The Influence between GIS Quality and user Satisfaction towards Individual Work Performance: A Proposed Conceptual Framework.

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Abstract— In this Industrial Revolution 4.0 (IR 4.0) era, information systems are widely used by organizations to understand and plan their operations efficiently. One of the trends used in organizations is the Geographical Information System (GIS). GIS is meant to be an element of location intelligence where it is viewed as a tool for organizations to visualize, understand, and analyze data. GIS benefits users in understanding data efficiently with minimal cost and improving work performance. However, based on extensive review of past literature, it was found the understanding of GIS quality is dwarfed when the antecedents and outcome of that phenomenon is not addressed in a single study. Hence, this study will focus on the ISO 25010 model as a base in measuring the quality of GIS application. Therefore, this paper aims to propose a conceptual framework to identify the influence between GIS quality, user satisfaction, and later investigate the effect of user satisfaction towards individual work performance. In essence, it is hoped that the proposed framework will help shed light on the antecedents that could be measured and considered to improve GIS quality, user satisfaction and individual work performance in any organization.

Keywords—GIS, Software Quality, ISO 25010, GIS Quality, User Satisfaction, Individual Work Performance.

I. INTRODUCTION

The exploration of technology has constantly modernized with new ideas and innovations. The world of information systems (IS) covers wide fundamentals consisting of computers, software, internet, databases, communication, mobile devices, and much more. The establishment of information systems were formed to assist and perform specific tasks, including interacting between various stakeholders inside and outside an organization [1]. Through the decade, location-based applications namely Geographical Information System (GIS) were introduced that focus on data capture, store, manage, analyze and present all forms of geographically referenced information that are identified according to locations.

According to [2], GIS focuses on spatial and attribute information, capable of doing analysis, and producing outputs. Interestingly, GIS comes with its own visualization platform. In addition, from the visualization output, GIS is able to relate spatial contexts, answer and solve challenges by looking at data in a way that is inferred and easily shared [2]. Knowing GIS as a technical software solution which requires specific knowledge and skills, there are lots of criteria to be considered before using it. GIS was so complex in operating it especially for non-GIS users [3]. This directly impacted the image of GIS as one of the visualization platforms. In several situations, GIS were affected by the user's perception of the relevancy and updated version of information which directly impacted the quality of output analysis [4]. Therefore, this paper aims with a motivation in identifying the real situation from the user's points of views on the quality of GIS available in the market. Through identifying the quality aspects needed in GIS, it was hoped that the players in the GIS industry would be able to produce more user-friendly solutions and better experience for the users.

II. BACKGROUND OF THE STUDY

The discussion of software quality is critical and important. The view of software quality in the scholar's context was as an assessment to validate the ability on the software to be accepted and functioning well for the user and organization. The quality of software provided in the market is very crucial from a business operation perspective [5]. As the evaluation of GIS quality can be very subjective, this study focuses on the standard that has been developed by the International Organization of Standardization (ISO) namely ISO-25010 Software Quality Model. ISO-25010 is an established model to measure the quality of software that was used by an organization or individual [6]. Even though the model was established in 2011, the relevancy and validity of the model made it still being used in most of the studies [5].

International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (E-ISSN 2250-2459, Scopus Indexed, ISO 9001:2008 Certified Journal, Volume 11, Issue 12, December 2021)

III. LITERATURE REVIEW

A. *Geographical Information System (GIS)*

A simple definition from [7] defined GIS solution as a tool that is able to drive business insights from geospatial information. The software provides specific functionalities, maps, data, and analytical capabilities to solve real-world problems, and for some cases it specifically able to solve business problems. In addition, the capabilities provided in GIS empower its users to make innovation in the way of completing tasks [8]. The way GIS works is different from other software available in the market. Techniques, approaches, and methods associated with the concepts utilizing geographic information and their use in the context of business makes GIS unique [9]. Spatial information refers to details of information that have the ability to be mapped, and other associated information that provide context and meaning [7]. It can represent the locations and shapes of geographic features and the relationships between them. GIS has the ability to integrate common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. Furthermore, GIS is the base foundation of location intelligence that has become a fundamental knowledge and concept in translating information as assistance in developing understanding for its users [10]. It is proven that GIS able to functions as problem solver to most industries nowadays [11]. Hence, by having clear visualization of information combined with spatial data, it was able to produce different perspectives of solutions especially in decision making [8].

