6 Play With My Team—Modeling Online Game Players’ Teamwork Model in Massively Multiplier Online Role Playing Games (MMORPGs)

Abstract: The need for teamwork has grown significantly in today’s online community. Especially for online game players, teamwork is an important means of engagement because many difficult missions require players to play with teams. This study attempts to investigate the impacts of trust on players’ teamwork with affective commitment and normative commitment as mediators. Furthermore, this research includes team experience as a moderator to compare the difference between different player groups. A model was proposed and tested on 296 online game players’ data using structural equation modeling. Findings revealed that team experience moderated the relationship between trust and teamwork. The results indicated that trust promotes teamwork for players with high experience through affective commitment compared to those with low experience. Following this, we conducted a focus group interview to develop several design recommendations that facilitate teamwork in MMORPGs. The proposed recommendations were organized as a honey comb which regards how online community should develop strategies for monitoring, understanding, and responding to different players’ teamwork situation.

6.1 Introduction

Teamwork, working collaboratively with a group of people in order to achieve a goal, is identified as an effective, system-based intervention that has broad implications for all organizations. Teamwork is the basis for the organization development today, since the increasing complexity of projects and has made them unachievable for individuals. Especially for online game communities, teamwork plays a critical role because prior studies have proposed that teamwork is highly correlated with players’ motivation to engage in game playing. Teamwork also brings numerous benefits for online game players, such as giving players more control and decision making power in groups, resolving member’s conflicts, providing greater opportunities to engage in interactive learning activities, and peer tutoring, which refers to allowing players to practice and clarify game skills through other’s assistance. More importantly, teamwork is proven to assist players in improving their playing performance compared to those who learn on his or her on. Consequently, these benefits attract more online
game players to input more time and contribute to the success of games.\textsuperscript{4, 5} Thus, to understand and cultivate teamwork is becoming more and more important for both game practitioners and scholars.

Manser\textsuperscript{6} reviewing the literature on teamwork, summed up trust, shared mental models, coordination, communication, and leadership as factors affecting teamwork. Among these factors, prior study highlighted trust as the most important factor contributing to successful teamwork because trust leads to a set of behavioral expectations among players.\textsuperscript{6-8} Trust refers to the confidence that they will not be harmed or put at risk by the actions of the other party.\textsuperscript{9} Trust allows player to manage the uncertainty or risk associated with the interaction, which leads players to jointly optimize the gains that will foster more teamwork behavior.\textsuperscript{10}

Despite the importance of trust in teamwork, previous research also reported that organizational teamwork is fragile for most online teams because of team dynamics.\textsuperscript{11} The purpose of this work is to establish a stringent understanding as to the formation and mediators of teamwork, in order to help understand the formation of teamwork in online game settings. Some of the emerging ideas in the literature that suggest that introducing online games in the workplace might improve employees' teamwork.\textsuperscript{12} For instance, a recent survey reported that IBM managers used lessons learned from online game to promote teamwork in their real jobs.\textsuperscript{12} Compared to other types of online communities, learning teamwork in an online game is often essential and quite different from other forms of teamwork. Online games often have a guild system to teach users about interpersonal and intercultural communication skills.\textsuperscript{12, 13} Online games also provide an in-game shared space to alleviate the social isolation caused by lack of face-to-face interaction.\textsuperscript{12, 14} Foremost, online games motivate users to engage in teamwork situations through an engagement cycle comprising motivating emotion, player re-engagement, social call to action, and visible progress/reward.\textsuperscript{13} Therefore, along with the trend of gamification, studying teamwork in online game settings can bring some helpful ideas for both the researchers and practitioners.

This work differs from previous research in three important ways. First, this study aims to examine the effect of trust on teamwork in a gaming context. The issues related to the influence of trust on teamwork have been examined for real world teams in some previous research,\textsuperscript{12-14} but in contrast, it is still uncertain whether the findings of previous research can be applied in various online teamwork environments.

Second, prior studies considered the influence of trust on teamwork to be mediated by several factors comprising of cognitive ability, emotional intelligence, mental model, and organizational commitment.\textsuperscript{15, 18} Among these factors, organizational commitment comprising affective commitment and normative commitment is applied herein, because it helps explain various social relationships that are critical for collaboration and interactions among players.\textsuperscript{15} Affective commitment refers to team member’s emotional attachment to, identification with, and involvement in a team, while normative commitment reflects member’s sense of obligation to remain in a team.\textsuperscript{15}
Team experience will also be assessed as a critical moderator during the formation of teamwork. Even though experience is an important variable in the context of consumer behavior (e.g. Yoon 20), and it has been rarely studied in the context of teamwork. Therefore, this research includes team experience as moderator to compare the differences between different player groups.

