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Makoto Ikeda   *Editors*

Complex, Intelligent, and Software Intensive Systems

Proceedings of the 13th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS-2019)

Springer

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Makoto Ikeda
Editors

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Conference on Complex, Intelligent,
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Welcome Message of CISIS-2019 International Conference Organizers

Welcome to the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019), which will be held from July 3 to July 5, 2019, at University of Technology Sydney (UTS), Sydney, Australia in conjunction with the 13th International Conference on Innovative Mobile and Internet Services in Ubiquitous Computing (IMIS-2019).

The aim of the conference is to deliver a platform of scientific interaction between the three interwoven challenging areas of research and development of future ICT-enabled applications: software intensive systems, complex systems, and intelligent Systems.

Software intensive systems are systems, which heavily interact with other systems, sensors, actuators, devices, other software systems, and users. More and more domains are involved with software intensive systems, e.g., automotive, telecommunication systems, embedded systems in general, industrial automation systems, and business applications. Moreover, the outcome of Web services delivers a new platform for enabling software intensive systems. The conference is thus focused on tools, practically relevant and theoretical foundations for engineering software intensive systems.

Complex systems research is focused on the overall understanding of systems rather than its components. Complex systems are very much characterized by the changing environments in which they act by their multiple internal and external interactions. They evolve and adapt through internal and external dynamic interactions.

The development of intelligent systems and agents which is each time more characterized by the use of ontologies and their logical foundations build a fruitful impulse for both software intensive systems and complex systems. Recent researches in the field of intelligent systems, robotics, neuroscience, artificial intelligence, and cognitive sciences are very important factor for the future development and innovation of software intensive and complex systems.

CISIS-2019 is aiming at delivering a forum for in-depth scientific discussions among the three communities. The papers included in the proceedings cover all aspects of theory, design, and application of complex systems, intelligent systems,

and software intensive systems. The conference received 166 papers and accepted 45 papers (about 27% acceptance rate), which were selected after a careful review process.

We are very proud and honored to have two distinguished keynote talks by Prof. Wanlei Zhou, University of Technology Sydney, Australia, and Dr. Nadeem Javaid, COMSATS University Islamabad, Pakistan, who will present their recent work and will give new insights and ideas to the conference participants.

The organization of an international conference requires the support and help of many people. A lot of people have helped and worked hard to produce a successful CISIS-2019 technical program and conference proceedings. First, we would like to thank all the authors for submitting their papers, the Program Committee Members, and the reviewers who carried out the most difficult work by carefully evaluating the submitted papers. We are grateful to Honorary Co-Chairs Prof. Makoto Takizawa, Hosei University, Japan, and Prof. Jie Lu, University of Technology Sydney, Australia, for their guidance and advice.

This year in conjunction with CISIS-2019 we have seven international workshops that complemented CISIS-2019 program with contributions for specific topics. We would like to thank the Workshops Co-Chairs and all Workshops Organizers for organizing these workshops.

Finally, we would like to thank Web Administrator Co-Chairs and Local Arrangement Co-Chairs for their excellent and timely work.

We hope you will enjoy the conference and have a great time in Sydney, Australia.

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Leonard Barolli
Farookh Khadeer Hussain
CISIS-2019 General Co-Chairs

Omar Hussain
Hiroaki Nishino
Kin Fun Li
CISIS-2019 Program Committee Co-chairs

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Welcome Message from CISIS-2019 Workshops Co-chairs

Welcome to the Workshops of the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019), which will be held from July 3 to July 5, 2019, at University of Technology Sydney, Sydney, Australia.

We are pleased that for this edition of CISIS International Conference we have seven international workshops. Some of these workshops are in 9th, 10th, 11th, 12th, and 13th editions. The objective was to complement as much as possible the main theme of CISIS-2019 with specific topics of different workshops in order to cover topics from the three challenging areas of ICT-enabled applications: software intensive systems, complex systems, and intelligent systems.

