Innovative Learning Media Based on e-Learning in the New Normal Era

Muhammad Mushfi El Iq Bali, Hasan Baharun, Ahmad Madanibillah, Chusnul Muali, Lukman, Nanang Khoirul Anam

Nurul Jadid University, Probolinggo, East Java, Indonesia mushfieliqbali8@gmail.com; ha54nbaharun@gmail.com; mushfieliqbali8@gmail.com; ha54nbaharun@gmail.com; mushfieliqbali8@gmail.com; ha54nbaharun@gmail.com; mushfieliqbali8@gmail.com; ha54nbaharun@gmail.com; mushfieliqbali8@gmail.com; mushfieliqbali8@gmail

Zamroni

Institut Agama Islam Negeri Samarinda, Borneo, Indonesia iceisa.iainsmd18@gmail.com

Abdul Talib Bon

Department of Production and Operations, University Tun Hussein Onn Malaysia, Malaysia talibon@gmail.com

Abstract

The use of instructional media is the most effective way to be used so that all learning objectives can be achieved. Innovative learners can empower the media provided by schools and under the development and demands of the times. This research approach uses a qualitative approach to the type of case study research. The research instrument used in this study was an interview guide designed for learners. The collected data is analyzed and categorized into main issues and themes based on literature using three channels, namely data reduction, data presentation, concluding/verification. The results are presented through a form of descriptive analysis. Based on the results of the study it can be concluded that the use of instructional media on innovative learning will greatly help learners to be able to solve problems in the learning process. By combining innovative learning media and e-Learning model is a basic form and logical consequence of the development of information and communication technology that provides flexibility, interactivity, speed, visualization through various advantages of each media in the new normality era.

Keywords:

Innovative Learning Media, e-Learning, New Normal Era

1. Introduction

Every teaching and learning process must certainly use certain media to run effectively and smoothly. The learning media functions to distribute, convey, and connect learning resources, which in turn can lead to better communication in learning and behaviour change because learning objectives can be achieved (Muali et al., 2019). Media as a connecting tool (communication medium) in the process of teaching and learning interaction to improve the effectiveness of student learning outcomes (Bali & Musrifah, 2020). The educator are required to be able to use the tools that can be provided by schools, and it is also possible that these tools are under the development and demands of the times. Educational innovation inherently involves educator training and learning of students and educators (Wadmany & Melamed, 2018). The use of instructional media is the most effective way to be used so that all learning objectives can be achieved (Fauzi et al., 2018). Innovative learning media is a solution so that all

learning objectives can be implemented. The use of innovative media can also increase students' interest in the learning process (Islam et al., 2018). This happens because innovative media will create a more effective and efficient learning atmosphere.

Good quality innovation in education can make students learn more in a shorter period and can improve learning competence (Munawar, 2019). The development of learning in education is now increasing (Zamroni et al., 2020) . The transformation of the learning system is very helpful for students, including learning patterns that are supported by a paradigm of higher-level thinking that requires the role and technological sophistication in the transfer of knowledge without compromising individual mobility (Rozi et al., 2020). Information systems will develop into artificial intelligence systems that use intelligent agents to adjust and filter relevant information and new methods and tools to be developed to encourage e-learning and innovation (Alrawi et al., 2012). Technology now has a role in education as a tool for teaching and learning. One example of technological progress in education is constrained by distance is the existence of an e-Learning system. This e-Learning system facilitates distance learning between students and educators so that it can run effectively and efficiently, especially during the pandemic.

Research conducted by Wahid revealed that the use of e-learning based learning media caused feelings of pleasure, quickly understood, and was more attractive than conventional learning media (Wahid et al., 2020). In line with Oktavia's research, online learning media can improve students' motor skills compared to offline learning media (Oktavia et al., 2019). Therefore, online learning media has a positive impact on the learning system during a pandemic. The development of technological innovation provides new nuances in an effective, creative, and fun learning process so that learning interest and students become active. Especially in the face of a pandemic that limits the movement of students in face-to-face learning, this online learning media innovation is the main pillar of the online learning process.