B. *Software Quality*

Over the decades there has been a lot of software developed and introduced in assisting daily life and businesses. Hence, this paper focused on measuring the antecedents of software quality that influence user satisfactions in developing high individual work performance. Software quality is defined as measurement of software which are able to please and meet the needs of users [6]. Many quality models have been developed and introduced in the event of trying to quantify the quality of a software [5]. Despite the evolution of the software quality model, various models were introduced such as by McCall (1977), Boehm (1978), Dromey (1995), FURPS model, ISO-9126 (2001) Software Quality Model and the most updated standard follow by the industry is ISO-25010 Software Quality Model.

Therefore, as current standards were referred to by most researchers, ISO-25010 software quality will be the foundation of establishment of GIS quality in this study.

IV. PROPOSED FRAMEWORK ON THE INFLUENCE BETWEEN GIS QUALITY AND USER SATISFACTION TOWARDS INDIVIDUAL WORK PERFORMANCE

The study proposed to have a clear evaluation of software quality where ISO 25010 to be the base in GIS quality. Level of user satisfaction was intended to be measured and expected to be directly influence individual work performance. The evaluation of GIS quality is crucial to ensure the solutions giving benefits to the organizations and users. Through brief evaluation elements constructed as best practice, ISO 25010 of software quality model can be the best setting in measuring GIS without bias. Hence, the characteristics of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability are the primary indicators in determining the quality of GIS. GIS quality is predicted to have influence with user satisfaction and with individual work performance.

All of the main characteristics will be measured through sub-characteristics to be as items in this study. Through this approach, the context of software quality will be measured according to the standard that has been set in ISO 25010. Furthermore, for this study, the inclusion of user satisfaction should be able to determine the acceptance of GIS to be a suitable solution and directly impact individual work performance. The expected scale to be used for this study will be based on seven-point Likert scale from one, strongly disagree to seven strongly agree. According to [12], the Likert scale were designed to measure how strongly the respondents agree with the statements. By having the scales, it is hope that the multiple options will able to give clearer understanding respondents points of view for this study.

Hence, apart from rectifying the knowledge gap, it is hoped to provide comprehensive understanding on the furtherance of GIS solutions development. Figure 1 show the proposed conceptual framework.

Figure 1: Proposed Framework On The Influence Between Gis Quality And User Satisfaction Towards Individual Work Performance

A. GIS Quality

The evolution of software quality extended year by year as the growth of technology and software. Hence the evolution in measuring software quality has become a challenge especially in determining the best quality model to be used [13]. The journey of ISO 25010 originated from the version of ISO 9126 and has been through revision and updates [13]. ISO 25010 consists of functional suitability, efficiency, compatibility, usability, reliability, security, maintainability and portability. Each one of the characteristics has its own sub-characteristics. The updates for ISO 25010 consist of adding security and compatibility as new characteristics in software quality. According to [14] the establishment of security and compatibility to be new characteristics in measuring software quality were derived from various studies through the ISO 9126. Hence, the revisions and update made strong justification on security and compatibility to be as characteristics in ISO 25010.

The evaluation of GIS quality is crucial to ensure the solutions giving benefits to the organizations and users. Through brief evaluation elements constructed as best practice, ISO 25010 of software quality model can be the best setting in measuring GIS without bias. Hence, the characteristics of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability are the primary indicators in determining the quality of GIS. All of the main characteristics will be measured through sub-characteristics to be as items in this study.

For the first characteristic, functional suitability refers to completeness, correctness and appropriateness of the software to accomplish the specific objective. In this context, the evaluation will review the completeness of the software to provide required functions, providing correct outputs and appropriate to be used from the user's context. Table I shows the sub-characteristics of functional suitability.