The list of workshops is as follows:

1. The 13th International Workshop on Engineering Complex Distributed Systems (ECDS-2019)
2. The 12th International Workshop on Intelligent Informatics and Natural Inspired Computing (IINIC-2019)
3. The 10th International Workshop on Frontiers in Complex, Intelligent and Software Intensive Systems (FCISIS-2019)
4. The 10th International Workshop on Virtual Environment and Network-Oriented Applications (VENOA-2019)
5. The 9th Semantic Web/Cloud Information and Services Discovery and Management (SWISM-2019)
6. The 6th International Workshop on Hybrid/Cloud Computing Infrastructure for E-Science Application (HCCIEA-2019)
7. The 1st International Workshop on Knowledge Creation and Innovation in Digital World (IKIDW-2019)

These workshops bring to the researchers conducting research in specific themes the opportunity to learn from this rich multidisciplinary experience. The Workshop Co-Chairs would like to thank CISIS-2019 International Conference Organizers for their help and support. We are grateful to the Workshops Organizers for their great

efforts and hard work in proposing the workshops, selecting the papers, the interesting programs, and the arrangements of the workshops during the conference days. We are grateful to Web Administrator Co-Chairs for their excellent work and support.

We hope you enjoy the workshops program and proceedings.

Mohammad Alshehri
Tomoya Enokido
Beniamino Di Martino
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17. Internet of Everything and Machine Learning Applications

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Welcome Message from ECDS-2019 International Workshop Co-chairs

It is our great pleasure to welcome you to the 13th International Workshop on Engineering Complex Distributed Systems (ECDS-2019), which will be held in conjunction with the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019) from July 3rd to July 5th, 2019, at University of Technology Sydney (UTS), Sydney, Australia.

In the past, this field included technology concerns related to middleware solutions, dealing with the heterogeneity of the miscellaneous hardware and software environments and computing infrastructure. These technologies have been used to address the integration of existing legacy applications and improve the interoperability between applications across enterprises. The advances in wireless communication and pervasive computing extend this traditional wired area of distributed systems and make the new advanced application possible. The complexity of today's applications requires additional approaches to be able to realize an enterprise application time- and cost-saving. This includes the ability to model business processes, business policies, and event-oriented aspects of large systems and express these models through design solutions to address the complexity of enterprise applications and ease software design efforts. In addition, the engineering of complex distributed systems also requires a good understanding of the problem areas of concern for information systems and business administration, such as process management, supply chain management, security issues, and electronic business. These topics need to be addressed in order to deal with the complexity of today's increasingly dynamic, mobile, cross-organizational, and cross-jurisdictional systems.

In this workshop, various aspects of the design and implementation of distributed systems will be discussed. The scope of the presented papers ranges from engineering approaches and techniques to applications.

This workshop would not have been possible without the help of many people. First of all, we would like to thank all the authors for submitting their papers to our workshop. We also like to thank the Program Committee Chair, Program

Committee Members, and additional reviewers, who carefully evaluated the submitted papers.

We hope that you find the ECDS-2019 program inspiring and that the workshop provides you with the opportunity to interact, share ideas with, and learn from other distributed systems researchers from around the world. We also encourage you to continue to participate in future ECDS workshops, to increase its visibility, and to interest others in contributing to this growing community.

Leonard Barolli
Makoto Takizawa
ECDS-2019 Workshop Co-chairs

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Message from IINIC-2019 International Workshop Organizers

Advanced information processing technologies have the potential to significantly accelerate research in different fields. In particular, techniques from artificial intelligence, machine learning, and data mining can assist researchers in the discovery of new knowledge for next-generation applications. This workshop aims to attract state-of-the-art solutions and novel attempts in this direction.

The 12th International Workshop on Intelligent Informatics and Natural Inspired Computing (IINIC-2019) will provide a platform for researchers to meet and exchange their thoughts. IINIC-2019 will be held in conjunction with the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019) from July 3rd to July 5th, 2019, at University of Technology Sydney (UTS), Sydney, Australia.

