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Research paper

Virtual Community Cohesion: a Proposed Measurement Instrument

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Abstract

Virtual community has become one of the interaction platforms that allows interactions among members of the community and thus could become a mechanism for a more established and broader relationship. The existence and prosperity of both physical and virtual community depends very much on cohesiveness among its members. Community cohesion is a popular concept that is used to describe the strength of human relationships and the stability of a more differentiated society. Prior study has been conducted to identify more inclusive indicators for the nine dimensions of a cohesion measurement framework as to come up with a reliable instrument for physical social cohesion. Based on the developed instrument for physical social cohesion, out of the nine dimensions, seven that are pertinent to virtual community are retained or revised: Trust in multi-ethnicities, Willingness to cooperate, Shared common values, Involvement in decision-making, Voluntarism, Safe-guard members, and Roles of administrator. Another study was then conducted to determine the indicators for the seven dimensions as an instrument for virtual community cohesion. Hence, this paper aims to elaborate on the development of the proposed instrument for measuring virtual community cohesion. The construction of the instrument is based on the seven steps of scale development and analysis namely Item Generation, Content Adequacy Assessment, Questionnaire Administration, Factor Analysis, Internal Consistency Assessment, Construct Validity, and Replication. However, only results up to the fifth step were included in this paper and the results suggest that the components that are significant to measure the virtual community cohesion are Perceived Members' Influence, Members' Characteristics and Community Participation. To confirm this, it is suggested that the subsequent steps be performed.

Index Terms: *Virtual Community, Community Cohesion, Cohesion Instrument, Scale Construction, Instrument Development*.

1. Introduction

As a result of the intersection of humanity and technology, the term virtual community emerged. Virtual community exists in cyberspace where words and human relationships, data and wealth and power are manifested by people using such computer-mediated technology. The impacts of such medium are similar to the impacts of the telephone, radio, television when they were once in ubiquity. People adopt new communication media and redesign their way of life with surprising rapidity. There is no single definition of virtual community. As for [1], virtual community represents "a group of people who share characteristics and interact in essence or effect only". This stems from the concepts of community and virtual which means "a group of people who share characteristics and interact" and "in essence or effect only" respectively. Based on collection of different definitions and classifications in the virtual community, [2] define virtual community as "a technology-supported cyberspace centered upon communication and interaction of participants, resulting in a relationship being built up". [3] regards online communities or virtual communities as a general gathering of **interest**, without the condition and organizational basis of residential proximity or the goal of affecting real-world events or interactions, in addition to human feelings as stated by [4]. Those who socialize in a virtual group consists of individuals coming from different walks of lives with the purpose of sharing and exploring information, knowledge and problems through a common space [5][6][7].

[8] indicate the ultimate aim of involving as members in a social group virtually is to be able to share information, knowledge and problems with their fellow friends and acquaintances regardless of races or cultures. All these are in line with [9][10][4] that indicates virtual communities are cultural aggregations that emerge when enough people bump into each other often enough in cyberspaces. Online interaction through virtual space may strengthen the relationships among members [11][12][13]. The capacity of such media in enabling and enhancing social connections is also apparent. In fact, social cohesion and unity can be achieved through the virtual interaction in the social media [8]. Pertaining to the use of globally distributed information systems, teams working over such platform need high degree of unity to be successful [14]. Moreover, virtual community has the characteristics of equality, multi-culture interaction and openness [13]. These are due to the nature of the Internet, on which the virtual community is established, which include virtual, invisible, low cost transmission and global

information sharing [15].

Virtual community has become one of the interaction platforms that are booming at this moment. It allows interactions among members, near and far, either known or unknown, and thus could become a mechanism for a more established and broader relationship among members of the society. The idea of virtual community has been recognized and accepted by millions of users worldwide since the projection made by [16] that the number of social network users is reaching almost 2.67 billion across the globe in 2018. The existence and prosperity of a community depends very much on cohesiveness among its members [17][18]. Building community cohesion is about building better relationships between people from different backgrounds including those from new and established communities. This is true for both physical and virtual community.

Social cohesion is sometimes used as a label for social success or stable race relations [19]. Social cohesion is a concept that relates to how well people and communities get on together for the benefit of all [20]. It is a popular concept that is used to describe the strength of human relationships and the stability of a more differentiated society. This connotes social cohesion is equal to community cohesion [21]. The definitions of social cohesion are often vague and difficult to operationalize [22][23][24][25]. Community cohesion, as defined by [26], signifies the "patterns of cooperation among individuals who live and work in close proximity". In this sense, values such as tolerance and mutual support are very vital. The [38] emphasizes on integration as the key contributor to community cohesion that allows different groups of people work together in harmony. From the Islamic perspective, [27] defined social or community cohesion as "a sense of belonging, togetherness, social unity, and perceived bondedness with others of the same social group or society."

