variables	Std Beta Step 1	Std Beta Step 2
E-Banking Adoption	Perceived of Trust	.395***	.107
	Mediator CRM Performance		.550***
	R2	.38	.52
	R2 Change	.38	.14
	F Change	92.51	86.28
	Sig. F change	.00	.00

9. Conclusion and Recommendation

With the research from the literature, it can be concluded that trust in technology is very important for CRM performance and the use (adoption) of e-banking. It turns out that CRM efficiency has a significant impact on the number of e-banking. The existence of an analysis of course has an indirect impact on CRM performance in building a relationship between trust in the use of technology in e-banking. In practice, the provision of e-banking services must of course pay attention to the use of a stable internet in the service as an element of customer trust for successful implementation. CRM has the principle of holding managers and staff accountable for the work they do. Increasing brand loyalty is one way in positive word of mouth (WOM), to be able to build trust in customer relationships in the use of technology supported by CRM performance and the use (adoption) of e-service in management.

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Elements of Commerce Shows Enterprise Development Innovation: Efficient Auditing and the Way of the Future

Gunawan Pamudji Widodo¹, Muhammad Syukri²
Universitas Setia Budi Surakarta¹
Universitas Sangga Buana²

Jl. Letjen Sutoyo, Mojosongo, Kec. Jebres, Kota Surakarta, Jawa Tengah
gedung B LT.1 Jalan PH.H. Mustofa (Suci) No.68, Cikutra, Kec. Cibeunying Kidul, Kota
Bandung, Jawa Barat
Indonesia

e-mail: gunawanpamudji@yahoo.com, muhammad.syukri@usbypkp.ac.id

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Abstract

Technological entrepreneurship helps create sustainable value, accelerate corporate growth and promote economic sustainability through the capitalization and commercialization of innovative new technologies. There are obstacles in conducting Business Model Innovation (BMI) as a reference form of technological entrepreneurship as a reference. This study aims to establish a business model for developing the economy with technological entrepreneurship innovation (BMIfTE). Readiness is one of the keys in carrying out a goal, because there are things that must be prepared, such as the topics discussed in papers related to previous researchers who have published the development of a BMIfTE. For this reason, the paper in this study discusses opportunities and risks, value transitions, economic development, strategies for companies, dynamic capabilities and stakeholders. The new proposal is a form of BMI reconstruction regarding the business model in function of technology to create new systems and methods to take advantage of existing business development opportunities to be able to compete and stand in the national market.

Keywords: Innovation, Business Model. Technology Entrepreneurship

1. Introduction

Entrepreneurship is malformed with a new context in the economy that can be done by everyone, where in that context it can be seen that innovation, knowledge on globalization becomes a great economic value, it can be in contributions such as; The balance between related parties affects the role in developing [1] of companies that are directly involved in exchanging economic values [3]. Where it can be seen in the company there is a process in creating technology-based products to achieve value [4]. Change is an obstacle in achieving a goal with a strategic fit in the business so that it can continue. Behind it all business models (BMI) have ways of maintaining new innovations to complement values that have not been

adequately organized [4]. The growing science brings changes that companies must be ready to use to be applied in the business model that is used now for the suitability of the company [5]. There are many ways for companies to display an image to display the business model used to attract business partners to the success achieved by utilizing technology between users in the company [6]. The need for new innovations in technology is a way to create new business models in dealing with existing problems in the market by exploiting customer dissatisfaction when using it. Because it can reduce the commercialization value of the use of the business model [1]. The link between the economy and technology becomes an integration in identifying the two correctly. The purpose of one of the efforts made is to be able to maximize technology with individual skills to develop a new innovation in business with competition. It can be seen that the challenges faced are more severe and can be described in outline about the future business model [7]. The number 987 can be said to be a lot theoretically in conducting research with business model sources in research, but there are still unclear concepts in achieving common goals. Academically, there is less research on the complexity of setting up multi-ness models directly. Doing it directly (practice) is still a problem and challenge in developing business models [6]. These challenges have a design in carrying out economic development. Even though the new business model is already running, success is not guaranteed [2] due to the environmental linkages involved with the new business. Managers play an important role in dealing with the interaction activities of business models and innovation in combining to understand BMI's understanding of the complexity of the business being big and successful in the market economy. A total of 987 research papers that have been collected and reviewed logically with the opinion of scholars are concluded to be synthesized. Where from some of these papers the research focus is on the factor of the use of science in BMI, institutional factors contained in BMI itself. Researchers mostly study BMI in the field of technology-based entrepreneurship. By conceptualizing the relationship between BMI and technology-related entrepreneurship independently. The work first connects technology with entrepreneurship on an ongoing basis by conducting an evaluation. The impetus provided by the researchers for the success of the intended redesign was to redesign BMI's new business model. The second way can be seen from the connection of business models with innovative companies for successful economic sustainability. Study sources reveal how innovation-specific relationships between entrepreneurial business models and technology can continue well in the economy.