Many people contributed to the success of IINIC-2019. We wish to thank the Program Committee Members for their great effort. We also would like to express our gratitude to the main organizers of CISIS-2019 for their excellent work in organizing the conference. Last but not least, we would like to thank and congratulate all the contributing authors for their support to the workshop.

Takahiro Uchiya
Leonard Barolli
IINIC-2019 Workshop Co-chairs

IINIC-2019 Organizing Committee

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Message from FCISIS-2019 International Workshop Organizers

It is our great pleasure to welcome you for the 10th International Workshop on Frontiers in Complex, Intelligent and Software Intensive Systems (FCISIS-2019). The workshop will be held in conjunction with the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019) from July 3rd to July 5th, 2019, at University of Technology Sydney (UTS), Sydney, Australia.

The objective of FCISIS Workshop is to foster the discussion in a rich inter-disciplinary context of the three challenging areas of ICT-enabled applications: software intensive systems, complex systems, and intelligent systems. FCISIS-2019 is conceived in terms of special papers, which were also carefully selected, from the organizers.

We would like to thank all participants of the workshop for submitting their research works and for their participation and look forward to meet you again in forthcoming editions of the workshop.

Leonard Barolli
FCISIS-2019 Workshop Chair

FCISIS-2019 Organizing Committee

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Message from VENOA-2019 International Workshop Organizers

Welcome to the 10th International Workshop on Virtual Environment and Network-Oriented Applications (VENOA-2019), which will be held in conjunction with the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019) from July 3rd to July 5th, 2019, at University of Technology Sydney (UTS), Sydney, Australia.

The past eight workshops were very successful, and many high-quality papers were presented and published in these workshops. We are pleased to announce the continuation of this workshop for serving as a forum for the exchange of information and ideas in the field of 3D computer graphics, virtual reality (VR), augmented reality (AR), mobile communications, IoT, and Web and network applications. We again received many unique and high-quality paper submissions in this workshop. We strictly followed the CISIS review procedures and finally selected excellent papers for publication and presentation. The program shows a variety of research activities with high relevance to the scope of the workshop.

This workshop cannot be organized without hard and excellent work of CISIS-2019 conference organizers. We would like to express our sincere appreciation to VENOA-2019 Program Committee Members and reviewers for their cooperation in completing their efforts under a very tight schedule. We also give our special thanks to all authors for their valuable contributions. We hope that these papers will have significant impacts and stimulate future research activities.

Yong-Moo Kwon
Hiroaki Nishino
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Message from SWISM-2019 International Workshop Organizers

Welcome to the 9th International Workshop on Semantic Web/Cloud Information and Services Discovery and Management (SWISM-2019), which is held in conjunction with the 13th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS-2019) from July 3rd to July 5th, 2019, at University of Technology Sydney (UTS), Sydney, Australia.

SWISM-2019 will bring together scientists, engineers, computer users, and students to exchange and share their experiences, new ideas, and research results about all aspects (theory, applications, and tools) of intelligent and semantic methods applied to Web- and Cloud-based systems, and to discuss the practical challenges encountered and the solutions adopted.

The program of SWISM-2019 includes papers related to information retrieval, ontologies, intelligent agents, intelligent techniques for management and programming of Cloud services and business processes. The program for the conference is the result of the excellent work of reviewers and Program Committee Members. We hope you will find the final program enriching and stimulating.

We believe that all the papers and topics will provide novel ideas, new theoretical and experimental results, and will stimulate the future research activities in this area.

The papers collected in this international workshop were carefully reviewed by reviewers. According to the review results, the Program Committee Members selected high-quality papers to be presented in this workshop.

We would like to express our sincere appreciation to all Program Committee Members for their cooperation. We are thankful to Honorary Co-Chairs, General Co-Chairs, Program Committee Co-Chairs, and Workshops Co-Chairs of CISIS-2019 for excellent conference organization. It was a great pleasure in working with them.

Last but not least, we are grateful to all authors for their valuable contributions and attendees who contributed to the success of the program with their papers and speeches on their research results, and with their participation in the conference.