Previous studies on social cohesion looked into various perspectives depending on how cohesion was defined. As the aims differ, the outcomes of the studies were also differ, thus led to different understanding of what cohesion actually is. However, [28] resolved this by introducing a cohesion measurement framework that put together nine relevant dimensions that has been studied by those researchers with the aim to produce a more holistic view of social cohesion state. To test the dimensions, [28] sampled out some indicators that reflect cohesion. As the framework provides only samples of indicators for each dimension, they recommended that further development of the framework be made. In response to this, a study has been conducted to identify more inclusive indicators for each dimension so as to come up with a reliable instrument for physical social cohesion as discussed by [8][29]. Based on the developed instrument for physical social cohesion, out of the nine dimensions, seven that are pertinent to virtual community are retained or revised: Trust in multi-ethnicities, Willingness to cooperate, Shared common values, Involvement in decision-making, Voluntarism, Safe-guard members, and Roles of administrator. The constructs that represent these dimensions and their corresponding descriptions are listed in Table 1. Another study was conducted to determine the indicators for the seven dimensions as an instrument for virtual community cohesion. Hence, this paper elaborate on the development of the proposed instrument.

Table 1: Description of constructs for Virtual Community Cohesion

Construct	Description
Philanthropic Involvement	The involvement of virtual community members in community activities/programmes.
Roles of Administrator	The confidence that the virtual community members have towards the roles played by the administrator.
Involvement in Decision-making	The involvement of virtual community members in decision-making activities within the community
Members Interaction	The existence of positive interaction among virtual community members.
Safe-guard members	The act of protecting members of the virtual community from bad influence.
Trust in Multi-ethnicities	The appreciation of the presence of in multiple ethnics in virtual community.
Shared Common Values	The appreciation of having common values in a virtual community.
Involvement in Informal Group	The inclination to participate in social relationships among members of an informal virtual community group.
Involvement in Formal Group	The inclination to participate in social relationships among members of a formal virtual community group.
Involvement in Self-Development	The participation in self-development activities/programmes organized by the virtual community.
Ensure Members' Interaction	The attitude of instilling positive interactions among members in a virtual community.

2. Methodology

In this study, the guideline for scale development and analysis as proposed by [30] was adapted. The original guideline outlines seven steps of scale development and analysis namely the Item Generation, Content Adequacy Assessment, Questionnaire Administration, Factor Analysis, Internal Consistency Assessment, Construct Validity, and Replication. Item generation concerns with creating the items that are relevant to the construct to be examined. This can be done either inductively or deductively. In this study, the deductive approach was adopted whereby the items for each construct were deduced from relevant literatures. In this step, the adequate number of items per construct was determined. The second step, Content Adequacy Assessment involves pretesting the items for content adequacy as to avoid measurement flaws. This step was done prior to this study and the suggested items for each construct have been confirmed by domain experts as well as through survey [8][29][31]. Step three, the Questionnaire Administration, aims to confirm if the items are valid and converge. These include determining the scale of items, determining adequate sample size, and administrating the proposed instrument. During the fourth step, Factor Analysis, a common factoring method namely the principal component analysis was suggested to identify items that clearly represent the construct. The fifth step, Internal Consistency Assessment, is intended to determine the reliability of the scale. In this paper, only the results obtained up to this stage will be reported. The results are the proposed instrument for measuring the state of virtual community cohesion.

The second last step is the Construct Validation that aims to look into supporting evidences for construct validity by determining the convergent and criterion-related validity. The final step that is Replication that aims to ensure confidence in the finalized instrument. The results of the last two steps will not be reported in this paper, as further data collection and analysis need to be conducted. The steps undertaken in developing the scale are depicted in Figure 1.

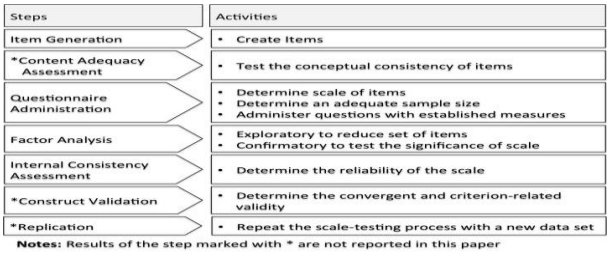

Figure 1: Scale development steps (adapted from [30])

3. Findings

This section presents the findings for the corresponding stages as outlined on the methodology section.

A. Item Generation

Based on the description of the items as presented in Table 1, the items that represent each factor are deduced from relevant literatures [50]. The outcome is as listed in Table 2. The corresponding statements that are envisioned to provide adequate and meaningful responses from the respondents are also listed in Table 2. As suggested by [32], the statements are short and concise, and plain languages (English and Malay) are used.