Where the article can answer the following questions:

1. What components of BMIfTE are there comprehensively?
2. What is BMIfTE's contribution to the economy?
3. How is BMIfTE Concept on constructs?

Theoretical foundation

Conceptual Relationship Between BMI and Technology Entrepreneurship

Opinions expressed about the existence of technological entrepreneurship are found in the company's founders in developing it [7], to provide the best facilities for the business model. The outstanding issues regarding business models have a significant impact on new ventures and markets. Therefore, a fact with correct evidence is needed to fix the issue. The emergence of the value of commercialization technology has an impact on the existing value being not optimal (less) in the business model method. Behind it all the impact that commercial technology has on companies has resulted in new innovations in the launch of flexible technology business models. The existence of innovation from the business model brings company benefits in satisfying customers' needs, which can be a plus that the business model is of high quality [1]. This understanding can be interpreted simply that the business model is an element and activity in satisfying customers. The combination of these two elements becomes an opportunity in

technically occurring latent requests. Therefore the business model can be seen as viable if the commercial success of the technology is not compromised [6] and it is well integrated into technology which in particular entrepreneurial innovation is already running well in general.

Elements of BMI for Technology Entrepreneurship

There are four main characteristics with the trading model within the company such as writing, regarding price recommendations, price rules listed, pricing, price matching and price delivery [8], it takes a significant way to commercialize advanced innovations. Behind it all, appropriate considerations are needed in managing, creating, capturing and planning for innovation [8]. As Foss and Saebi (2017) recently said that setting the desired price can be done by providing suggestions, targets achieved and parts, price chains and also internal structure. With this, BMI makes adjustments to the market in developing, because basically ongoing trade requires changes and adjustments to the market [9].

The occurrence of trade fair activities changed the mindset to be more enthusiastic in seeing the point of view of the products displayed to create new innovations. With this BMI can see how far the consistency of the values that have been set. The improvement of the modeling carried out by BMI in one component plays an important role with the model that is carried on trade will change under certain conditions [10]. These reasons can bring about major changes that can change the components of BMI in playing trading. Many assumptions are given about BMI, such as one of them being the key to company execution in increasing existing resources to compete in a healthy manner [11]. The existence of innovation brings the introduction of new products or new models without violating the rules of trade with the involvement of goods, forms, and markets, which can be produced by carrying out good implementation.

2. Research Method

The implementation in this study was to conduct a survey by describing several BMI writings related to current business innovations in a determinant way to get financial results [12]. The ideas that emerged over time brought the efficiency of BMIFTE development into a strategic concept of duplication created. The difference in writing through Google Researcher (GS) is the effort in preparing BMI for new innovations for a single development business. The large number of distributions and multidisciplinary concepts are different from the literature review to organize the survey in an appropriate and fast way for system empowerment [13]. Treatments can be used in trades that showcase the innovation business directly regarding progress and finances.

Selection Criteria and Study Eligibility

The citation of information that became the main source came from the Web of Science (WoS), GS, and Scopus. Where the coverage contained in WoS and Scopus presents various information with complete timeframes. The scope of events in various social sciences and humanities is quite large. GS citations are often advantageous due to relative few sources. The scale of the questions on the GS does not contrast well with the subject matter [14]. The quality of the information obtained from GS, WoS and Scopus is more science than general, giving GS an advantage over the subject. Many markers are built in improving quality [15]. Such as the existence of h-index and SJR (SCImago Diary Rank). The statement obtained can contain GS information, that the quality of the articles is selected using the method of calculating the effect of diaries (JIF) distributed by Thompson Reuters WoS, and SJR from Scopus. JIF is an import.