We hope you will enjoy the workshop and conference and have a great time in Sydney, Australia.

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Beniamino Di Martino
Salvatore Venticinque
Antonio Esposito
SWISM-2019 Workshop Co-chairs

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Vincenzo Loia   University of Salerno, Italy

Welcome Message from HCCIEA-2019 International Workshop Chair

On behalf of the Organizing Committee, we would like to welcome you to the 6th International Workshop on Hybrid/Cloud Computing Infrastructure for E-Science Application (HCCIEA-2019) which will be held in conjunction with the 13th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS-2019) from July 3rd to July 5th, 2019, at University of Technology Sydney (UTS), Australia.

The workshop aims to promote research and development activities focused on E-science applications using distributed computing infrastructure, such as grid, Cloud computing, and hybrid system. With the rapid emergence of software systems and their applicability, the amount of data is growing exponentially. Existing computing infrastructure, software system designs, and use cases must take into account the enormity in volume of requests, size of data, and computing load. A complementary goal is to identify the open issues and the challenges to fix them, especially on security, flexibility, reliability, and privacy aspects.

Cloud computing has become a scalable services consumption and delivery platform in the field of services computing. Cloud is a platform or infrastructure that allows execution of code in a managed and elastic way. We want to put the emphasis of scientific and technologies progress on Cloud solutions and infrastructures, in particular concerning research activities on scalability and adaptability using effective scheduling for the virtualization.

All people involved in this workshop (authors and PC members) are researchers with high expertise, working on related research areas and projects. We are really grateful for their support, and we thank them for contributing their knowledge toward a successful event.

We would like to thank CISIS organizers for giving us the opportunity to organize HCCIEA Workshop series. We hope that the results of this event will advance the related research in multifold ways.

Olivier Terzo
HCCIEA-2019 chairs

HCCIEA-2019 Organizing Committee

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Welcome Message from IKIDW-2019 International Workshop Co-chairs

Welcome to the 1st International Workshop on Knowledge Creation and Innovation in Digital World (IKIDW-2019). The workshop will be held in conjunction with the 13th International Conference on Complex, Intelligent and Software Intensive Systems (CISIS-2019) at University of Technology Sydney, Australia, from July 3rd to July 5th, 2019.

The value of most organizations today greatly exceeds their net tangible assets. The IKIDW-2019 workshop aims to address contemporary issues in managing knowledge, intellectual capital, and other intangible assets in the digital world with the help of IT application. The digital era contributes to the amount of knowledge available in various qualities. This is a challenge for business people in strategic decision making. IT application is expected to reduce knowledge ambiguity so that it will improve the quality of organizational decisions. Beginning with a view that knowledge becomes strategic assets, the workshop will discuss the fundamentals of managing knowledge and intellectual capital, understanding some of the measurement issues, processes, and cycles involved in their management and the specific issues in managing knowledge, especially with the availability of big data and with the help of IT application.

We would like to express our sincere gratitude to the members of the Program Committee for their efforts. We thank the 13th International Conference on Complex, Intelligent, and Software Intensive Systems (CISIS-2019) for co-hosting IKIDW-2019. Most importantly, we thank all the authors for their submission and contribution to the workshop.

We hope all of you will enjoy IKIDW-2019 and find this a productive opportunity to exchange ideas with many researchers.

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Olivia Fachrunnisa
Ardian Adhiatma
IKIDW-2019 Workshop Co-chairs
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IKIDW-2019 Organizing Committee

Workshop Co-chairs

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Farookh Hussain   University of Technology Sydney (UTS), Australia
Omar Hussain   University of New South Wales, Canberra, Australia

CISIS-2019 Keynote Talks

Trust, Security and Privacy in Low-Cost RFID Systems

Wanlei Zhou

University of Technology Sydney, Sydney, Australia

Abstract. Radio Frequency Identification (RFID) enables the automatic identification of objects using radio waves without the need for physical contact with the objects. RFID has been widely used in various fields such as logistics, manufacturing, pharmaceutical, supply chain management, healthcare, defense, aerospace and many other areas, apart from touching our everyday lives through RFID enabled car keys, ePassports, clothing, electronic items and others. However, the wide adoptions of RFID technologies also introduce serious security and privacy risks as the information stored in RFID tags can easily be retrieved by any malicious party with a compatible reader. In this talk, we will introduce some trust, security and privacy challenges in RFID technologies, and based on our research, we will outline a number of schemes for authentication, ownership transfer, secure search and grouping proof in Low-cost RFID systems.

