VIETNAM NATIONAL UNIVERSITY, HANOI
VNU UNIVERSITY OF ENGINEERING AND TECHNOLOGY

SOCIALISTREPUBLIC OF VIETNAM
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INFORMATION ON DOCTORAL THESIS

1. Full name: Nguyen Tho Thong 2. Sex: Male

3. Date of birth: 05/06/1989 4. Place of birth: Ha Noi

5. Admission decision number:778/QĐ-CTSVDated:21/08/2017

6. Changes in academic process:

Changing thesis title (26/8/2019):

- Old title: Developing of Fuzzy geographically weighted clustering algorithms in the field of urban development

- New title: Developing Decision-Making Models in Dynamic Environment Based On Neutrosophic Set.

7. Official thesis title: Developing Muticriteria Decision Making Models using Dynamic Interval Neutrosophic Set

8. Major: Information Systems 9. Code: 9480104.01

10. Supervisors:

- Supervisor 1: Assoc. Prof. PhD. Nguyen Dinh Hoa
- Supervisor 2: PhD. Do Duc Dong

11. Summary of the **new findings** of the thesis:

The thesis has achieved some main results as follows:

Firstly, the thesis proposes an extended theory of neutrosophic set called dynamic interval-valued neutrosophic set (DIVNS) where all the factors in DIVNSs such astruth, indeterminacy and falsity degrees are in different ranges oftime. Mathematical operations associated with DIVNSs andcorrelation coefficients have also been defined. In addition, the thesis has developed anextended TOPSIS (Technique for OrderPreference bySimilarity to IdealSolution) method based on the DIVNS and a practical application of the method for ranking students' performance is given to illustrate the efficiency of the approach.

Secondly, the thesis presents the ways to solve the problems about unknown weight information of MCDM problems in dynamic interval-valued neutrosophic environments. Therein, weights of time, decision maker and criteria is considered. An extend TOPSIS-DIVNS method under dynamic interval-valued neutrosophic set with unknown weightinformation in the dynamic neutrosophic environment is established and applied to rank students' performance. The thesis introduced a new modification of Choquet aggregation operator under the Dynamic inteval-valued neutrosophic environment in which the interdependency betweencriteria are observed and two score function have also been defined for DIVNSs. Furthermore, the thesishas presented a decision making method based on proposed theories and have testedits potential application by rankingstudents' performance.

Thirdly, the thesis proposes an extended DIVNS called Generalized Dynamic Interval-ValuedNeutrosophic set (GDIVNS) to deal with change of criteria, alternatives, decision makers during time and historical data. their Mathematical operators on GDIVNSs have been proposed. Furthermore, based on mathematical operators in GDIVNS (definitions and weighted aggregation operators), a framework of Dynamic TOPSIS is introduced in dynamic neutrosophic environment. The proposed method is applied for ranking students to illustrate the efficiency of the approachunder dynamic neutrosophic environment.

12. Practical applicability, if any: .....

13. Further research directions, if any: .....

14. Thesis-related publications:

[NTThong1] **Thong, N. T.**, Dat, L. Q., Son, L.H., Hoa, N. D., Ali, M., & Smarandache, F. (2019). Dynamic interval valued neutrosophic set: Modeling decision making in dynamic environments. Computers in Industry, 108, 45-52. (SCIE, 2019, IF = 3.954).

[NTThong2] **Thong, N. T.**, Giap, C. N., Tuan, T. M., Chuan, P. M., Hoang, P. M., & Dong, D. D. (2020). Modeling multi-criteria decision-making in dynamic neutrosophic environments bases on Choquet integral. Journal of Computer Science and Cybernetics, 36(1), 33-47.

[NTThong3] **Thong, N. T.**, Lan, L. T. H., Chou, S. Y., Son, L. H., Dong, D. D., & Ngan, T. T. (2020). An Extended TOPSIS Method with Unknown Weight Information in Dynamic Neutrosophic Environment. Mathematics, 8(3), 401. (SCIE, 2019, IF = 1.747).

[NTThong4] **Thong, N.T.**, Smarandache, F., Hoa, N.D., Son, L.H., Lan, L.T.H., Giap, C.N., Son, D.T., Long, H.V. A Novel Dynamic Multi-Criteria Decision Making Method Based on

Generalized Dynamic Interval-Valued Neutrosophic Set. Symmetry 2020, 12, 618. (SCIE, 2019, IF = 2.645).

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Signature: ……	Signature: ……
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