Table 2: Items for corresponding construct of virtual community cohesion

Factor	Item	Statement (27)
Philanthropic Involvement	• Voluntary partnership, Engagement in voluntary partnerships [28][38][39][40] • Engagement in NGOs [38][39] • Philanthropy [41]	• *I involved in voluntary activities/programmes organized by the virtual group that I joined.* • *I involved in voluntary activities/programmes that are rewarding to the virtual group members.*
Roles of Administrator	• Trust (social – in others, institutional, political) [39][42]	• *I am confident in the accountability of the virtual group's administrator.* • *I am confident that the virtual group's administrators consider members' opinions in decision-making process.* • *I am confident that the virtual group's administrator enforce on rules and regulations within the group.* • *I am confident in the fairness as practiced by the virtual group.*
Involvement in Decision-making	• Participation in various forms of social/organization/political contacts [28][38][42][43][44] • Behavior/conduct to the community [45][46]	• *I am involved in the establishment of a virtual group.* • *I am involved in decision-making process for the virtual group.* • *I am being responsible towards the decision that I made for the virtual group.*
Members Interaction	• Positive and active social relationships among members of the community [20][21][39][38]	• *I will ensure positive interactions among members of the virtual group that I joined.* • *Positive interactions exist in the virtual group that I joined.*** • *Active interactions exist in the virtual group that I joined.*
Safe-guard members	• Social equality - in access to opportunities & etc. [20][21][38][39][47][48][49] • Mutual respect [20][21]	• *I compete for the interest of members of the virtual group that I joined.* • *Members of the virtual group will do something to protect themselves.* • *Members of the virtual group will do something to make themselves happy.*
Trust in Multi-ethnicities	• Recognition – tolerance of plurality [21] appreciate and value positively community diversity [38][49] • Strong and positive relationship of people from different background [38][49] • Sense of trust [39]	• *I will join a virtual group that comprised of multi-ethnicities.* • *Multi-ethnicity exists in the virtual group that I joined.* • *Members in the virtual multi-ethnic group have respects towards each other.*
Shared Common Values	• Identities and values between those of different background. [20][21][28][50] • Common vision/shared values [39][49][51] [52] • Strength of shared experiences [20][21][38]	• *Members of the virtual group that I joined cherish the presence of different identities.* • *The virtual group that I joined has a common vision.* • *Members of the virtual group that I joined are willing to share their experiences.*
Involvement in Informal Group	• Positive and active participation either informal or formal social networks [20][21][38][39]	• *I actively participate in an informal virtual group that I joined.* • *Members actively involved in the interactions that occur in an informal virtual group that they joined.*
Involvement in Formal Group	• Positive and active participation either informal or formal social networks [20][21][38] [39]	• *I actively participate in a formal virtual group that I joined.* • *Members actively involved in the interactions that occur in a formal virtual group that they joined.*
Involvement in Self-Development	• Engagement in voluntary partnerships [28][38][39][40]	• *I involve in self-development activities/ programmes organized by the virtual group that I joined.*
Ensure Members' Interaction	• Positive and active social relationships among members of community [20][21][38] [39]	• *Positive interactions exist in the virtual group that I joined.*** • *I will ensure that I interact positively in the virtual group that I joined.*

Notes: ** Same item is used in measuring different constructs

B. Questionnaire Administration

According to [33], the items proposed in this study are categorized as the non-objective or subjective items in which there will be rooms for subjectivity in scoring. Due to the subjectivity of items in the mentioned category, Likert scale was used to capture the responses. For new items, [30] suggest that five- or seven-point Likert scales be used as they could give adequate coefficient alpha reliability estimate for internal consistency among items [34]. Following this suggestion, a seven-points Likert scale response as indicated below was used:

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Strongly Agree

To ensure that the instrument is appropriate for the audience, a pilot test was conducted. The questionnaires were posted on-line and made available to the public for a month's duration. Response received is 115. [35] suggested that the sample size is based on the item-to-response ratio. The recommended range of the ratio is between 1:4 to 1:10. For a very large or unknown population, a sample size of 100 to 200 respondents is considered appropriate [36]. The questionnaire contains 27 items, and thus the number of responses received is adequate to obtain meaningful results of analysis.

C. Factor Analysis and Internal Consistency Assessment

Following the suggestion by [30] and [37], the principal component analysis (PCA) was performed to identify items that clearly represent the construct. The PCA was conducted on the 27 items with orthogonal rotation (Varimax). The Kaiser–Meyer–Olkin measure verified the sampling adequacy for the analysis, KMO = .906 ('superb' according to Hutcheson & Sofronion, 1999), and all KMO values for individual items were > .849, which is well above the acceptable limit of .5 (Field, 2009). Bartlett's Test of Sphericity $\chi 2$ (351) = 2607.172, $p < .001$, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues over Kaiser's criterion of 1 and in combination explained 68.25% of the variance. The scree plot (Figure 2) showed inflexions that would justify retaining three components.