The Covid-19 pandemic is not over yet, even the World Health Organization (WHO) says this pandemic will not end quickly (Bender, 2020). The coronavirus pandemic (Coronavirus Disease-2019/Covid-19) is truly extraordinary, forcing governments in various countries to adopt fairly extreme policies. Protection of children and educational facilities is very important. Preventive action is needed to prevent the potential spread of Covid-19 in the school environment. It is important to remember that Covid-19 does not distinguish between borders, ethnicity, disability status, age or gender. Motivation to adopt innovative communication (Syakroni et al., 2019) and e-learning practices in the educational environment can be stimulated by events such as natural disasters. For this reason, it is expected that people in all walks of life are prepared to adapt to familiarize themselves with Covid-19. The New Normal Era is a policy of reopening limited economic, social and public activities using health standards that did not exist before the pandemic.

This study aims to describe the online learning system during the Covid-19 pandemic and its positive impact on the learning process in the new normal era. In addition, it provides understanding regarding perceptions and insights to the public regarding the transformation patterns of learning methods and strategies during a pandemic.

2. Innovative Learning Media

Learning media means everything that can be used to stimulate the thoughts, feelings, attention and abilities or skills of students so that it can encourage the learning process. The creation of deliberate instruction about media is the key to advancing student learning (McLain, 2019). In the continuity of learning in the classroom, the media has a very important role. For a shift in thinking towards an innovative and creative environment that supports the production of academic media that can be used together with the learning media movement in education. The typology of innovation has evolved from a structured and well-defined technological system of features to a system consisting of a large number of marketing (Amalia, 2020), design, organizational, and social features. Technological innovation as a force that drives social and organizational change, and perception of innovation as the ability of humans to create something new and different for their interests (Rahman et al., 2019). The implication is in making innovative learning media for practical teaching, many key components must be taken into account when designing innovative media, including analytical thinking, critical thinking, sharing opinions, expressing rational ideas, and developing an open mind.

Innovative educators have the opportunity to integrate face-to-face and digital learning models to advance learning models that are involved, effective, efficient and affordable in the 21st century (Pavlik, 2015). Students provide information about digital devices they have or have access to, and about using media and e-Learning tools and services for their learning (Fauzi et al., 2018). Innovative learning media focuses on the learning process of students who are designed, developed and managed creatively, dynamically, by applying a multi-direction approach to better, and using the latest media to create an atmosphere and learning process that is conducive for students.

3. e-Learning Model

The global absorption of mobile devices such as smartphones, tablets and laptops, which are synonymous with social media web 2.0, has opened new possibilities for learning and teaching in the context of learning. As the impact of globalization continues to influence the growth of knowledge-based societies that have technical skills and can think creatively it is seen as an integral part of the acceleration of the advancement of civilization (Cartner & Hallas, 2017). The rapid progress of information and communication technology in the world of education triggers a tendency to transition from conventional learning face-to-face to contemporary learning based on e-learning that can be accessed by utilizing media, such as hardware and software devices, interactive multimedia and internet networks without distance, space, and time by anyone who needs it. Most learners use computer learning to support their learning through communication models, education, computers are one of the efforts to renew education included in the teaching-learning process (Muali et al., 2018). Unlike traditional pedagogy, educators need to rethink teaching approaches to realize the potential of e-learning as an effective teaching method.

e-Learning is a teaching and learning process that utilizes information technology (in this case the internet) as an effective means and expands knowledge under the development of science in real-time (Stewart-McKoy, 2014). With e-Learning, learners will be more empowered, because now the teaching-learning process is no longer centred on learners but switches to students. The implementation of social media and cloud platforms offers innovative solutions for collaborative teaching and learning (Vickers et al., 2015). Online Collaborative Learning theory (OCL) focuses on educational applications that facilitate the creation of ideas, the organization of ideas, and intellectual convergence through the internet. OCL theory consists of three intellectual phases: that is, Generating Ideas (IG); Organizing Ideas (IO); and Intellectual Convergence (IC) (Mnkandla & Minnaar, 2017). Learners have a significant disconnect between learning media that works optimally for millennials and ordinary media experience. As instructors and designers of teaching content, learners believe that this effort provides optimal results for students. Before looking at the details of the teaching content, it is important to compare and differentiate individuals involved in teaching and learning relationships in education (Arnold, 2016). The combination of traditional forms of learning (classroom learning) and e-learning is called hybrid learning. Hybrid learning describes learning or training supplements.