Search items	BMI	TE	Total	Criteria
Total articles after exclusion criteria	N = 613	N = 215	N = 828	Screening
Title-based relevance	N = 435	N = 67	N = 502	
Abstract-based relevance	N = 119	N = 37	N = 156	
Full text and research question relevance	N = 38	N = 9	N = 47	Eligibility
After duplicated articles were eliminated	N = 42			Included
Relevant from traditional review	N = 7			
Final relevant articles	N = 49			

Note. BMI = business model innovation; TE = technology entrepreneurship.

Data Analysis and Synthesis

To find important findings, it can be done by looking for information that is in accordance with the facts and is selected in detail in order to get a big picture of a certain space without invalid data. Where articles are arranged on trade issues from trade plans, trade cases and workers are contained. One way approach that can be utilized is through the hypothesis of BMI to describe in the description of the business model [13]. In conducting a subjective review of the data, surveys are arranged regularly to identify, evaluate, and efficiently access writing combinations [15]. Research from Rousseau et al. (2008) revealed that in conducting a survey on writing with significant precise results that could test strategies in covering general rules.

Quality Assessment and Data Extraction

Analyzing requires several ways such as finding writings according to the theme, choosing the right keywords and evaluating the results that make the quality of the research. Separation of information from two different comments was carried out [16]. The results of the differences between opinion givers with different analyzes reached an appropriate agreement. The article has a physical copy for easy evacuation [17]. If the article contained in the text is incomplete, then communication is carried out to find out the answer from the analysis that is not used from the article. Article auditing is divided into several parts to distinguish GS by quality check using JIF - WoS and SJR - Scopus. In the diary there are 49 additions while the number 44 (89.80) is categorized as Q1 with the quartile in the SJR position. Of the five articles in the four diaries, they were categorized into the bottom two, Q2 and Q3 separately and used as relevant references. Why is it used because it is usually used in concepts in business companies from unsatisfactory application innovations.

Analysis and Discussion

Regulating BMI for Tech Entrepreneurship

Changes are made under certain conditions without exception to get maximum results such as trading, ability in business is one of the things needed in finding other companies to be homes, taking advantage of the market and looking for new things that can be done. When running, many related parties such as techno-entrepreneurs are involved with R & D, try, production, planning, recharging, change, and execution directly or indirectly. The success rate cannot be separated from the right procedures in carrying out good performance so that the results obtained improve the quality of the company's financial management. The company takes a major step by thinking about what the current client needs [2]. This requires coordination of R&D and organization. The basic discussion of price creation and relocation becomes the object of thought. There are evaluations such as ability, money prerequisites, assessment of opportunities and dangers to be faced will eliminate this. Furthermore, business visionaries must coordinate redundant components in testing, planning, reshaping, and changing the mode of commerce.

Improving innovation in a modern way certainly requires continuous evaluation of the bookkeeping as valid data in commercializing products with existing capacities and utilizing the capabilities of the existing resources in the company. Improving trade shows to progress effectively can be done by means of companies giving awards or rewards to partners when

entering into agreements to reach agreements. Therefore, it is very important for companies every time they make long-term decisions so that the links between the components of BMIfTE are maintained financially. The outline of BMIfTE is sponsored by a number of components that contribute to execution and development. These different inputs are shown in Table 3. To advance and adapt an existing trade show, organizational assets and capabilities are needed. This ability makes a difference in creating and capturing self-esteem in the innovation business [18]. It is incomprehensible to create an effective trading demonstration without assets. In this way, the company's self-esteem is created through the regulation of human capital and money-related resources. In this way, corporate self-esteem is created through the regulation of human capital and monetary assets [19]. In its development, organizing with diverse performing artists played an important role in adapting an existing trade show because it made a difference to get different inputs used to adapt an existing trade show [10]. In addition, there must be solid connections and collaborations between supply organizations, merchants and other partners to build an effective network-based trade show.