6.2 Modeling the teamwork mechanism in game

The research model displayed in Figure 1 illustrates trust affect teamwork through the meditation of affective commitment and normative commitment. This study extends the commitment theory model proposed by Meyer and Allen, 15 and believes it can be utilized to explain the relationship between trust and teamwork in this study. More specifically, in the proposed model team experience operates as moderator to compare the difference between different groups.

![Proposed conceptual model](image)

**Figure 6.1.** Proposed conceptual model

We consider the level of team experience as a potential moderating variable because a review of the literature reveals that players with a high level of experience are different from those with a low level of experience in terms of knowledge structure. 21, 22 Hernandez Maestro and colleagues 23 indicated that differences in knowledge structure are reflected in varying cognitive behaviors related to information processing, such as problem solving, reasoning and induction, forming opinions, and recalling and recognizing information. Specifically, many studies have highlighted the importance of experience on players’ behavior and intention. For instance, Bennett et al. 24 conducted a study on business-to-business brand commitment and found that use experience is the critical moderator for managers’ decision making. Yoon 20 also investigated the antecedents of customer satisfaction with Internet banking service in China and explored how experience operates as the moderator on user’s satisfaction.
and commitment. He found that users with a high level of use experience perceived a different level of commitment compared with those with a low level of use experience. Many game studies have also suggested that use experience is critical to players’ social interaction behavior and intention.\textsuperscript{25-27} These observations imply that players may perceive teamwork differently depending on their team experience.

To optimize gaming achievement, online game players utilize a reciprocal relationship with other team members if they need items, weapons, and equipment. This reciprocal relationship operates between players based on the foundation of mutual trust.\textsuperscript{28} Mutual trust provides a sense of belonging within a group and comfort in supporting team members, which facilitates team members’ affective attachment to organizations. Moreover, mutual trust is considered an important factor in the long-term stability of the organization and the well-being of its members.\textsuperscript{29} Fukuyama\textsuperscript{30} also found that higher levels of trust fulfill members’ social needs and sense of belonging, which drive experienced team members to implement organizational tasks and missions spontaneously. Steinauer et al.\textsuperscript{31} surveyed organizational trust issues in an e-commerce environment and found that high levels of trust not only motivated members’ organizational citizen behavior but also facilitated member’s sense of obligation. Thus, this study hypothesizes that trust will increase experienced members’ affective commitment and normative commitment to teams. Two hypotheses of this study are as follows:

H\textsubscript{1a}: The relationship between trust and affective commitment is moderated by experience, and the relationship is stronger among college players with high levels of experience than among those with low levels of experience

H\textsubscript{1b}: The relationship between trust and normative commitment is moderated by experience, and the relationship is stronger among college players with high levels of experience than among those with low levels of experience

Adebanjo and Kehoe\textsuperscript{17} conducted a study on employee teamwork in organizations, and found experienced employee’s affective commitment is highly correlated with group member’s teamwork. He found that affiliating needs within the workplace would increase members’ attitude to work with others. Silos\textsuperscript{32} identified that the key to Japanese efficiency was teamwork and concluded that affective commitment is the predictor of experienced members’ teamwork. Moreover, teamwork increases overall organizational performance by enhancing synergy and coordinated efforts, which increases members’ sense of obligation within an organization.\textsuperscript{33, 34} Therefore, based on above literature we propose the following hypothesis:

H\textsubscript{2a}: The relationship between affective commitment and teamwork is moderated by experience, and the relationship is stronger among college players with high levels of experience than among those with low levels of experience

H\textsubscript{2b}: The relationship between normative commitment and teamwork is moderated by experience, and the relationship is stronger among college players with high levels of experience than among those with low levels of experience
6.3 Investigate the impacts of trust on players’ teamwork

6.3.1 Subjects

To gain a clear understanding of player’s team experience in-game, a participative observation was first conducted with ten World of Warcraft (WOW) players (five male and five female). We observed and collected data from these players’ team play behaviors and player to player interaction. Based on the collected information, we found 20 teamplay-per-week is the median of team play frequency among all participants. The result was also supported by extensive reviews of reference artifacts such as documents, communication logs, news and development’s updates, and posts in WOW main forums. Therefore, we adopted 20 teamplay-per-week as the cut-off point for high and low experience groups.