Intelligent Context Awareness in Internet of Agricultural Things

Nadeem Javaid

COMSATS University Islamabad, Islamabad, Pakistan

Abstract. Variability in climate and recession in water reservoirs, diminishing the agrarian sector ecosystem production day by day. There is an imperative requirement to restore robustness and ensure high production rate with the use of smart communication infrastructure. Moreover, the farmers will be able to make resource efficient decisions with the availability of modern monitoring systems like Internet of agricultural things (IoAT). However, the data generated through IoAT devices is disparate which needs to be handled intelligently to bring artificial intelligence (AI), machine learning (ML) and data analytic (DA) techniques into play. In this talk, we will recommend the intensive use of coordination between AI, ML and DA at middleware to optimize the performance of IoAT system along with context awareness. Additionally, it will enable horizontal functionality for diverse services to mitigate the problem of inter-operability. An analysis is carried out using TOWS matrix to consider the effects of internal and external factors on the performance of automation techniques collaboration. This analysis points out various opportunities to innovate the livelihood of agrarian society around the globe.

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Effect of Islamic Leadership on Teacher Performance Through It Intervention Competency

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Abstract. The purpose of this study is to analyze the effect of Islamic Leadership on Teacher Performance through Competency based on Information Technology (IT) Intervention and Quality of Work Life. This study used 100 teachers as a sample with Purposive Random Sampling. The result of this research showed that Islamic Leadership, Competency based on IT Intervention, and Quality of Work Life positively affect Teacher Performance. Based on data analysis, only Quality of Work Life on Teacher Performance which has no significant effect. However, Competency based on IT Intervention and Quality of Work Life cannot be considered as intervening variable in this research.

Keywords: Islamic leadership · Quality of work life ·
Competency based on IT intervention · Teacher performance

1 Introduction

Teachers play an important role in the development of education by building quality human resources (Leftwich 2009; Phillips 2011; Schweisfurth et al. 2018; Jones et al. 2014; Brautigam and Diolle 2009). The role of teachers in education is for human growth in all aspects: spiritual, intellectual, imaginative, physical, scientific, linguistic both individually and in groups (Aabed and Randall 2006; Dincer et al. 2015; Schweisfurth et al. 2018; Brannelly and Lewis 2011). Teacher performance is an achievement of a teacher in performing his duties and responsibilities that refers to teaching activities. Assessment of teacher performance is measured by individual teacher achievement, contribution to the learning process, student achievement, and graduates produced by the school (Clawson 2003).

Based on the Regulation of the Minister of National Education of the Republic of Indonesia No. 16 of 2007 concerning Teacher Competency Standards, it is stated that teacher competencies consist of pedagogical competence, personality competence, social competence, and professional competence. Assessment for the teacher performance can be said to be good if the teacher has all four competencies in carrying out his duties. Based on previous observations made by the authors in 3 Public Elementary Schools in Kudus, Central Java, Indonesia, the performance of elementary school teachers is still not optimal. The learning process conducted by teachers is still

conventional, the sense of morale is still lacking and there is still a lack of Teacher Competency Test (UKG) in 2015 for 20% of teachers in Kudus, Central Java, Indonesia, declared not to have passed the UKG test.