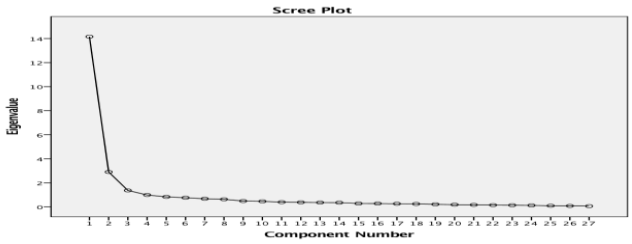

Figure 2: Screen plot

Table 3 shows the factor loadings after rotation. The items that cluster on the same components suggest that the components are: Perceived Members' Influence, Members' Characteristics and Community Participation. Each component is named based on the common theme that could substantially represent every item for the respective components. Looking into the items in the first component (Perceived Members' Influence), they revolve around the members' perceptions towards the influence of the other members' (including the administrator) actions. The second component is named as Members' Characteristics as the items that are clustered together represents the perceived characteristics of the members of the community. The third component is referred to as Community Participation since the items that are clustered together connote the acts of participating in the interactions, activities or programmes organized by the community. All the components have high reliability as the Cronbach alpha values are around 0.8 and above as shown in Table 3. In line with [36], alpha values of greater than 0.6 indicate the responses were reliable with acceptable internal consistency, and as such the scale is reliable.

Table 3: Results of principal component analysis for the all items of virtual community cohesion

	Component		
	Perceived Members' Influence	Members' Characteristics	Community Participation
Accountability of administrator	.837		
Administrator enforces rules and regulation	.772		
Administrator considers members opinions in decision-making	.767		
Practice of fairness	.732		.424
Member's involvement in voluntary activity	.730		
Member's being responsible on the decision made	.702		.440
Member's involvement in decision-making process	.697		.465
Member's involvement in rewarding voluntary activity	.696		
Common vision		.789	
Members cherish different identities		.782	
Existence of multi-ethnicities		.780	
Members make themselves happy		.768	
Members willing to share experiences		.758	
Be members of a multi-ethnic group		.750	
Active interaction in informal group		.703	
Ensure positive interaction		.620	
Active interaction in formal group		.578	.524
Interact positively	.420	.563	.416
Participate in formal group			.780
Participate in informal group			.743
Involvement in self-development activity			.716
Members protect themselves			.705
Members of multi-ethnic group respect each other			.666
Active interaction exist	.413		.639
Positive interaction exist	.439		.615
Involvement in establishment of group	.576		.606
Member compete for the group members' interest	.570		.578
Eigenvalues	14.161	2.902	1.364
% of variance	52.447	10.749	5.054
Cronbach alpha (α)	0.933	0.930	0.939

4. Discussion and Conclusion

In this paper, a systematic approach on designing and developing a scale for measuring virtual community cohesion was presented. The results suggest three components or constructs that are pertinent in measuring virtual community cohesion namely the Perceived Members' Influence, Members' Characteristics, and Community Participation. There are two main differences when comparison of the proposed virtual community cohesion instrument was made against the original seven construct of virtual community cohesion. First, the latter focuses on the relationships among members of a community and the relationships between members of the community and the government. However, the outcome of this research suggested an almost totally different constructs for measuring virtual community cohesion. Despite the differences, the scope of measurement remains resulting in the proposed instrument could not be used to determine the state of cohesion based on the stated relationships as suggested in the original framework. Secondly, the virtual community cohesion model of [8][29] also differentiates between the attitudes of the members of the community and their manifested behaviors. The suggested constructs for the proposed instrument do reflect that as well and thus show some consistencies with the original framework even with different number of constructs. As the proposed instrument uses less number of constructs in measuring cohesion, it results in suppressing many details that can be assessed using the instrument developed based on the original framework. However, the proposed instrument does consider the perspectives given in the original framework and this suggests that both instruments would give similar indications about the outcome if the instruments were to be used. Nevertheless, the proposed instrument is not yet ready for implementation as the construct validation and replication stages are not being conducted. Hence, it is suggested that further work be conducted to strengthen and confirm the findings of this research. Once these stages are completed, the instrument can be used to measure the state of cohesion among virtual community members and thus enabling appropriate measures for community cohesion being established. As a result, the right procedures, policies and regulations pertaining to the use of virtual community in achieving cohesion can be formulated.

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