TABLE I

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
1	Functional Suitability	<ul style="list-style-type: none"> Functional Completeness Functional Correctness Functional Appropriateness

The second characteristics are performance efficiency where element of time behaviour, resource utilization and capacity. GIS is a software that always faces the issue of time behaviour and requires an amount of time to process the data due to the size of data normally processed by GIS [15]. It will require additional resource utilization and capacity of storage when operating the software [16]. Table II shows the sub-characteristics of performance efficiency.

TABLE II

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
2	Performance Efficiency	<ul style="list-style-type: none"> Time Behaviour Resource Utilization Capacity

The third characteristics are compatibility which refers to co-existence and interoperability. The terms of co-existence refer to the ability of the software to function without jeopardizing other software. It is able to work together in the same environment while interoperability means the ability of the software to have two-way communication either to exchange or to retrieve information from other systems [17]. Table III shows the sub-characteristics of compatibility.

International Journal of Emerging Technology and Advanced Engineering

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TABLE III

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
3	Compatibility	<ul style="list-style-type: none"> • Co-Existence • Interoperability

The fourth characteristics are usability consisting of appropriateness recognizability, learnability, operability, user error protection, user interface aesthetics and accessibility. The evaluation in usability is the interpretation from users that the software is able to meet their needs, easy to learn and operate, able to protect the user from making errors, having good experience and able to be used for different purposes [13]. Table IV shows the sub-characteristics of usability.

TABLE IV

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
4	Usability	<ul style="list-style-type: none"> • Appropriateness Recognizability • Learnability • Operability • User Error Protection • User Interface Aesthetics • Accessibility

The fifth characteristic is reliability consisting of maturity, availability, fault tolerance, and recoverability. The sub-characteristics in reliability refers to the software being always available, operational and accessible to be used at any time [18]. In addition, the software must be able to function even if there were minor errors from the hardware or software. Through this event, the evaluation of recoverability refers to the ability of the software to retrieve all activities back before the errors occur. Table V shows the sub-characteristics of reliability.

TABLE V

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
5	Reliability	<ul style="list-style-type: none"> • Maturity • Availability • Fault Tolerance • Recoverability

The sixth characteristic is security where the sub-characteristics consist of confidentiality, integrity, non-repudiation, accountability and authenticity. The software must be able to manage the confidentiality of access according to rights, no modification of data can be made, authentication of the user can be managed and the accountability of change can be identified. Table VI shows the sub-characteristics of security.

TABLE VI

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
6	Security	<ul style="list-style-type: none"> • Confidentiality • Integrity • Non-Repudiation • Authenticity • Accountability

The seventh characteristic is maintainability. The sub-characteristics consist of modularity, reusability, analyzability, modifiability, and testability. All of the sub-characteristics were referred to as able to be maintained even after some of components not working, the ability to be used for another department, able to analyze the impact when errors occur, any modification can be made to fulfil user need and it can be easily tested once modifications were made. Table VII shows the sub-characteristics of maintainability.

TABLE VII

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
7	Maintainability	<ul style="list-style-type: none"> • Modularity • Reusability • Analysability • Modifiability • Testability

The last component in GIS quality is portability which refers to the component of hardware and software that can be transferred for the purpose of operation or environment [19]. The sub-characteristics of portability consist of adaptability, installability and replaceability.

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The three sub-characteristics were referred to as the ability of the software to be adapted with different operational or usage environments, the efficiency of installing or uninstalling the software and the ability to replace other software in the organization. Table VIII shows the sub-characteristics of portability.

TABLE VIII

No	GIS Quality (ISO 25010)	
	Main Characteristics	Sub-Characteristics
8	Portability	<ul style="list-style-type: none"> • Adaptability • Installability • Replaceability

B. User Satisfaction

Measuring user satisfaction is subjective and depending on individual preferences [20]. One of the goals in system or software implementation is to give satisfaction to the users. The most popular understandings in information systems are by [21] where the measurement of user satisfaction in the IS success model focusing on flexibility, reliability and usefulness of the application [22]. According to [23], the characteristics of user satisfaction were namely usefulness, trust, pleasure and comfort. The definition of satisfaction refers to the ability of the software to be able to meet the requirements and make improvement from the existing effort [24]. According to [25] user satisfaction is where the perceptions from users that the software able to produce expected results. The higher the quality of output produced by the software, the higher level of satisfaction from the user [26].