4. New Normal Era

Educational arrangements must continue to be friendly, respectful, inclusive, and supportive for all. Steps taken by schools can prevent the entry and spread of Covid-19 by students and staff who may be exposed to the virus while minimizing disruption and protecting students and staff from discrimination (Yao et al., 2020). The combination of using social media and e-learning to support teaching, learning, communication, and related organizational practices fosters resilience for students, staff, and organizations in times of crisis. The use of e-learning by respondents is motivated by technological and content factors. The new normal is an effort to save the lives of citizens and keep the state empowered to carry out its functions (Young & Donovan, 2020). Thus the wheels of the community's economy continue to run, people can still make a living. New normal is a new stage after the Work From Home policy or social restrictions are imposed to prevent the massive spread of coronavirus outbreaks.

Towards the adaptation of education in the New Normal era, each school must begin to improve itself in preparing for education. The integrated pedagogical need to improve the E-learning Environment has recently emerged as a priority area in supporting creative users in the New Normal era. The combination of various types of media in an interactive e-learning environment, especially for programming tasks, has generated strong interest even during the pandemic (Mulenga & Marbán, 2020). Its potential has recently been demonstrated in the context of improving technical skills for creative users in cyberspace, with a combination of various interactive multimedia applications in various units of educational institutions. All forms of education such as registration of prospective new students, selection tests, announcements of graduation and even the learning process are done online. If it still has to be done directly (offline), it must follow strict health protocols.

5. Research Methods

This research was conducted at the Faculty of Islam, Nurul Jadid University. The population in this study consisted of 654 students of the Faculty of Islam. The sample in this study was 75 students of the PGMI Study Program. The material studied is the use of online learning media in the e-learning-based lecture process. E-learning

applied in learning is an innovation in learning systems in the digital era. Although it cannot be denied that the application of e-learning responds by an incident to the Covid-19 pandemic. To facilitate services to students and the sustainability of academic activities, it is necessary to hold field analyzes related to the impact and evaluation of the implementation of online learning, so that the achievement of learning goals and targets can be met by maintaining the quality and quantity of student learning outcomes.

This research approach uses a qualitative approach to the type of case study research. The research instrument used in this study was three sets of interview questions designed for specialists in their expertise. Primary data of this study were obtained directly from observations at the research location and through interviews with students. Secondary data is data obtained by researchers from research subjects in the form of documents and other written sources. The collected data is analyzed and categorized into main issues and themes based on literature using three channels, namely data reduction, data presentation, concluding/verification. Checking the validity of the data using the techniques of credibility test, transferability test, dependability test, and confirmability test. The results are presented through a form of descriptive analysis.

6. Result and Discussion

Based on the results of the analysis in the application of learning that has been carried out using online learning media, it can be described in the following graph.

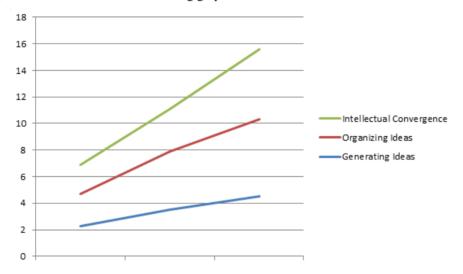


Figure 1. Analysis of Online Collaborative Learning Application

The innovative use of emerging technologies enables a fundamental transformation of the teaching and learning process. Innovative learning as learning that is designed by learners, which are new, not as is usually done, and aims to facilitate students in building their knowledge in the context of the process of changing behaviour towards better according to the potential and differences of students. This emerging paradigm includes changes in at least five main dimensions of teaching and learning, including the direction of communication, the level of interactivity, communication media, constraints on the educational process, and learning outcomes. Creating a dynamic environment for creativity and innovation must be a goal for all learning institutions. In the context of teaching and learning programs, innovative learning programs can mean programs created as an effort to find a solution to a problem. Students today (the generation that is connected electronically from birth) are trying new innovative technologies before they reach university. The use of social media in the classroom to increase student involvement and is a good idea for many different subjects.

Online collaborative learning has three intellectual phases: (1) Generating ideas. Collaborative groups are characterized by a variety of ideas and activities that result from brainstorming, verbalizing, and producing information, which leads to sharing information and then to position on matters of interest; (2) Organizing ideas. The process of conceptual change, intellectual progress, and a shift towards convergence of ideas to group them according to their strengths and relationships or shortcomings; and (3) Intellectual convergence is a construction of knowledge. OCL manifests into scientific knowledge or hypotheses and social applications that result in the development of knowledge. The use of instructional media in innovative learning will greatly help learners to be

able to solve problems in the learning process. The media will assist in the delivery of learning objectives and can stimulate students to be more active in the learning process. The interactive and decentralized nature of digital tools enables teachers and students to communicate and strengthen social bonds, in addition to participation in the production of new knowledge and media content. Innovative learning can also stimulate the development of students' thinking progress to solve problems they face correctly and can make school education more relevant to life, especially the world of work.