Leadership has an important role in changing human resources (Sarachek 1968; Asrar-ul-Haq and Anwar 2018; Schweisfurth et al. 2018). The ability to manage and empower the Principal must be improved in order to work up teacher performance. Islamic leadership plays a very big role in improving teacher performance because it has the principle that an ideal worker makes the *Qur'an* and *Hadith* as a source of knowledge. In addition, the quality of work life must be considered more than the organization (school) because it is seen as being able to work up the participation of the teacher towards the school itself.

2 Literature Review

2.1 Islamic Leadership

Islamic leadership is a leadership that is always guided by the Qur'an and Hadith as a leader. The principle of Islamic leadership in an organization is that employers and employees in carrying out their daily activities are always based on and imbued with Islamic values and culture (Ahmad and Ogunsola 2011; Schweisfurth et al. 2018). There are several leadership characteristics of the Prophet Muhammad who can be exemplary, they are, *Siddiq* (Honesty), *Amanah* (Trust), *Fathonah* (Intelligence), and *Tabligh* (Openness).

Research conducted on BMT (Sharia Cooperatives) employees in Temanggung, Central Java, Indonesia, *PT. Bank Syariah Mandiri, Tbk*, and *Rabbani* show a positive and significant influence between leadership and quality of work life. These results raise the suspicion of the influence of Islamic leadership on the performance, competence and quality of the teacher's work life.

H1: Islamic Leadership has a positive and significant effect on Teacher Performance.
H2: Islamic Leadership has a positive and significant effect on the Quality of Work Life.
H3: Islamic Leadership has a positive and significant effect on Competency based on IT Intervention.

2.2 Quality of Work Life

The Quality of Work Life is to change and improve one's performance so that the end result is as expected (Nursalam et al. 2018; Punch et al. 2019; Boyle et al. 2018). The quality of work life is a sense of satisfaction that teachers feel in participating school organizations (Swamy et al. 2015; Zubair et al. 2017).

There are several indicators that represent the Quality of Work Life variable, namely, health and well-being; job security; job satisfaction; competency development; and the balance of work and life; (Greenhaus et al. 2003; Amstrong 2006; Sarmiento et al. 2004).

H4: Quality of Work Life has a positive and significant effect on Teacher Performance.

2.3   Competency Based on IT Intervention

Competency based on IT Intervention is an ability possessed by a teacher in carrying out his professional duties which will have an effect on the quality of education (Leijen et al. 2016; Nursalam et al. 2018). There are also two types of competence, namely visible competencies and hidden competencies (Sanchez and Lehnert 2019).Teachers must fulfill four basic competencies according to Minister of Education Regulation No. 16. 2007, they are, Pedagogic Competence, Personality Competence, Social Competence, and Professional Competence (Bersh 2018; Greene et al. 2012; Glăser-Zikuda and Fu$^\beta$ 2018).

H5: Competency based on IT Intervention has a positive and significant effect on Teacher Performance.

2.4   Teacher Performance

Teacher performance is a process of interaction carried out by the teacher in his work environment must be in accordance with predetermined criteria. Based on the Regulation of the Minister of National Education of the Republic of Indonesia No. 16 of 2007 concerning Academic Qualification Standards and Teacher Competencies, there are five indicators that are able to build Performance variable, namely, Quality of Work, Quantity of Work, Timeliness, Attendance, and Ability to Cooperate. In addition, there are several factors that can influence a person's performance, namely, individual factors related to expertise, leadership factors related to the quality of group factors/co-workers, system factors related to systems/work methods, situation factors related to environmental change.

3   Research Model

Based on the analysis of the literature review and the results of previous studies which gave rise to allegations between variables with one another, then it was described in the empirical model of the study as follows (Fig. 1):
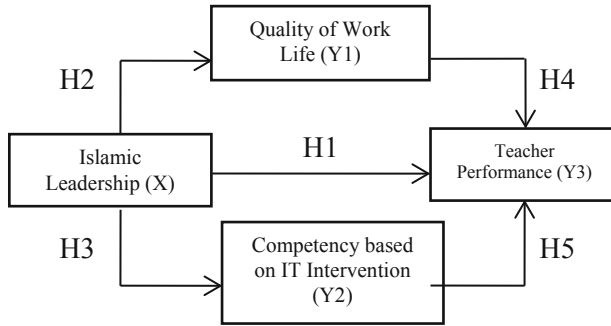
Fig. 1. Empirical Research Model