The discussions on perceptions of usefulness of GIS were questions whether GIS fit to be used by non-technical areas [13]. Hence, by looking at the perception of usefulness, it is able to clear the understanding of usefulness thought from the users. The second characteristic is trust. The definition of trust is the set of beliefs that users hold that influence them to use and believe the results of use [27]. The context of trust for this study consists of trust towards feature, functionality and ability of GIS to work with users' needs. Lack of trust has been identified as a big issue hampering any GIS implementation [28]. Hence, it is important to ensure trust is in place so that users have strong beliefs that GIS are able to perform as per user expected. The third characteristic is the pleasure in using GIS.

Pleasure in GIS are situations where users evaluate through experience in using the application [29]. Pleasure is the experience that occurs when users use GIS throughout the application. This experience can be affected by the internal or external characteristics of the applications [30].

In addition, comfort experience in using the software will be one of the motivations to use the software regularly [31]. Hence, satisfaction from users' context was the perception of GIS usefulness, trust towards GIS, pleasure and level of comfort when using it. As there were many previous studies that extensively investigated user satisfaction in the information systems field, GIS quality was a grey where measuring level of user satisfaction are subjective. Therefore, the measurement areas of user satisfaction in this study were referring to the impact towards happiness using the system, trusted output produced from the system and importantly making improvement on the productivity.

C. Individual Work Performance

One of the important aspects in measuring the success of software implementation was through measuring individual work performance [32]. Individual work performance is a concept in measuring quality produced by individuals. Individual work performance is defined as actions or behaviors of individuals made in achieving goals [33]. In addition, performance is defined as a high result of work efficiency, effectiveness, and quality of work [34]. The higher an individual's performance will result from satisfaction and mastery regarding personal tasks or jobs [35]. However, none of the existing instruments can measure all the relevant aspects of individual work performance [33].

The proposed conceptual framework involved individual work performance where it worked to be a dependent variable where the GIS quality and user satisfaction can be measured directly to understand the influence from other variables. There are two characteristics where the measurement will be looked at: task performance and adaptive performance. Task performance can be defined as proficiency or ability to perform the core or central tasks of the job [33]. It consists of planning and organizing, completing jobs, solving problems, and keeping knowledge up to date. Meanwhile, the concept of adaptive performance is defined as the ability of individuals to adapt dynamically and fast to work situations and challenges [36].

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Through the ability to adapt with the situation, individuals will perform by producing new ideas to deliver the task, fast analysing the problems, producing innovative ways in implementing tasks, and being flexible on the tasks. Successful adaptive performance implies that employees are able to efficiently deal with uncertain and unpredictable work situations that may, for example, arise from organizational restructuring, a change in priorities, or the lowered availability of resources [37].

V. CONCLUSION

In conclusion, we have discussed the characteristics that influence quality of a software, user satisfaction and individual work performance. This study is expected to produced specific outcomes:

- It is hoped that the proposed framework is expected to provide understanding on the quality characteristics needed in GIS.
- To have an understanding on the level of user satisfaction from GIS quality context.
- To measure the influence of GIS quality towards individual work performance
- Through the exploration of understanding qualities required in GIS, it is also hoped that this proposed framework can contribute to the body of knowledge.
- It is hoped this study can be applied in the GIS research area so that the quality of GIS can be improved for the benefits of GIS community.
- By doing so, it also hopes that negative perception towards GIS can be eliminated and the solution can be fully utilized by users especially in improving performance and productivity.