e-Learning as a new way in the teaching and learning process that uses electronic media, especially the internet as a learning system. E-learning is the basis and logical consequence of the development of information and communication technology. With e-learning, students do not need to sit sweetly in the classroom to listen to every utterance from the learners directly, all can be accessed through e-learning. Three levels of information technology adoption in learning, among others; (1) personal productivity tools based on the use of applications to perform tasks more efficiently. This is the basic level of technology that has been adopted by most educational institutions; (2) additional enrichments such as e-mails, videos, websites and other multimedia tools, added to traditional learning; and (3) "paradigm shifts" which require learners to redesign learning content and reconfigure teaching and learning tasks to take full advantage of new technology. At present, most educational institutions have reached the first and second levels, and are struggling for the third which leads to a fundamental change in the teaching paradigm. However, using the same instructional design in e-learning environments will cause three significant problems including; (1) many ways of contemporary learning are far more valuable and effective than traditional ways of learning exceptions; (2) important student needs related to their ability to cope with assignments in the learner's future career are largely ignored; and 3) educational institutions fail to make the changes needed to adapt to environmental changes and narrow the gap between academics and stakeholders.

New normal is the step to accelerate the handling of Covid-19 in the health, social, and economic fields.

The new normal scenario is carried out by considering the readiness of the region and the results of epidemiological research in the relevant region. Therefore, the term side by side is more appropriate to use than to make peace with the coronavirus. The government must adopt a policy to deal with this pandemic, namely by implementing new normal in all aspects of human life. No exception in the field of education. The government plans to open the education sector if they are ready to implement health protocols in the new normal era or new norms. Learning for school students in the new normal era certainly requires adaptation as well, adjusting to the available study time and health protocols. Previously, learners and students were accustomed to virtual learning in the Covid-19 pandemic era, so this New Normal situation must be able to combine face-to-face and virtual learning methods. Because face-to-face hours are not full as usual, students must be creative and innovative to take advantage of the short face-to-face time to be truly effective and efficient. Therefore, it is necessary to separate which sub-chapters must be delivered face-to-face and which are not. In the online teaching process, teachers must not only play the role of transmitting knowledge but also play the role of leader and companion through effective guidance and communication. For deepening (question and answer) and assignments are done virtually through the school's e-Learning or via WhatsApp and email.

7. Conclusion

Innovative learning media is a learning process for students that are designed, developed and managed creatively, dynamically, by applying a multi-way approach to better learning, and using the latest media to create an atmosphere and learning process that is conducive for students. The use of instructional media in innovative learning will greatly help learners to be able to solve problems in the learning process. e-Learning is a form of information technology that is applied in education in the form of websites that can be accessed by internet networks anywhere. e-Learning is the basis and logical consequence of the development of information and communication technology. The advantage of e-learning is that it provides flexibility, interactivity, speed, visualization through various strengths from each media. New normal is the step to accelerate the handling of COVID-19 in the health, social, and economic fields. In the world of education, learning in this era must be able to combine face-to-face and virtual learning methods, because face-to-face hours are not full as usual, so teachers must be creative and innovative to take advantage of the short face-to-face time to be truly effective and efficient.

References

Alrawi, K., Alrawi, A., & Alrawi, W. (2012). How Knowledge Management Adds Critical Value to e-Learning Media. *International Journal of Educational Administration and Policy Studies*, 4(3), 78–83. https://doi.org/10.5897/IJEAPS09.097

Amalia, V. (2020). Strategi Komunikasi Humas dalam Meningkatkan Public Trust di Perguruan Tinggi (Studi Kasus