BMI Modeling for Technology Entrepreneurs

Companies that innovate certainly improve the quality of human resources in terms of the skills they have by sending them to employment training [7]. The values that are promoted are to become a strategy for the company by providing the latest and right innovations to business companies when holding trade shows. The opinion of Khefacha and Belkacem (2016) states that companies always innovate with fast movements to bring new application progress with the right fit and can create trade without leaving innovation. The integrated relationship between the company and trade with new innovations brings uniqueness and a built identity. These integration considerations bring BMI to give birth to new entrepreneurship with the uniqueness that exists in entrepreneurship [8].

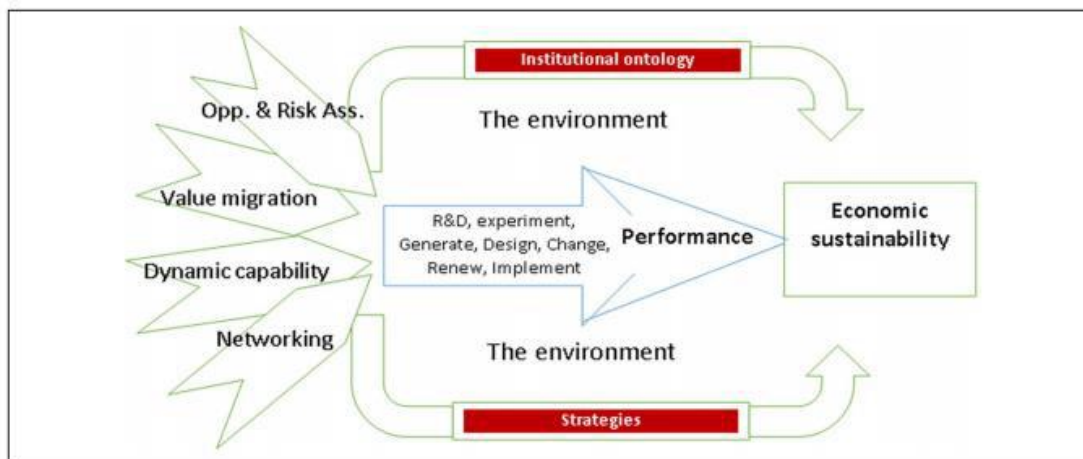


Figure 1. The structure of BMI for technology entrepreneurship.
Note. BMI = business model innovation.

In general, there is a connected concept of BMI with opportunity creation, self-esteem movement, energetic ability, and organization. In all these houses, the use of unused innovation through energetic handling of imaginative destruction contributes to long-term financial development. To summarize, trade models are used to establish and capture value [1] through creation, testing, rebuilding, and commercialization [6] of trade shows.

Entrepreneurship exercises create and capture the financial value of abusing modern or existing innovations. The trade show is related to strict execution and is seen as a driver of strict execution. The system is strictly related to innovation and execution [3]. Primarily BMI

decides on the execution of the company, although in the long term, the energetic role of the entrepreneurial movement in the innovation sector drives financial development. This means that business innovation can be a driver of financial progress. In addition, the baseline win variable for BMI should be considered [7]. The basic components are included as input as an illustration when published. It can be seen that the components of a successful startup company can see the old problems of work activities in how much readiness to face danger, clear trade rules, methods with progress and dynamically arranged arrangements on the display expressed by Brem (2008).

The trading model is demanded with sensibility (imaginative) that is in accordance with the economic catch of the market without losing the progress of the trade [11]. It can be interpreted that business people are allowed to participate in improving the quality of products or services, launching new innovations, markets and strategies that are carried out when experiments are ready to take risks without lowering esteem. The value of the company is inseparable from the financial processes that support the company. Supportability can be the creation of an innovation business. Where to maintain the company, of course, the quality obtained in terms of contributions in the company participates in developing the community in the economic field [18]. For this reason, readiness to make changes in the organization is increased, partner investigations and communication between clients become a proper esteem in the face of community requests. Problems that occur during trade fairs can be solved with new innovations to deal with trade fair finances in a well-coordinated manner without reducing the value of money. It can be seen that Figure 1 illustrates the general structure of BMI in the innovation business.

Every progress made is not far from the technique in directing the creation of the appropriate price from any angle. Mechanical companies have their own methods of considering assets owned with the ability to manage money so that misunderstandings between clients do not occur [14]. The methodology is executed correctly and appropriately so that it can contribute well financially so that it becomes an attraction when attracting clients because they see excellence when managing money.