REFERENCES

- [1] Boell, S. K., and Cecez-Kecmanovic, D. 2015. What is an Information System? 2015 48th Hawaii International Conference on System Sciences.
- [2] Farkas, G. 2017. Applicability of open-source web mapping libraries for building massive Web GIS clients. *Journal of Geographical Systems*, 19(3), 273–295
- [3] Zhou, C., Su, F., Pei, T., Zhang, A., Du, Y., Luo, B., Cao, Z., Wang, J., Yuan, W., Zhu, Y., Song, C., Chen, J., Xu, J., Li, F., Ma, T., Jiang, L., Yan, F., Yi, J., Hu, Y., and Xiao, H. 2020. COVID-19: Challenges to GIS with Big Data. *Geography and Sustainability*, 1 (1), 77–87.
- [4] Moon, M., Zhang, X., Henebry, G. M., Liu, L., Gray, J. M., Melaas, E. K., and Friedl, M. A. 2019. Long-term continuity in land surface phenology measurements: A comparative assessment of the MODIS land cover dynamics and VIIRS land surface phenology products. *Remote Sensing of Environment*, 226, 74–92.
- [5] Wahyuningrum, T., and Mustofa, K. 2017. A systematic Mapping review of software Quality Measurement: Research Trends, model, and method. *International Journal of Electrical and Computer Engineering (IJECE)*, 7(5), 2847.
- [6] Nistala, P.V., Nori, K.V., and Reddy, Y. 2019. Software Quality Models: A Systematic Mapping Study. 2019 IEEE/ACM International Conference on Software and System Processes (ICSSP), 125-134.
- [7] Martindale, J. 2021. Research Guides: Mapping and Geographic Information Systems (GIS): What is GIS? Research Guides University of Wisconsin-Madison Libraries. Retrieved December 10, 2021, from <https://researchguides.library.wisc.edu/GIS>
- [8] Arshad, Y. B., bin Mohd Sani, M. S., and Binti Syed Ibrahim, S. N. 2018. Geographical Information System (GIS) as an Innovative Adoption to Ease Customers in Locating SME Business Premises in Malacca. *MATEC Web of Conferences*, 150, 05045.
- [9] Viana, M., Abrantes, C., and Rocha, J. 2019. Introductory chapter: Geographic information systems and science. *Geographic Information Systems and Science*.
- [10] Chen, S. Y., and Lu, C. C. 2016. A Model of Green Acceptance and Intentions to Use Bike-Sharing: YouBike Users in Taiwan. *Networks & Spatial Economics*, 16 (4), 1103-1124.
- [11] Skopenko, N., and Yevsieieva-Severyna, I. 2020. Modern Information Systems and Technologies Implementation in Management for Increasing Competitiveness of Enterprises. *Scientific Works of National University of Food Technologies*, 26(4), 58–70.
- [12] Sekaran, U., and Bougie, R. 2016. Research methods for business a skill-building approach. John Wiley & Sons.
- [13] Peters, E., and Aggrey, G. K. 2020. An ISO 25010 Based Quality Model for ERP Systems. *Advances in Science, Technology and Engineering Systems Journal*, 5 (2), 578–583.
- [14] Saptarini, I., Rochimah, S., and Yuhana, U. L. 2017. Security Quality Measurement Framework for Academic Information System (AIS) Based on ISO/IEC 25010 Quality Model. *IPTEK Journal of Proceedings Series*, 0 (2), 128.
- [15] Anugrah, W., Suryono, S., and Endro Suseno, J. 2018. Real-time Geographic Information System (GIS) for Monitoring the Area of Potential Water Level Using Rule Based System. *E3S Web of Conferences*, 31, 11019.
- [16] Richta, T. 2006. Issues of GIS data management. *Geoinformatics FCE CTU*, 1, 56–63.
- [17] Estdale, J., and Georgiadou, E. 2018. Applying the ISO/IEC 25010 Quality Models to Software Product. *Communications in Computer and Information Science*, 492–503.
- [18] Haoues, M., Sellami, A., Ben-Abdallah, H., and Cheikhi, L. 2016. A guideline for software architecture selection based on ISO 25010 quality related characteristics. *International Journal of System Assurance Engineering and Management*, 8(S2), 886–909.
- [19] Hovorushchenko, T., and Pomorova, O. 2016. Evaluation of mutual influences of software quality characteristics-based ISO 25010:2011. 2016 XIth International Scientific and Technical Conference Computer Sciences and Information Technologies (CSIT).