An online survey was then advertised on course websites and bulletin board systems (BBS) to recruit WOW players to participate in the study. After excluding volunteers with incomplete data, 296 college student’s data was collected for the study. Table 1 summarizes the demographic data of all subjects. At this stage, we partitioned all subjects into two groups: 155 players with more than twenty team play per month (high-experience group), and all the rest (low-experience group).

<table>
<thead>
<tr>
<th>Table 6.1. Study Participants: High Experienced Players (N=155) and Low Experienced Players (N=141)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants (N=296)</td>
</tr>
<tr>
<td>College level</td>
</tr>
<tr>
<td>First year</td>
</tr>
<tr>
<td>Second year</td>
</tr>
<tr>
<td>Third year</td>
</tr>
<tr>
<td>Forth year</td>
</tr>
<tr>
<td>Graduates</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Guild participation experience</td>
</tr>
<tr>
<td>1-12Months</td>
</tr>
<tr>
<td>12-36months</td>
</tr>
<tr>
<td>&gt;36 months</td>
</tr>
<tr>
<td>No. of Friend list</td>
</tr>
<tr>
<td>&lt;10</td>
</tr>
<tr>
<td>10-25</td>
</tr>
<tr>
<td>25-40</td>
</tr>
<tr>
<td>&gt;40</td>
</tr>
<tr>
<td>Team Experience</td>
</tr>
<tr>
<td>20 times team play per month</td>
</tr>
<tr>
<td>&lt; 20 times team play per month</td>
</tr>
<tr>
<td>Average age</td>
</tr>
</tbody>
</table>
6.3.2 Measures

The questionnaire used for data collection contained scales to measure the various constructs of the research model. The measurements were adapted from studies by DeRosa et al., Hsu et al., Bateman et al., Meyer and Allen, and McCallum. A pilot test was, therefore, conducted with university players to validate the measurement items. The wording of the survey items was modified based on the results of the pilot test and the advice of game study experts. Individuals indicated their agreement or disagreement with the survey items using a seven-point scale. Data analysis proceeded in two stages. First, a validity test on the research measurements was conducted by confirmatory factor analysis (CFA). Second, an analysis of the structural multi-group model was used to test the associations in the research model.

6.3.3 Reliability and validity of measurement items

As shown in Table 2, Cronbach’s α for all constructs was above 0.7. Accordingly, the questionnaire meets the requirement of inter reliability. The factor loading value of all items was larger than 0.5, and the CRs of all constructs greater than the 0.7, which met the requirement of convergent validity (see Table 2). Discriminant validity was also very high because each construct’s square root value of the average variance extracted (AVE) was higher than the others in corresponding rows (see Table 2).

<table>
<thead>
<tr>
<th>Construct</th>
<th>No. of items</th>
<th>Mean</th>
<th>SD</th>
<th>CR</th>
<th>AVE</th>
<th>α</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>4</td>
<td>5.04</td>
<td>1.18</td>
<td>0.905</td>
<td>0.761</td>
<td>0.840</td>
<td>0.825</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective commitment</td>
<td>6</td>
<td>5.04</td>
<td>1.05</td>
<td>0.864</td>
<td>0.768</td>
<td>0.847</td>
<td>0.669</td>
<td>0.748</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normative commitment</td>
<td>6</td>
<td>4.00</td>
<td>1.08</td>
<td>0.914</td>
<td>0.810</td>
<td>0.800</td>
<td>0.401</td>
<td>0.311</td>
<td>0.797</td>
<td></td>
</tr>
<tr>
<td>Teamwork</td>
<td>3</td>
<td>5.15</td>
<td>1.07</td>
<td>0.881</td>
<td>0.776</td>
<td>0.839</td>
<td>0.519</td>
<td>0.474</td>
<td>0.217</td>
<td>0.831</td>
</tr>
</tbody>
</table>

Note. Square root of AVE is on the diagonal in bold.

6.3.4 Structural model testing

To build the teamwork model, we employed the partial least squares (PLS) approach to perform structural equation modeling (SEM) analysis. The analysis was implemented
using the PLS software—SmartPLS 2.0. Our research adopted one-tailed testing (t-value >1.645, p<0.05) and sets the re-sampling number at 500.