- di Universitas Nurul Jadid, Paiton, Probolinggo). *AL-TANZIM: Jurnal Manajemen Pendidikan Islam*, *4*(1), 13–23. https://doi.org/10.33650/al-tanzim.v4i1.812
- Arnold, S. (2016). Rethinking E-Learning Media: What Happens When Student "Like" Meets Professor "Me"? International Conferences ITS, ICEduTech and STE: International Association for Development of the Information Society, 281–286.
- Bali, M. M. E. I., & Musrifah. (2020). The Problems of Application of Online Learning in the Affective and Psychomotor Domains During the Covid-19 Pandemic. *Jurnal Pendidikan Agama Islam*, *17*(2), 137–154. https://doi.org/https://doi.org/10.14421/jpai.2020.172-03
- Bender, L. (2020). Guidance for COVID-19 Prevention and Control. *IASC: Inter-Agency Standing Committee*, *March*, 1–13.
- Cartner, H. C., & Hallas, J. L. (2017). Challenging Teachers' Pedagogic Practice and Assumptions about Social Media. *Online Learning Journal*, 21(2), 1–21. https://doi.org/10.24059/olj.v21i2.1009
- Fauzi, A., Mundiri, A., & Manshur, U. (2018). E-Learning in Pesantren: Learning Transformation based on the Value of Pesantren E-Learning in Pesantren: Learning Transformation based on the Value of Pesantren. *Physics: Conference Series PAPER*, 1114. https://doi.org/10.1088/1742-6596/1114/1/012062
- Islam, S., Baharun, H., Muali, C., Ghufron, M. I., Bali, M. M. E. I., Wijaya, M., & Marzuki, I. (2018). To Boost Students' Motivation and Achievement through Blended Learning. *Journal of Physics: Conference Series*, 1114(1), 1–11. https://doi.org/10.1088/1742-6596/1114/1/012046
- McLain, T. R. (2019). Social Media Treasure Hunt Practical Lessons Using Twitter in the English Classroom. *Teaching English with Technology*, 19(2), 88–100.
- Mnkandla, E., & Minnaar, A. (2017). The Use of Social Media in E-Learning: A Metasynthesis. *International Review of Research in Open and Distance Learning*, 18(5), 227–248. https://doi.org/10.19173/irrodl.v18i5.3014
- Muali, C., Islam, S., Bali, M. E. I., Hefniy, H., Mundiri, A., Jasri, M., & Fauzi, A. (2018). Free Online Learning Based on Rich Internet Applications; The Experimentation of Critical Thinking about Student Learning Style. *Journal of Physics: Conference Series*, 1114(1). https://doi.org/10.1088/1742-6596/1114/1/012024
- Muali, C., Minarti, S., Taufik Qurohman, M., & Haimah. (2019). Analysis of metacognitive capability and student learning achievement through edmodo social network. *Journal of Physics: Conference Series*, 1175(1). https://doi.org/10.1088/1742-6596/1175/1/012150
- Mulenga, E. M., & Marbán, J. M. (2020). Is COVID-19 the Gateway for Digital Learning in Mathematics Education? *Contemporary Educational Technology*, *12*(2), 1–11. https://doi.org/10.30935/cedtech/7949
- Munawar, M. (2019). Supervisi Akademik: Mengurai Problematika Profesionalisme Guru di Sekolah. *Al-Tanzim: Jurnal Manajemen Pendidikan Islam*, 3(1), 135–155. https://doi.org/10.33650/al-tanzim.v3i1.522
- Oktavia, D., Bali, M. M. E. I., Rahman, H., Umar, U., Syakroni, A., & Widat, F. (2019). Exploration of Fine Motor Skills through the Application of Paint. *WESTECH*, 1–6. https://doi.org/10.4108/eai.8-12-2018.2284038
- Pavlik, J. V. (2015). Fueling a Third Paradigm of Education: The Pedagogical Implications of Digital, Social and Mobile Media. *Contemporary Educational Technology*, 6(2), 113–125. https://doi.org/10.30935/cedtech/6143
- Rahman, K., Wahid, A., Afandi, I., Bali, M. M. E. I., & Hakim, L. (2019). Effectiveness of Teams Teaching-Hybrid Learning (TTHL) in Higher Education. *WESTECH*, 1–6. https://doi.org/10.4108/eai.8-12-2018.2284036
- Rozi, F., El Iq Bali, M. M., Firdaus, S., Wijaya, M., Al Mursyidi, R. A., Haqiki, M. W., & Abidin, Z. (2020). Learning management; identifying learning styles of language learners in madrasah. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, August, 3783–3790.
- Stewart-McKoy, M. A. (2014). "Digitize Me": Generating E-Learning Profiles for Media and Communication Students in a Jamaican Tertiary-Level Institution. *Journal of Educators Online*, 11(1), 1–29. https://doi.org/10.9743/JEO.2014.1.2
- Syakroni, A., Muali, C., & Baharun, H. (2019). Motivation And Learning Outcomes Through The Internet Of Things; Learning In Pesantren. *Journal of Physics: Conference Series*, *1363*, 1–5. https://doi.org/10.1088/1742-6596/1363/1/012084
- Vickers, R., Field, J., & Melakoski, C. (2015). Media Culture 2020: Collaborative Teaching and Blended Learning Using Social Media and Cloud-Based Technologies. *Contemporary Educational Technology*, *6*(1), 62–73. https://doi.org/10.30935/cedtech/6139
- Wadmany, R., & Melamed, O. (2018). "New Media in Education" MOOC: Improving Peer Assessments of Students' Plans and their Innovativeness. *Journal of Education and E-Learning Research*, 5(2), 122–130. https://doi.org/10.20448/journal.509.2018.52.122.130
- Wahid, A. H., Najiburrahman, Rahman, K., Faiz, Qodriyah, K., Hambali, Bali, M. M. E. I., Baharun, H., & Muali, C. (2020). Effectiveness of Android-Based Mathematics Learning Media Application on Student Learning