International Journal of Emerging Technology and Advanced Engineering

Website: www.ijetae.com (E-ISSN 2250-2459, Scopus Indexed, ISO 9001:2008 Certified Journal, Volume 11, Issue 12, December 2021)

- [20] Angelova, B., and Zekiri, J. 2011. Measuring Customer Satisfaction with Service Quality Using American Customer Satisfaction Model (ACSI Model). *International Journal of Academic Research in Business and Social Sciences*, 1 (3), 27.
- [21] Delone W.H. and McLean E.R., 2003. The DeLone and McLean model of information systems success: a ten-year update. *J Manag Inf Syst* 19(4):9–30.
- [22] Bano, M., Zowghi, D., and Rimini, F. 2016. User satisfaction and system success: an empirical exploration of user involvement in software development. *Empirical Software Engineering*, 22(5), 2339–2372.
- [23] Gao, M., Kortum, P., and Oswald, F. 2018. Psychometric Evaluation of the USE (Usefulness, Satisfaction, and Ease of use) Questionnaire for Reliability and Validity. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 62(1), 1414–1418.
- [24] Latief, Y. 2012. The Influence of Software Quality Human Resources Information System and User Participation Toward User Satisfaction as System User. *Business and Entrepreneurial Review*, 11(2), 139.
- [25] Rahrouh, M., Taleb, N., and Mohamed, E. A. 2018. Evaluating the usefulness of e-learning management system delivery in higher education. *International Journal of Economics and Business Research*, 16(2), 162.
- [26] Pratiwi, W. 2021. Effect of Accounting Information Systems, System Quality and Service Quality on User Satisfaction of Mobile Banking-Based Applications. *Journal of Economics, Finance and Management Studies*, 04(05)
- [27] Meziane, F., and Kasiran, M. K. 2008. Evaluating trust in electronic commerce: A study based on the information provided on merchants' websites. *Journal of the Operational Research Society*, 59(4), 464–472.
- [28] Truong, N. B., Lee, H., Askwith, B., and Lee, G. M. 2017. Toward a Trust Evaluation Mechanism in the Social Internet of Things. *Sensors*, 17(6), 1346.
- [29] Lew, P., Zhang, L., and Olsina, L. (2010). Usability and user experience as key drivers for evaluating GIS application quality. 2010 18th International Conference on Geoinformatics.
- [30] Roth, R. 2017. User Interface and User Experience (UI/UX) Design. *Geographic Information Science & Technology Body of Knowledge*, 2017 (Q2).
- [31] He, D., Melumad, S., and Pham, M. T. 2018. The Pleasure of Assessing and Expressing Our Likes and Dislikes. *Journal of Consumer Research*, 46(3), 545–563.
- [32] Widyastuti, T., and Hidayat, R. 2018. Adaptation of Individual Work Performance Questionnaire (IWPQ) into Bahasa Indonesia. *International Journal of Research Studies in Psychology*, 7(2).
- [33] Koopmans, L., Coffeng, J. K., Bernaards, C. M., Boot, C. R., Hildebrandt, V. H., de Vet, H. C., and van der Beek, A. J. 2014. Responsiveness of the individual work performance questionnaire. *BMC public health*, 14, 513.
- [34] Goodhue, D., and Thompson, R. L. 1995. Task-technology fit and individual performance. *MIS Quarterly*, 19, 213–236.
- [35] Sonnentag, S., Volmer, J., and Spychala, A. 2008. Job Performance. *The SAGE Handbook of Organizational Behavior: Volume I - Micro Approaches*, 427–448.
- [36] Park, Y., Lim, D. H., Kim, W., and Kang, H. 2020. Organizational Support and Adaptive Performance: The Revolving Structural Relationships between Job Crafting, Work Engagement, and Adaptive Performance. *Sustainability*, 12(12), 4872.
- [37] Loughlin, E. M., and Priyadarshini, A. 2021. Adaptability in the workplace: Investigating the adaptive performance job requirements for a project manager. *Project Leadership and Society*, 2, 100012.