6.3.5 Result

To validate the hypothesized effects of the structural multi-group analysis, we examined the coefficients of the causal relationships between constructs. Figure 2 illustrates the paths and their significance on the structural model. In high experience group, as shown in Figure 2, trust explains 51.7% variance of affective commitment ($R^2=0.517$) and 46.7% variance of normative commitment ($R^2=0.467$), and finally explains 45.7% teamwork ($R^2=0.457$). In low experience group, trust influences teamwork significantly with normative commitment as mediator, explain 45.5% normative commitment ($R^2=0.455$), and explains 47.2% teamwork ($R^2=0.472$).

Figure 6.2. SEM result

Based on the entire sample (see Table 3), two hypotheses are significant, with $H_{1a}$ and $H_{2a}$ being supported. Regarding the moderating effects of experience, the influence of trust on affective commitment is stronger for players with high experience than for those with low experience ($H_{1a}$ is supported); however, the influence of trust on normative commitment is not stronger for players with high experience than for those with low experience ($H_{1b}$ is not supported). Consequently, the influence of affective commitment on teamwork is stronger for players with high experience than for those with low experience ($H_{2a}$ is supported); while the influence of normative commitment
on teamwork is not stronger for players with high experience than for those with low experience (H2b is not supported).

Table 6.3. Comparison of the path coefficients in both samples

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>High Experience (n1=155)</th>
<th>Low Experience (n2=141)</th>
<th>t-Value comparing the two group</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a TR-&gt;AC</td>
<td>0.28</td>
<td>0.081</td>
<td>0.076</td>
<td>19.64**</td>
</tr>
<tr>
<td>H1b TR-&gt;NC</td>
<td>0.274</td>
<td>0.292</td>
<td>0.055</td>
<td>-3.21*</td>
</tr>
<tr>
<td>H2a AC-&gt;TW</td>
<td>0.477</td>
<td>0.3</td>
<td>0.074</td>
<td>15.58**</td>
</tr>
<tr>
<td>H2b NC-&gt;TW</td>
<td>0.329</td>
<td>0.633</td>
<td>0.071</td>
<td>-25.71**</td>
</tr>
</tbody>
</table>

*p < 0.05 level. **p < 0.01 level*Significant at the 0.05 significance level.

Further analysis of indirect and direct effects was performed as shown in Table 4 and Table 5. For high experience group, the decomposition first indicates that the mediated effect of trust on teamwork through affective commitment (50.54%) is substantially stronger than that through normative commitment (49.46%).

Table 6.4. Analysis of indirect effects in high experience group

<table>
<thead>
<tr>
<th>Path</th>
<th>Affective Commitment</th>
<th>Normative commitment</th>
<th>Total Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust-&gt;Teamwork</td>
<td>0.280</td>
<td>50.54%</td>
<td>0.274</td>
</tr>
</tbody>
</table>

For low experience group, the decomposition in Table 5 also indicates that the mediated effect of trust on teamwork is through normative commitment (100%) rather than that on affective commitment (0%).
Table 6.5. Analysis of indirect effects in low experience group

<table>
<thead>
<tr>
<th>Path</th>
<th>Affective Commitment</th>
<th>Normative commitment</th>
<th>Total Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust→Teamwork</td>
<td>–</td>
<td>0.292</td>
<td>100%</td>
</tr>
</tbody>
</table>

Finally, in order to compare the path coefficients of hypothesis testing as well as the moderating effect, hypotheses were examined by comparing the path coefficients referencing Chin.\textsuperscript{38} Therefore, this study performs standard error estimates from each re-sampling in a parametric sense via t-tests. All t-values comparing the two groups are significant above the 0.05 level and are showed in Table 3. As shown as Figure 3, the slope means the affective commitment varies more for players with high experience group, while Figure 4 means the normative commitment varies more for players with low experience group.

![Figure 6.3. Interaction between teamwork and affective commitment.](image)

![Figure 6.4. Interaction between teamwork and normative commitment.](image)
6.4 Developing several design recommendations that facilitate teamwork in MMORPGs

6.4.1 Subjects and Procedures.

Five male and five female MMORPG guild leaders participated in the interview. All of them are frequent team leaders and have at least five years team-play experience, with the size of their guilds ranging from 330 to 500. All users were asked to identify and discuss teamwork recommendations based on their prior experience in-game. Finally, several teamwork recommendations were developed following the interviews.