BMIfTE has effective combinations with components that can result in superior execution. Because this occurs from abuse resulting in cost reduction to a minimum, it can be seen in a productive use as shown in Figure 1. The BMI structure for innovation companies is clear. With a note BMI = trade shows progress. 8 SAGE Unlocking company resources, capturing self-esteem through organizing, and relocating self-esteem. When values begin to be captured through organizational metaphysics, maintenance is guaranteed. Ultimately, progress in a trade driven by energetic abilities, self-esteem movements, abuse of opportunity, and partner organization is linked to maintenance.

The innovation business enterprise includes joint experimentation and item creation in innovative and logical development thinking [7], which is shared by many innovation firms. This means that in creating prices on trade, it takes the right catch of business innovations with high value and can be practically applied in companies to improve quality and existing mechanisms. However, in a system that is organized in an organized manner when trade shows have a network base. Therefore, making BMIfTE is important from a conceptual perspective; Innovative business firms seek settings for problems, through the abuse of opportunities from advancements in development, organization, administration, and opportunities [7]. The linkage of trade fairs basically cannot be separated from esteem creation and capture, the goals of an organization, components of transportation means and interdependence of instruments [7], which in fact are directly related to trade fairs. Similarly, BMIfTE must be linked by many nomads to be managed with advances in science and technology.

4. Conclusion

The view that can be drawn about BMI towards techno-entrepreneurship is more towards financial support. It can be seen from the point of view of the guidelines regarding the evaluation of the establishment of a trading model that can be reconsidered in terms of variables such as interrelated opportunities and dangers, relocating the right price, creating capabilities and with the organization of partners. An organized mindset in explaining the components of BMI to create innovations for the built business can reveal the most important choices of regulatory cosmology funds when assets, exercises and forms become part of BMI. Satisfaction is one of the values that can be captured between collaborative organizations and partners when establishing relationships in achieving common goals can produce prizes in the form of awards. In development, the exposure and use of mechanics for BMIfTE finance should go a long way. In general, BMI-based innovation companies are operationally run using training methods in modern trade tested, decomposed, produced and implemented to be able to form and get rewards appropriately through several procedures in the company such as carrying out evaluations repeatedly to get opportunities, being able to reallocate prices, have the ability and the relationship between organizations and partners is good naturally.

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Discussion of Agile Software Development Methodology and its Relevance to Software Engineering

Amitkumar Dudhat¹, Muhammad Ali Abbasi²

Master of Science in information and communication technology, Veer Narmad South Gujarat University¹, master's in computer engineering, Istanbul Aydin University²
India¹, Turkey²

e-mail: amit000790@gmail.com, Alyabbasi93@gmail.com

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Abstract

Agile Software Development Methodology is a lesser-known and infrequently utilized methodology in academia. In reality, though, content developer software practitioners frequently employ this technique. This journal was created to give readers an overview of agile techniques and their use at various stages of software development in general.

Keywords: Agile Methodology, Software Engineering

I. INTRODUCTION

Over the last few years, agile software development methods have grown in popularity[1]. Agile practices were created with the goal of delivering software quicker and ensuring that the program satisfies changing customer demands. Some argue that agile software development is the "contemporary" alternative for waterfall software development [2].

Traditional plan-driven software development techniques (such as waterfall) have the drawback of being too mechanistic to be applied in detail. As a result, industrial software developers are wary of new solutions that are difficult to understand, and as a result, they go underutilized[3].

Agile software development encompasses a wide range of techniques:

- Adaptive Software Development
- Extreme Programming (XP)
- Dynamic System Development Methodology,
- Feature Driven Development,
- SCRUM,
- Agile Modelling, and
- Crystal,

Various writers focused on various areas of software development. Some were concerned with methods to planning and requirements, while others were concerned with ways to build software that could be modified more readily, and yet others were concerned with the human interactions that allow software engineers to adapt more quickly to changing client demands[4], [5]. These different initiatives served as a focal point for a community that advocated a set of practices that succeed without requiring many of the activities that more defined methods need.