4   Research Method

The population of this study is the public elementary school teacher in Kudus, Central Java, Indonesia, which consists of 129 teachers. Respondents used in the study amounted to 100 teachers with the sampling technique used was Purposive Random Sampling. The sample characteristics that will be used in this study consist of the status of teacher positions taken by permanent employees, principals and teachers must be Muslim, work experience of at least 2 years, ages 22–60 years, and final education at least Diploma (Undergraduate).

5   Finding and Discussion

5.1   Findings

Based on the test results, the field research data shows that the research data in this study was valid and reliable. The data in this study also showed that there were no symptoms of multicollinearity which meant that there was no high correlation in the three regression models of this study. Linearity testing on the three research regression models also states that it meets linearity assumptions which means the regression model is considered correct.

The data of the study also carried out heteroscedasticity testing showed that the three regression models of this study has no heteroscedasticity and normal so that both models were used for forecasting (estimation). F Hypothesis test aims to test the significance of the regression coefficients of independent variables (X, Y1, and Y2) simultaneously on the dependent variable (Y3) that the three regression models of this study show significant results. That means there is a significant relationship among variables in each regression model (Table 1).

Table 1. Test of path analysis

Analysis of the Effect of Islamic Leadership (X) on Teacher Performance (Y3) through Quality of Work Life (Y1)		Analysis of the Effect of Islamic Leadership (X) on Teacher Performance (Y3) through Competency based on IT Intervention (Y2)	
P1	P2 × P4	P1	P3 × P5
0,228	0,369 × 0,097 = 0,036	0,228	0,247 × 0,292 = 0,072
Total influence: P1 + (P2 × P4) = 0,264		Total influence: P1 + (P3 × P5) = 0,300	
P1 > (P2 × P4) Quality of Work Life (Y1) cannot be an intervening variable		P1 > (P3 × P5) Teacher competency (Y2) cannot be an intervening variable	

Source: Primary Data processed, 2017.

Table 2. Summary of calculation results and data processing

Regression model	Stand. Coef.	F_{-count}	Sig. F	R	R^2	Status	Hypothesis	T_{count}	Sign. T	Status
Regression I:		8,052	0,000	0,448	0,176	Sign.	**H1** (X → Y3)	2,261	0,026	Positive and Sign
Constant **Islamic Leadership (X)**	0,228									
Quality of Work life (Y1)	0,097									
Competency based on IT Intervention (Y2)	0,292									
The equation of the linear regression model I: Y3 = b1 X + b2 Y1 + b3 Y2 + e Y3 = 0.228 X + 0.097 Y1 + 0.292 Y2							**H2** (X → Y1)	3,929	0,000	Positive and Sign
Regression II:		15,439	0,000	0,369	0,136	Sign.	**H3** (X → Y2)	2,519	0,013	Positive and Sign
Constant **Islamic Leadership (X)**	0,369									
The equation of the linear regression model II: Y1 = b1 X + e Y1 = 0.369 X + e							**H4** (Y1 → Y3)	0,987	0,326	Positive and not Sign
Regression III:		6,345	0,013	0,247	0,061	Sign.	**H5** (Y2 → Y3)	3,099	0,003	Positive and Sign
Constant **Islamic Leadership (X)**	0,247									
The equation of the linear regression model III: Y2 = b1 X + e Y2 = 0.247 X + e										

Source: Primary Data processed, 2017.