Proceedings of the 11th Annual International Conference on Industrial Engineering and Operations Management Singapore, March 7-11, 2021

Achievement. Journal of Physics: Conference Series, 1-7. https://doi.org/10.1088/1742-6596/1594/1/012047

Yao, J., Rao, J., Jiang, T., & Xiong, C. (2020). What Role Should Teachers Play in Online Teaching during the COVID-19 Pandemic? Evidence from China. *Science Insights Education Frontiers*, *5*(2), 517–524. https://doi.org/10.15354/sief.20.ar035

Young, J., & Donovan, W. (2020). Shifting to Online Learning in the COVID-19 Spring. *PIONEER INSTITUTE:* Public Policy Research, April, 1–6.

Zamroni, Ilyasin, M., & Tohet, M. (2020). Multicultural education in a religious life: Developing harmony among religions in southeast asia. *Proceedings of the International Conference on Industrial Engineering and Operations Management, August*, 3791–3801.

Biographies

Muhammad Mushfi El Iq Bali is a lecturer at the Faculty of Islamic Studies, Nurul Jadid University, Indonesia. He is the Head of the Madrasah Ibtidaiyah Teacher Education Study Program at the Islamic Faculty of Religion and the manager of the Journals on the Campus.

Hasan Baharun is an a lecturer at the Faculty of Islamic Religion, Nurul Jadid University, Probolinggo, East Java, Indonesia. In his daily life, he is a lecturer and practitioner of education. he also devoted himself as an educator at the Darul Lughah Karomah Islamic boarding school, Probolinggo, East Java, Indonesia.

Ahmad Madanibillah is a final student of Madrasah Ibtidaiyah Teacher Education Study Program at the Islamic Faculty of Religion Nurul Jadid University, Indonesia.

Chusnul Muali is a lecuture and vice dean of Nurul Jadid University. He has been recognized as a professional consultant with over 15 years of experience in working with closely-held technological educational.

Lukman is a final student of Madrasah Ibtidaiyah Teacher Education Study Program at the Islamic Faculty of Religion Nurul Jadid University, Indonesia.

Nanang Khoirul Anamis a final student of Madrasah Ibtidaiyah Teacher Education Study Program at the Islamic Faculty of Religion Nurul Jadid University, Indonesia.

Zamroni is an lecturer at the Faculty of Tarbiyah and Teacher Training, IAIN Samarinda, Indonesia. He is a lecturer and practitioner of education in his area. In this study, he was the leader of the research team on the theme raised

Abdul Talib Bon is a professor of Production and Operations Management in the Faculty of Technology Management and Business at the Universiti Tun Hussein Onn Malaysia since 1999. He has a PhD in Computer Science, which he obtained from the Universite de La Rochelle, France in the year 2008. His doctoral thesis was on topic Process Quality Improvement on Beltline Moulding Manufacturing. He studied Business Administration in the Universiti Kebangsaan Malaysia for which he was awarded the MBA in the year 1998. He's bachelor degree and diploma in Mechanical Engineering which his obtained from the Universiti Teknologi Malaysia. He received his postgraduate certificate in Mechatronics and Robotics from Carlisle, United Kingdom in 1997. He had published more 150 International Proceedings and International Journals and 8 books. He is a member of MSORSM, IIF, IEOM, IIE, INFORMS, TAM and MIM.