Literature Review

Agile Software Development Overview

Addison-Wesley Longman is a good place to start. According to dictionary definitions, the term "Agile" refers to the ability to move swiftly and effortlessly[6]. Thus, for a software development organization, "agility" refers to the ability to adapt and respond quickly, effectively, and properly to changes in its environment as well as the expectations imposed by this environment[4], [7].

Extreme Programming, Embrace Change¹ was released in the fall of 1999, and the trend had found its spark. In early 2001, a gathering of innovators working on various agile approaches gathered and drafted the "Agile Manifesto for Software Development."

This manifesto emphasizes the following aspects of development:

- Individuals and interactions over procedures and tools
- Working software against thorough documentation
- Collaboration with customers rather than contract negotiations
- Adapting to change in a planned manner

They announced the 12 Agile Software Development principles, which are depicted in Figure 1.

12 Agile Software Development principles



Motivation

Traditional / heavyweight / plan-oriented techniques suffer difficulties and failure, therefore agile or lightweight development methodologies are a solution to the problem. With the characteristics of agile development techniques, developers are attempting to build software fast while maintaining the required quality[8].

Developers in the heavyweight environment have the difficulty of bringing a seemingly endless backlog of software projects to fruition while staying on top of the newest advancements. Most software projects fail against some measure of success, according to study after survey. Software is supplied late, beyond budget, and fails to satisfy quality standards[9]. Furthermore, determining the reasons of these failures is challenging. However, most projects fail for one or more of the reasons listed below:

- Requirements that are not clearly communicated
- Requirements that do not solve the business problem
- Requirements that change before the project is completed
- Software (code) that has not been tested
- Software that has not been tested in the way that the user will use it
- Software that has been developed in such a way that it is difficult to modify
- Projects that are not staffed with the resources necessary in the project plan
- Schedule and scope commitments are made before fully comprehending the needs or the technical hazards

At the same time, several projects that did not need binders of paperwork, comprehensive drawings, or project plans were highly effective[10]. Without all these extra stages, many experienced programmers had excellent success. The individuals working on the project, rather than the technology or procedures utilized, proved to be the decisive factor in project success. These events serve as a catalyst for engineers to abandon heavyweight techniques in favour of agile approaches to software development[11].

II. METHODE

Characteristics

The following are some of the most frequent characteristics of agile development methodologies:

a. Lightweight

Agile techniques are easier to utilize than traditional (heavyweight) approaches because they need fewer steps to analyse, develop, and execute software requirements.

b. Adaptable

If the requirements are properly defined and do not change, heavyweight techniques for software estimating and project planning perform effectively. However, most projects' needs vary over time, necessitating the use of methods that can adapt to changing requirements [12]. Because changes are the rule, not the exception, agile methodologies allow for a quick reaction to requirement changes.

c. incremental / iterative

Developers only require short project cycles in agile development. A system that can be executed is not created at the end of a project. Instead, it is created quickly and provided to the customer for testing.

d. Collaborative

Agile development is collaborative because clients and developers collaborate often and in close communication. The client is supposed to be present at the construction site and to be actively participating in the construction process.

e. Simple and straightforward

The technique is simple to understand and adapt, as well as extensively documented.

f. People-oriented

Agile development techniques provide developers a lot of control. Developers make all the technical decisions, estimate the amount of work to be done, sign up for iteration tasks, and decide how much procedure to follow in a project. As a result, it is more concerned with people than with processes.

Despite their similarities, plan-oriented and agile techniques are not exactly competitors. Both have their own set of applications and 'home turf.' They're utilized in a variety of projects, including the following:

- In big projects with predictable needs, plan-oriented approaches are used. an extremely important application domain
- Agile techniques for small teams and unpredictable settings generating applications that aren't important

The table below summarizes the spectrum of application (home ground) for agile and plan-driven methods:

Homeground area	Agile methods	Plan-driven methods
Requirements	Largely emergent , rapid change	Knowable early, largely stable
Refactoring	Inexpensive	Expensive
Primarily objective	Rapid value	High assurance
Customers	Dedicated, knowledgeable, collocated, collaborative, representative, and empowered	Access to knowledgeable, collaborative, representative, and empowered customers.
Development	Agile, knowledgeable, collocated, and collaborative	Plan-oriented, adequate skills, access to external knowledge
Architecture	Designed for current requirements	Designed for current and foreseeable requirements
Size	Smaller teams and products	Larger teams and products

Demonstrates one facet of these disparities. The two decreasing curves in this diagram indicate the possible damage to a project if not enough time and effort is put into planning. The two increasing curves depict the project's potential harm because of excessive planning time and effort.