5.2   Discussion

5.2.1   The Effect of Islamic Leadership on Teacher Performance

Table 2 explains that hypothesis 1 has a positive and significant effect between Islamic leadership (X) on teacher performance (Y3), meaning that teacher performance will increase if the implementation of Islamic leadership style carried out by the Principal is also improved. Indicators of Islamic leadership that include the Principal's honesty attitude, trust possessed by the Principal in leading, intelligence, and the Principal's openness toward teachers. Indicators of teacher performance include the quality of work, quantity of work, the timeliness of the teacher in carrying out his duties and responsibilities as an educator, the presence of the teacher, and also the ability to cooperate between coworkers and the Principal.

5.2.2   The Effect of Islamic Leadership on the Quality of Work Life

Table 2 shows that the second hypothesis is accepted, meaning that there is a positive and significant influence between Islamic leadership on the quality of work life. The implication is that if the intelligence of a Principal improved, it will work up the health and well-being of a teacher. If the Principal's attitude of openness is enhanced in the work environment, it will have a good effect on job security and the development of a teacher's competence. An increase in the Principal's sense of trust is also able to increase the sense of job satisfaction for the teachers. In addition, the high attitude of honesty of the Principal will increase the balance of time between work and life for a teacher.

5.2.3   The Effect of Islamic Leadership on Teacher Competency Based on IT Intervention

Based on the results of the t-test in Table 2 show that the third hypothesis is accepted. This means that this study found a positive and significant effect between Islamic leadership on competency based on IT Intervention. If a school principal has a high level of honesty, the teacher's personal competence is expected to increase due to the awe that arises from within the teacher to the principal. The high trust level of the Principal to the teachers is expected to be able to improve teacher professional competence related to the development of IT in work. The high intelligence possessed by the principal is expected to be able to help the teachers to improve pedagogical competence and IT development in work, namely, by sharing ideas and opinions. A high level of openness from the principal will be able to improve the teacher's social competence by establishing harmonious relationships between principal, teacher, students, and guardians of the student.

5.2.4   Effect of Quality of Work Life on Teacher Performance

The t-test results in Table 2 conclude that the fourth hypothesis in this study was rejected, which means that there is no significant effect between the Quality of Work Life and Teacher Performance because a teacher working in a Public Elementary School is required to always perform high under any conditions. These demands are considered to be the responsibility of Public Elementary School as institutions that operate in the field of public services, namely education services. These results have

similarities with the results obtained by Pamungkas (2016) on the employees of the Central Bureau of Statistics in Yogyakarta, Indonesia. Although institutionally under the auspices of the Ministry of Education and Culture (*Kemendikbud*) continues to strive to improve the Quality of Work Life of a teacher, the teachers already have high self-awareness to remain and improve their performance as well as possible. The results of this study indicate that all public elementary school teachers are highly dedicated as educators to remain high-performing under any conditions.

5.2.5   The Effect of Competency Based on IT Intervention on Teacher Performance

The t-test results in Table 2 conclude that the fifth hypothesis is accepted, meaning that it has similarities with the real conditions in the field. The teacher professional competence which is supported by the ability of IT development must be applied as well as possible and improved to be able to have a positive impact on the quality and quantity of teacher performance in an organization. The demand to improve social competence in its environment aims to increase empathy and concern for others both in the work environment, family environment, and community environment. The well-established communication will be able to improve the quality of the teacher's work in communicating and having good relations with human beings on this earth.

6   Conclusion

The results of this study indicate a positive effect between Islamic leadership on the quality of work life, competency based on IT interventions, and teacher performance. Only the relationship between the Quality of Work Life on Teacher Performance that has insignificant results. This also provides a solution related to the still less optimal performance of Public Elementary School teachers in Indonesia, namely, the application of Islamic Leadership by Principal. This study suggested that the Principal should improve the application of Islamic Leadership styles in Public Elementary School. The form of leadership style must be based on honesty and intelligence. This study used only one independent variable, namely Islamic Leadership variable, resulting in a low effect percentage on the Quality of Work Life, teacher's competency based on IT intervention, and Teacher Performance. For future researchers, it is recommended to use other variables, such as inspirational motivation and knowledge management. In addition, data collection methods not only use the questionnaire method but also can use the interview method in order to obtain detailed and more accurate information as research material.

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