6.4.2 Results

Design recommendations that facilitate teamwork in MMORPGs are as follows:
- Shared space called guild territory.
- Mentor system to promote social learning.
- Off-world communication system to improve negotiation and communication.
- Player-guild recommendation mechanisms.
- Guild uniforms to increase guild members’ sense of belonging.
- Reward distribution mechanisms to promote teamwork behaviors.
- Guild forums to increase the guilds’ sociability and social capital.

6.5 Discussion and Implication

To our best knowledge, this study is the first study to theoretically specify or empirically test the impacts of trust on online game player’s teamwork with affective commitment and normative commitment as mediators. The results indicated that trust only promotes more teamwork for players with high experience through affective commitment in comparison to those with low experience. This finding is partially consistent with the previous research indicating that team experience offers a possible basis for effective teams. For example, Antin and Churchill proposed the gamification design for social media users and also suggested that design elements such as badges can actively increase user’s sense of trust, which results in more teamwork.

Based on the results of this study, it turns out that low teamwork is likely attributed to a lack of trust based on affective commitment or normative commitment. Thus, we may discover a few theoretical, managerial, educational implications as follows.

From the theoretical perspective, this article contributes to the literature on commitment and teamwork in several ways. First, it extends research of Meyer and Allen’s organizational commitment theory by examining trust and teamwork
for players. Previous research considering attachment from a multidimensional perspective used commitment to organizational entities as independent variables and examined their relationships with various teamwork outcomes. This research focused on evaluating the influence of trust on teamwork, with affective commitment and normative commitment serving as mediators. By doing so, we identified relationships that could help explain how members with different levels of experience employ teamwork in organizations. Also, this study found team experience is valuable in constructing theory about the nature of team structures and coordinative mechanisms that are needed to support interpersonal social systems in the online environment.

From a managerial standpoint, prior study 12, 14, 36 has considered MMORPGs as effective tools to support group formation, maintenance, and coordination. The significant influence of affective commitment and normative commitment (i.e., mediators) on user’s perception of teamwork suggests that both mediators should be taken as checking points for monitoring how trust affects teamwork in the virtual work environment. Business managers should know that employees are very sensitive to any confusion about business activities in which their affective and normative commitment is weakened. As managers detect employees’ low trust in the organization, they should further fortify affective and normative commitment by transcribing business activities and verifying such activities as corporate culture to the employees in order to win their trust. Also, when forming different project teams, managers can use prior team experience for selecting employees to promote teamwork and reduce potential conflicts.

In terms of education, this study explored the role of affective commitment and normative commitment in strengthening participants’ teamwork. This result represents the development of effective social bonds, which may promote the emergence of an online community of practice. Through this community of practice, all members can form a joint team with a mutual engagement to develop a shared repertoire of knowledge and competences together. Also, this result may increase the understanding of learner-to-learner interaction in the situated learning context. For instance, the result implied that participants with high experience are more sensitive to such an influence, and they will display greater willingness to conduct teamwork with other team participants. Instructors may accordingly assist learners to maintain long-term affective relationships, such as online learning families, to enhance teamwork.

Some limitations of this research should be noted. First, the research design was non-experimental. Regardless of the sophistication of the statistical techniques, causal inferences must be treated with extreme caution when using non-experimental designs. Although the results are consistent with prior research and the hypothesized model, causal inferences should be withheld. Second, the respondents were mostly male (78%). Differences in how men and women are socialized may affect the team environment experiences and the willingness to commit to teams or organizations.
6.6 Conclusion

The need for teamwork has grown significantly in today’s organizations. Based on the theoretical framework of teamwork and organizational commitment theory, a conceptual model was proposed in this study to examine the impacts of trust on players’ teamwork via affective commitment and normative commitment. Results showed trust only facilitates more teamwork for players with high experience through affective commitment compared to those with low experience. To increase personal commitment, the community leader should provide high-level emotional support to each member, such as encouraging reciprocal behaviors, care culture, and mentor systems. This finding implies that organizations should check and redesign their community-environment components (e.g., sense of belonging, team-tasks design, and communication system) to facilitate members’ teamwork. Todays’ organizations should identify and overcome potential situational constraints in organizational learning processes that may be decrease members’ teamwork efficacy.

6.7 Areas for Future Research

Future studies may examine the influence of regional and national cultures on players’ teamwork behaviors, because online game players can be found throughout the world. Finally, further studies should address the broad applicability of these findings and should test the effect of the teamwork design recommended herein.

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**Biosketch**

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