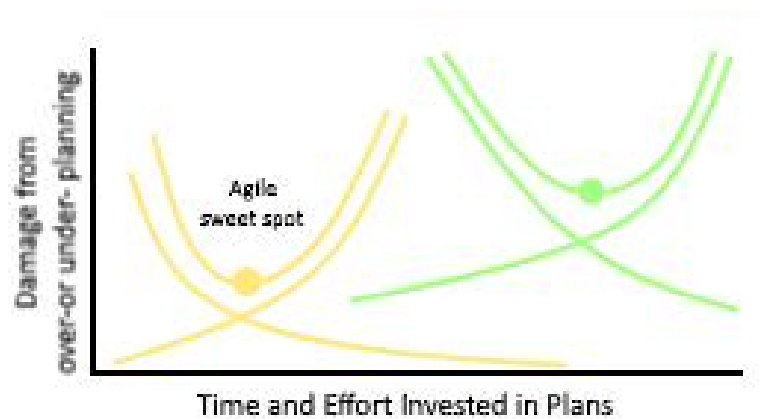


Figure 2: Using the Spiral Model and MBASE to Balance Discipline and Flexibility

The lines crossing on the left show a project where potential harm is low with under-planning and high with over-planning. This category includes a lot of commercial software, including Web services [13]. The lines crossing on the right represent a project for which potentially harm from under-planning is quite large, and for which much more planning would be required before damage from delays due to planning would occur. This category includes safety-critical software projects.

The Most Important Advantages of Agile Software Development

Agile software development is less document-oriented and more code-oriented than traditional software development. This, however, is not its most distinguishing feature, but rather a reflection of two more fundamental distinctions between the two styles. In this section, we will attempt to describe the key advantages of agile software development, which are difficult to achieve in traditional software development.

1. It's easier to plan and keep track of what's going on.
 - a. Customer and developer cooperation is emphasized in agile software development. Developers can plan and manage projects more easily using this practice.

Furthermore, agile approaches often suggest iterations and provide a new software version every one to three months.

b. Early input is essential.

Agile techniques are particularly excellent at enabling communication between consumers and developers because of their tight collaboration [14]. Developers can obtain early feedback from consumers because of their habit of often providing functioning software.

c. Gives the customer value right away.

Again, because the customer is involved throughout the software development process, it has the potential to substantially enhance customer satisfaction, particularly if the client truly knows their requirements and is ready to participate.

d. Allows the creative process to take place.

Agile approaches are more concerned with people than with processes. To develop high-quality software, they depend on people's experience, competency, and direct collaboration rather than rigid, document-centric processes.

e. Adaptable to changes

Most of the software process is planned in detail over a longer time period using traditional approaches [15]. This works well if not much changes and the development team is familiar with both the application domain and software technology [16]. Agile approaches truly demonstrate their power in an application area where changes are frequent. The development is quite responsive to changes, thanks to an on-site customer who is always ready to offer answers to any clarifications developers want.

The Most Important Issues in Agile Software Development

While it appears that many software developments projects have been successful thanks to agile procedures, most of these success tales are based solely on personal experiences. We aim to highlight the key challenges and limitations surrounding agile methods in this section:

1. There is a scarcity of funding for large-scale development projects.

The control and communication mechanisms employed in agile techniques are suitable for small to medium-sized teams [17]. If a large team is involved in the software development project, less agile techniques will be required to address challenges that are unique to large management. Failure to offer enough structure and documentation.

2. It's difficult to create huge, sophisticated software

It is thought that refactoring may be used to eliminate the requirement to plan for change in agile software development. However, it may not operate effectively in big complicated systems since essential design features may be difficult to modify [18]. Models/designs play a critical role in such systems, whose functionality is so tightly linked and interwoven that incremental software development may not be viable.

3. There is a lack of support for reusability.

Extreme Programming, for example, focuses on creating software products that answer a specific problem [19]. While there appears to be a justification for using agile processes to create reusable artifacts, it is unclear how agile techniques can be properly applied.

4. Non-functional needs are difficult to manage.

When customers or users discuss what they want the system to accomplish, they rarely consider resources, maintainability, portability, security, or performance [20]. Some needs for the user interface or safety can be solicited and implemented throughout the development phase. Non-functional requirements should be handled more explicitly in agile techniques since they can influence the database, programming language, or operating system chosen.

5. Support for distributed development environments is limited.

Face-to-face communication may not be possible in development contexts when team members and consumers are physically separated. An overview of Agile Software Development Methodology and Its Relevance to Software Engineering Communication Agile procedures enhance communication in software engineering.

6. Agile development can have an impact on an organization's structure.

The decision-making authority in agile software development is distributed.

This approach to decision-making differs from that of many organizations [21]. In certain cases, programmers make a lot of important decisions, including those that are directly related to business, process, and system requirements, while their supervisors either accept it or not.

III. RESULT AND DISCUSSION

Using Agile Methodology in Software Development

The general procedure of Agile Methodology is like that of traditional software engineering methodology [4]. It begins with a requirement analysis, then moves on to the design, implementation, and testing phases. The specifics that occur in each phase, on the other hand, are extremely different since the focus is not on the model but on the quickly changing needs. This section explains how agile techniques differ from one another yet may be integrated into the software engineering process.

8. Analysis of Requirements

The ability to reach out to customers is critical in agile software development [22]. This provides the foundation for quick feedback and communication, resulting in a better knowledge of requirements and the development process. In the Extreme Programming approach, for example, it is considered that the customer is an ideal user representative who can correctly answer all questions and has the authority to make sound judgments.

All agile methodologies highlight that interacting with customers is the best way to obtain information for development and avoid misunderstandings. Customers and developers should try to speak with the person in charge if something is unclear or loosely stated to avoid indirect knowledge transfer.

However, there is still an issue, even though agile techniques are built on incorrect client participation throughout the whole development process. Agile techniques often require several clients with diverse backgrounds, but sometimes just one customer is available to work with the development team. As a result, not all the questions that arise can be answered in sufficient depth.

9. Modelling and design

Agile Modelling is one of the agile approaches that heavily incorporates modelling (AM). Although modelling is utilized in AM, it serves a distinct function. Models are used in AM to express understanding about a tiny component of a system under development, for example. Most of the models do not make it into the final system model since they are primarily throw-away models that are created on a whiteboard or paper and wiped after serving their function [23].

The agile technique is appropriate for small to medium-sized projects when used in this way. Because it integrates a full model of software in the design process, the plan-driven technique is better suited for big and complicated projects.

8. Incorporation

A method utilized in Extreme Programming is the most interesting and extreme method when it comes to implementation. It's known as "pair programming." In XP, programmers collaborate in pairs and as a group, using a basic design and rigorously tested code, constantly updating the design to meet current demands. Pair programming, on the other hand, does not imply that all code is written by two programmers working together on a single computer. Some code is better done alone, while others are best implemented in pairs.

10. Testing

Before writing the core code, developers in Extreme Programming perform unit tests for everything. They develop unit tests for all the common scenarios as well as any unique ones. Then they run all the unit tests, and if they discover a bug in the code, they write more unit tests to isolate the issue. After that, they repair the problem in the code and repeat all the tests.

11. Methodology Tools for Agile

The agile method may be used with a variety of technologies available on the market [7]. VersionOne is one of the programs. We can plan and manage our agile software development projects with the help of a tool like this. VersionOne is a software development project management company that specializes in the planning, management, and execution of quickly changing, unexpected software development projects [5], [24], [25]. It also offers numerous template projects in a web-based environment for Scrum, Extreme Programming, and DSDM techniques.

Another tool, known as TP, was created to make planning, tracking, and quality assurance tasks easier.

III. CONCLUSION

To summarize, the agile approach is a viable alternative to plan-driven methodologies (e.g., UML or Waterfall Model) in the creation of high-quality software. It's also ideal for small to medium-sized projects because developers don't generally focus on models as the major component of the final program. An overview of Agile Software Development Methodology and Its Relevance to Software Engineering Agile techniques feature a distinct approach to each software engineering phase that focuses on feedback and change. As a result, it is thought that this technique can increase programmers' productivity.

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